The psychological and social mechanisms at work in Zapotec cooperative institutions

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Abstract

The broad, cross-cultural variation in human cooperation poses a challenge to classic evolutionary explanations. Addressing this challenge, cultural evolutionists propose that norms and institutions shape cooperation. However, this remains a topic of debate. To shed light on how institutions influence cooperation, we present a detailed comparative analysis of two cooperative institutions in an indigenous Zapotec community of Oaxaca, Mexico. *Gozona* is a mutual aid institution that supports cooperation in agricultural labor and celebrations, while *usos y costumbres* are a set of traditional political institutions that facilitate the provisioning of public goods. Drawing on ethnographic, vignette, and survey data from 45 participants, we dissect the psychological and social mechanisms that these institutions harness to stabilize cooperation. Results reveal that *gozona* and *usos y costumbres* are governed by social norms that drive domain-specific cooperation; they are not associated with generalized prosociality. This finding is hard to explain from a purely genetically evolved psychology perspective, providing support for a cultural evolutionary view of human cooperation. We also find that *gozona* and *usos y costumbres* rely on overlapping but distinct

sets of mechanisms to sustain cooperation, including direct reciprocity, indirect reciprocity, punishment, and interdependence psychology. These results suggest that as cooperative institutions culturally evolve, they stitch together different cooperation-sustaining mechanisms– elucidating the rich diversity of culturally evolved institutions. Even within one, small-scale society, different institutions work in different ways.

1. Introduction

In San Francisco Yateé, a Zapotec village in the mountains of Oaxaca, Mexico, people cooperate in many ways. In steep, hillside plots, friends and neighbors help each other harvest corn and coffee. When a family hosts a wedding, funeral, or saint's feast, villagers arrive early with contributions of corn, sugar, chocolate, and cash. Many stay all day to help with preparations, making *tamales*, washing dishes, setting up tables, and carrying firewood. The men of Yateé regularly work together to benefit the community– constructing a new school, clearing landslides, and putting out wildfires. Moreover, each year a rotating group of men set aside their subsistence or wage labor to fill unpaid civic roles, performing important functions like maintaining the drinking water system and organizing public works projects.

Such intense cooperation is not a given in human societies. In some other small-scale societies, such as the Machiguenga of the Peruvian Amazon, communities struggle to mobilize cooperation beyond the extended family group (Henrich & Henrich, 2007; Johnson, 2003). Meanwhile, while residents of large-scale, Western, Educated, Industrialized, Rich, and Democratic (WEIRD) societies readily cooperate with strangers in some domains (paying taxes, donating blood; Henrich, 2020), it is hard to imagine a typical American forgoing a year of salary

and instead working gratis to benefit their hometown. Why do the people of Yateé cooperate so intensely, across so many domains?

Variation in the scale, intensity, and domains of cooperation represent a key puzzle in human evolution (Henrich & Muthukrishna, 2021). Although humans likely have genetically-evolved psychological capacities that support cooperation between close relatives (kin altruism; Hamilton, 1964), and tit-for-tat partners (direct reciprocity; Trivers, 1971), these mechanisms fail to adequately explain the observed patterns of human cooperation. For example, while direct reciprocity effectively maintains cooperation within pairs, formal modelling shows that it rapidly falls apart in larger groups (Boyd & Richerson, 1988). A full explanation of human cooperation must also address human ultrasociality (we cooperate more intensely and at larger scales than other mammals); the rapid scaling up of cooperation since the birth of agriculture (a time period too short to make genetic evolution a likely explanation); and the fact that many of the forces that support human cooperation can also sustain noncooperative or even maladaptive behaviors (Chudek & Henrich, 2011; Henrich & Muthukrishna, 2021).

Cultural evolution researchers argue that we can elucidate these puzzles by taking seriously the role of culture. According to cultural evolutionary theory, human minds have evolved to acquire and retransmit culture, including tools, know-how, beliefs, rituals, and– crucially– social norms (Chudek & Henrich, 2011; Henrich, 2016). Social norms are culturally transmitted standards of behavior that are shared and enforced within a community (e.g. "people should pay their taxes" or "newlyweds should live with the groom's family"). Social norms are packaged together into institutions, which govern domains such as kinship, exchange, and religion.

Cultural evolutionary theory suggests that social norms and institutions play a crucial role in shaping human social behavior, including cooperation. Through the process of norm

internalization, cooperative norms can infiltrate our minds, transforming into internal preferences, biases, and heuristics (Chudek & Henrich, 2011). Meanwhile, institutions pull on various psychological and social levers to stabilize cooperation. Theorists suggest that as institutions culturally evolve, they stitch together different cooperation-sustaining mechanisms, such as reciprocity, reputation, and punishment. Each institution travels a distinct cultural evolutionary path, giving rise to rich institutional diversity both within and between societies (Henrich & Muthukrishna, 2021). Thus, within a cultural evolutionary framework, norms and institutions are integral to explaining the broad variation in the scale, intensity, and domains of human cooperation.

In line with this view, research has shown that many types of institutions can shape cooperation. For example, prosociality within groups can be fostered by mutual aid and risk-pooling institutions (Cronk, Berbesque, et al., 2019), intensive kin-based institutions (Akbari et al., 2019; Enke, 2019; Moscona et al., 2017; Schulz et al., 2019), collective rituals (Watson-Jones & Legare, 2016; Whitehouse & Lanman, 2014), and common-pool resource institutions (Lansing, 1991; Ostrom, 1990). Meanwhile, variation in prosociality towards strangers can be partly explained by exposure to market institutions (Henrich et al., 2001, 2010; Rustagi, 2023; Rustagi et al., 2010); religions that feature a supernatural agent who cares about and punishes human behavior (Norenzayan et al., 2016; Purzycki et al., 2016); and weak kin-based institutions (Schulz et al., 2019). This body of research strongly suggests that that institutions lie at the root of cross-cultural variation in cooperation.

However, the role of social norms and institutions in the evolution of human cooperation remains a topic of debate. Some evolutionary psychologists contend that human cooperation is better understood as the product of specialized cognitive adaptations to a "cognitive niche" (Pinker,

2010). According to this hypothesis, humans evolved cognitive mechanisms that allowed our species to thrive in diverse ecologies. Researchers have proposed that cognitive adaptations for cooperation include moral emotions, reciprocal altruism, a conditional cooperation strategy, aversion to free-riding, and a motivation to punish free-riders (Pinker, 2010; Price et al., 2002; Tooby et al., 2006). Burnham & Johnson (2005) argue that large-scale cooperation reflects maladaptive misfiring of cognitive capacities that evolved for cooperation in small, face-to-face groups of the human past. According to this hypothesis, the large-scale cooperation that we observe today represents an evolutionary mismatch. Other evolutionary researchers have suggested that contemporary variation in cooperation can be explained by non-cultural factors, such as ecology (Lamba & Mace, 2011). Meanwhile, Boyer & Petersen (2012) theorize that institutions primarily reflect, rather than shape, human psychology, suggesting that humans tend to create or acquire institutions that fit their genetically evolved intuitions. In a review, Kurzban et al. (2015) identify the role of cultural evolution in cooperation as an area of open debate.

To contribute to our understanding of the role that institutions play in human cooperation, this paper presents a detailed case study of two cooperative institutions in a Zapotec village of Oaxaca, Mexico. *Gozona* is a mutual aid institution that supports cooperation in the contexts of celebrations and agricultural labor. Meanwhile, *usos y costumbres* facilitates the provisioning of public goods that benefit the entire community.

We use this case study to test predictions from cultural evolutionary theory about how institutions shape cooperation. Drawing on ethnographic, vignette, and survey data, we first show that both institutions are governed by social norms. We find that these norms drive cooperation in specific domains; they are not associated with a general prosocial inclination. This finding is hard to explain from a purely genetically evolved psychology perspective, providing instead support

for a cultural evolutionary view of human cooperation. We then probe the other psychological and social mechanisms that these institutions tap, considering the roles of reciprocity, reputation, punishment, and interdependence. We find that *gozona* and *usos y costumbres* rely on distinct but overlapping sets of mechanisms to sustain cooperation, highlighting the diverse ways that cultural evolution can build cooperative institutions. In addition to elucidating how institutions shape cooperation, this paper brings a novel, cultural evolutionary perspective to bear on institutions that have long interested anthropologists studying Mesoamerica (Monaghan & Cohen, 2000; Mulhare, 2000).

We begin by providing a cultural evolutionary framework for understanding how social norms and institutions sustain cooperation. We then introduce the Zapotec village of San Francisco Yateé and the institutions of *usos y costumbres* and *gozona*. Finally, we analyze these institutions, probing the social and psychological mechanisms through which they sustain cooperation.

2. Theoretical background

2.1 Norms psychology, norms, and cooperation

Cultural evolutionary theory suggests that the emergence of social norms in early human groups drove the co-evolution of social learning capacities and cognitive tools specialized for dealing with norms ("norm psychology"). Humans are primed to recognize, remember, and adopt norms, as well as to identify and punish norm violations (Chudek & Henrich, 2011). Supporting the idea that these capacities are innate, norm psychology comes online early in development– by 18 months, children have already developed normative expectations, and by 3 years they actively follow and enforce norms (Schmidt et al., 2019; Schmidt & Tomasello, 2012). Because of our

evolved norm psychology, social norms and institutions can infiltrate human minds, molding psychology and behavior. Norm psychology allows the mind to adapt to the local institutional environment over the course of ontogeny. During this process, norms can become internalized, transforming into proximate motivations, heuristics, and preferences. When this happens, adherence becomes automatic; we must "think" in order to break the norm (Chudek & Henrich, 2011; Henrich, 2016; Rand, 2016).

Our norm psychology facilitates cooperation in response to cooperative norms. Recent cross-cultural research on children has charted the coincident emergence of prosocial behavior and attention to prosocial norms across development. Children across diverse societies show similar patterns of prosociality early in development. However, they begin to diverge towards local adult behavior during middle childhood, around the same time that they become responsive to novel norms about prosociality (House et al., 2013, 2020). This suggests an important role for norm psychology and social norms in shaping prosociality and generating cross-cultural variation in prosocial behavior. Other work has specifically demonstrated the power of internalized norms to influence prosocial behavior. For example, many researchers use anonymous, one-shot behavioral economics games to study the relationship between institutions and prosociality (Henrich et al., 2001, 2010; Purzycki et al., 2016; Rustagi, 2023). Because these games involve no possibility of punishment or reputational damage, behavior in this context is thought to reflect intrinsic motivation– internalized norms (Henrich & Ensminger, 2014). Further evidence comes from studies using time pressure. When forced to make allocation decisions quickly, WEIRD participants exhibit greater cooperation in a one-shot Public Goods Game (Rand et al., 2012). This again highlights the role of internalized norms– emerging here as quick, automatic allocation decisions– in directing prosocial behavior.

2.2 But how are cooperative norms sustained?

Norms can foster cooperation– but what sustains these norms? A norm that demands individuals pay a cost to benefit the group can easily collapse. To see why, imagine a group of fishermen trying to preserve a dwindling fish stock. They devise a rule: each fisherman can catch no more than 100lbs of fish per week. On his boat, Mark faces a decision. Should he follow the rule and limit his catch, meaning less income for his family? Or should he ignore the rule, catch as many fish as possible, and reap the benefits of a good payday? Assuming everyone else follows the rule, Mark stands to gain a lot by defecting– the fish stocks will remain healthy, but his income will increase. Unfortunately, every fisherman is making the same calculus. In this classic collective action problem, free-riders quickly swamp cooperators and the public good crumbles. No one adheres to the fishing limit, the fish population crashes, and everyone is worse off. In the face of these dynamics, how are cooperative norms sustained?

Formal evolutionary modeling has identified several mechanisms that can stabilize costly behaviors. Although the models were originally devised specifically to understand the emergence of cooperation, the results indicate that the mechanisms that sustain cooperation can, in fact, sustain *any* similarly costly behavior. Thus, in a broader sense, these models reveal the mechanisms that maintain costly norms– including cooperative norms (Henrich & Muthukrishna, 2021). Cultural evolutionary theory suggests that, as cooperative institutions culturally evolve in different social and ecological settings, they harness different cooperation-sustaining mechanisms (Henrich & Muthukrishna, 2021).

2.2.1 Indirect reciprocity and reputation

One set of formal models highlights the role of indirect reciprocity in stabilizing cooperative norms. Here, individuals modulate their behavior towards a target based on that target's past record– that is, their reputation. In its simplest form, termed *negative* indirect reciprocity, communities tolerate the exploitation of members with a bad reputation. For example, when someone earns a bad reputation for stealing from his neighbor or failing to contribute in a cooperative task, others can steal *his* crops without facing any consequences (Bhui et al., 2019). In *positive* indirect reciprocity, individuals decline to help those with a bad reputation, instead offering help only to well-reputed group members. Formal modeling shows that both negative (Bhui et al., 2019) and positive (Panchanathan & Boyd, 2004) indirect reciprocity can sustain group cooperation. When a person violates a cooperative norm, their reputation suffers. The threat of targeted exploitation or loss of future help motivates adherence to the cooperative norm. Evidence from lab-based experiments with behavioral economics games (Nowak & Sigmund, 2005) and studies in small-scale societies (Glowacki & Lew-Levy, 2022) indicate that indirect reciprocity and reputation play a significant role in human cooperation.

2.2.2 Costly punishment

A second set of formal models emphasizes the power of costly punishment for sustaining cooperative norms. Punishment involves paying a cost to sanction a violator. This contrasts with indirect reciprocity, wherein individuals pay no cost to sanction– they merely withhold help or even benefit by exploiting the violator. The threat of facing punishment for defecting motivates individuals to adhere to cooperative norms. However, the possibility that people will decline to pay

a cost to punish non-cooperators– termed "second-order free-riding"– poses a challenge to costly punishment models.

Nonetheless, models have overcome this challenge to show that costly punishment can sustain cooperation in many ways. For example, conformist transmission can stabilize cooperation as people copy each other's tendency to punish (Henrich & Boyd, 2001). Cooperation is also sustained when people can coordinate their punishment, only following through when enough group members have signaled an intent to punish (Boyd et al., 2010). Punishing is also effective when it acts as a costly signal of trustworthiness, enhancing the reputation of the punisher and increasing the likelihood that other cooperators will choose to partner with them (Jordan et al., 2016). Finally, light or graduated sanctions with the possibility of ostracism for repeat offenders– a pattern that recurs in many small-scale societies– has recently been shown to effectively stabilize cooperation (Noblit & Henrich, 2023).

2.3 Institutions can harness features of evolved psychology

In addition to stitching together different cooperation-sustaining mechanisms, cultural evolutionary theory suggests that institutions can exploit features of our evolved psychology (Henrich & Muthukrishna, 2021). The human mind has several evolved capacities that can be harnessed to support cooperation beyond close kin and repeated interactants.

2.3.1 Kin altruism

Kin altruism– a tendency to help one's blood relatives– is a genetically-evolved foundation of human cooperation. Born out of formal modeling (Hamilton, 1964), kin selection theory has been repeatedly supported by empirical research. For example, social network-based studies have found that as genetic relatedness increases, so does the probability of food sharing (Kangiqsujuaq

Inuit: Ready & Power, 2018) and gifting-giving (Hadza: Apicella et al., 2012). Kin-based institutions tap kin altruism, reinforcing, directing, and expanding it. In unilineal kinship systems, for example, culturally-acquired norms about who constitutes "family" direct kin altruism towards one parent's kin, and suppress it towards the other's. At the same time, kinship systems can expand kin altruism to encompass non-genetic relatives, such as affines and fictive kin (Henrich, 2020; McNamara & Henrich, 2017).

2.3.2 Direct reciprocity

Direct reciprocity, or the tendency to cooperate with a partner in a tit-for-tat manner, is another genetically evolved feature of the human mind. Evidence from formal modeling (Axelrod & Hamilton, 1981), research with non-human primates (Jaeggi & Gurven, 2013) and studies in small-scale societies (Apicella et al., 2012; Jaeggi et al., 2016; Jaeggi & Gurven, 2013; Ready & Power, 2018) suggest that reciprocity plays an integral role in dyadic cooperation, independent of kinship. Direct reciprocity in humans can take the form of in-kind exchange (e.g. meat for meat), but also complex reciprocal trade (e.g. meat for labor) (Jaeggi et al., 2016). Fiske (1992) identifies reciprocity (which he calls "equality matching") as one of four possibly universal forms of human social relationship.

Norms and institutions can harness reciprocal altruism and shape patterns of reciprocity (Henrich & Muthukrishna, 2021). For example, developmental psychologists have documented that hearing normative stories about positive reciprocity can increase children's tendency to offer a sticker to an agent who gave them a sticker in the past (Chernyak et al., 2019). Moreover, the ontogeny of positive reciprocity differs across cultures, suggesting a role for norms (House, 2017).

Institutions that create relationships based on reciprocity, such as mutual aid institutions, likely tap reciprocal altruism.

2.3.3 Interdependence psychology

Finally, researchers have theorized that humans have an evolved "interdependence psychology" that fosters cooperation between people whose fitnesses are intertwined (Aktipis et al., 2018; Balliet et al., 2017; Barclay, 2020; Fiske, 1992; Henrich & Muthukrishna, 2021; Roberts, 2005; Tomasello et al., 2012). Fitness interdependence can emerge in many ways, including sharing genes, sharing offspring, and living in a group that shares risks and benefits (Cronk, Steklis, et al., 2019). Some have argued that interdependence psychology arose via gene-culture coevolution. According to this hypothesis, the cultural evolution of norms and institutions that pool risks, share costs, and spread benefits within a group created a selection pressure for the capacity to recognize and cooperate with those on whom one's fitness depends (Henrich, 2020; Henrich & Muthukrishna, 2021). At the most basic level, consider meat-sharing norms in mobile hunter-gatherer groups. Hunting is a high-risk, high-reward foraging strategy; most hunters successfully make a kill on only a small proportion of days (Hill & Hurtado, 2009). When game is shared among the entire band, the fitnesses of band members become entangled. For example, the health and well-being of the children of Hunter A depend in part on Hunter B. If Hunter B falls ill, the groups' collective hunting returns will diminish, and the calorie intake of Hunter A's children will decline. So, the fitness of Hunter A and his children depend in part on Hunter B. Expanding the circle, if Hunter B's wife can nurse him back to health, *her* health and survival also contribute to the fitness of Hunter A and his children. Thus, social norms and institutions, such as those governing food sharing, can create situations in which the fitnesses of even indirectly

connected individuals become intertwined. In this setting, selection should favor (i) the ability to assess one's fitness interdependence with others, perhaps via cues like eating together, working together, and sharing social ties, and (ii) the tendency to help and support those on whom one's fitness depends (Henrich, 2020; Henrich & Muthukrishna, 2021). Given that risk-pooling norms like food sharing have long been part of the human repertoire, this line of reasoning suggests that humans evolved an interdependence psychology.

Once such a psychology is in place, certain kinds of institutions may trigger it. First, researchers have suggested that institutions that create relationships based on mutual aid, sharing, or exchange should generate interdependence (Cronk, Steklis, et al., 2019; Henrich, 2020). Beyond establishing reciprocity-based prosociality between partners, these institutions should generate broader interdependence within groups where mutual support is widespread. If you have an exchange partner on whom you depend in times of need, and that partner has other partners in the community on whom *they* depend, you should be concerned about the well-being of those other partners; their fitness is intertwined with yours. Second, institutions that create corporate groups with shared rights and obligations should foster interdependence (Cronk, Steklis, et al., 2019; Henrich, 2020). For example, when groups collectively control and protect important resources such as agricultural lands or herds of cattle, each member's ability to contribute to productivity and defense impacts the well-being of other group members.

2.4 Summary

In this section, we have introduced a cultural evolutionary framework for understanding how institutions shape cooperation. We argued that the norms that comprise institutions can be internalized, transforming cooperative rules into proximate preferences. We also identified a series

of psychological and social mechanisms that institutions can tap to sustain and further enhance cooperation, even in the absence of norm internalization. We highlighted the roles of indirect reciprocity (reputation), punishment, and evolved psychological capacities such as direct reciprocity and interdependence. With this theoretical framing established, we now turn our attention to the village of San Francisco Yateé and a description of its cooperative institutions.

3. Ethnographic background

San Francisco Yateé, known colloquially as Yateé, is a Zapotec community in the mountainous Sierra Norte region of Oaxaca (Figure A5). Approximately 430 people live in the village (Instituto Nacional de Estadística Geographía e Informatica, 2020), while a large migrant community resides in Los Angeles, California. Yateé has a mixed agrarian and market-based economy. Residents rely on slash-and-burn agriculture to cultivate small, hillside plots. The main crops are *milpa* (intercropped corn, beans, and squash), bunching onions, and coffee. Households supplement cultivated crops with products purchased at regional markets and small local stores. Many households also sell products at regional markets, and some residents do wage labor.

A rich mosaic of cooperative institutions structure social life in Yateé. We focus on *gozona*– a mutual aid institution– and *usos y costumbres*– a set of traditional political institutions. Other institutions that foster cooperation within the community include kin-based institutions, *compadrazgo* (a ritual kinship institution), and *barrios* (voluntary associations that sponsor Catholic celebrations). However, here we concentrate on *usos y costumbres* and *gozona*.

3.1 *Usos y costumbres* (traditional political institutions)

Like many indigenous Oaxacan communities, Yateé is semi-autonomous from the government, run under what is formally known as "indigenous regulatory systems" (*sistemas*

normativos indígenas). Locally called *usos y costumbres* ("customs and traditions"), the system represents a web of institutions governing citizenship, community service, collective decision-making, and ingroup justice. The contemporary *usos y costumbres* system is the product of centuries of transformation. While political organization in Oaxacan Pre-Columbian civilizations was stratified– with authority and land tenure concentrated in the hands of ruling kin groups– 20th century anthropologists encountered small, egalitarian communities with collective land rights and strong, place-based identities (Chance, 1989; Chassen-López, 2004a, 2004b). Scholars have argued that this fundamental shift in social organization was spurred by Spain's "divide and conquer" approach to dealing with the indigenous population of Mexico. The Crown intentionally broke up larger civilizations and lineages into small, place-based units, granting them rights, legal identities, and some level of autonomy, while also extracting tributes and forced labor (Chance, 1989; Chassen-López, 2004b; Nader, 1989). Today, there is broad institutional variation across Oaxacan indigenous communities (Curtin et al., 2024), likely generated over the centuries as each community has traveled its own, cultural evolutionary path.

3.1.1 The cargo *system*

The *cargo* system is a defining feature of social organization in indigenous communities throughout Oaxaca (Bustillo Marín, 2016; Monaghan & Cohen, 2000) and Mesoamerica more broadly (Cancian, 1965; Carrasco, 1961; Hertzog, 2020; Mulhare, 2000). The system consists of a hierarchical ladder of unpaid, civil-religious posts (*cargos*, lit. "burdens") that each citizen must ascend over the course of adulthood. *Cargo*-holders administer crucial public goods, including public safety, infrastructure, and drinking water. Research in the mid-20th century documented *cargo* systems in communities throughout Mesoamerica. Many anthropologists at the time

predicted that *cargo* systems were doomed to soon disappear (Cancian, 1992; Hertzog, 2020). While outmigration strains and sometimes reshapes *cargo* systems (Robson & Berkes, 2011), they persist in many Oaxacan communities today (Bustillo Marín, 2016).

The *cargo* system is a hybrid institution. Although partially a Spanish import to Colonial Mexico, it is likely that the institution built on pre-existing indigenous practices. Based on his analysis of Aztec records, Carrasco (1961) argued that age-graded "ladder" systems existed for roles related to warfare, priesthood, and trade– although it is unclear whether similar ladder systems existed in Pre-Conquest Oaxaca (Chance & Taylor, 1985). In addition, although the top, most prestigious *cargo* positions are clearly Spanish, some of the lower *cargos*, which often involved providing personal services to top *cargo*-holders, likely had indigenous origins. Supporting this idea, some of these *cargos* have indigenous names (e.g. *topil*) (Chance, 1989; Chance & Taylor, 1985).

In Yateé, men typically serve 12 *cargos*, totaling about 8.5 years of service (Table 1). At the bottom of the ladder, youths begin their career as *topil*, running errands for elder *cargo*-holders and standing guard at the municipal building. Moving up the ladder, *cargos* involve greater responsibility and costs. For example, "the Authorities" comprise a group of four *cargo*-holders towards the top of the ladder whose duties include organizing public works projects, managing the town's money, and adjudicating conflicts. The Authorities work all day, every day for the entire year, precluding any subsistence or wage labor. Their duties also include hosting social gatherings with food for the community, implying substantial financial outlays. Serving *cargos* is one of the essential duties of a male citizen of Yateé. Citizens are named into *cargos* by the Communal Assembly. Serving when called upon is obligatory.

TABLE 1. The *Cargo* System of San Francisco Yateé

Age-class ("Group")	*Cargo*	Primary Function(s)	Duration
Bi wego' ("Youths")	1. *Topil* *	Run errands for the Authorities; stand guard at the municipal building; respond to small issues within community	6 months
	2. *Policía* *		1 year
Bi' yez ("Young citizens")	3. *Mayor de vara* *	Intervene when *topiles/policías* cannot resolve an issue (e.g. fights, unruly drunkard, car accident)	6 months
	4. Committee		1 year
	5. Commission		1-1.5 months
Benne' gole yez ("Elder citizens")	6. *Regidor* *	Intervene when *mayores de vara* cannot resolve an issue; can stand in for a member of Authorities in their absence	1 year
	7. Committee		1 year
	8. Commission		1-1.5 months
	9. One of the following ("the Authorities"):		
	Agente municipal *	Plan and organize public works projects; deal with paperwork and government bureaucracy	1 year
	Suplente del agente *	Town treasurer; assist *Agente* with administration of public works	
	Alcalde Unico Constitucional *	Adjudicate conflicts (e.g. marital or property disputes); impose fines; collect taxes (*cooperaciones*)	
	Suplente del alcalde *	Oversee public street lighting; assist *Alcalde* with conflict adjudication	

TABLE 1. The *Cargo* System of San Francisco Yateé *(continued)*

Age-class ("Group")	*Cargo*	Primary Function(s)	Duration
	10. Committee		1 year
	11. Commission		1-1.5 months
Benne' gole xwan ("Elder and older men")	12. One of the following:		
	Síndico *	Oversee and advise Authorities; solve serious issues and calm tensions within community; has power to impose punishments; oversees safety and maintenance in town (e.g. calls *tequios*)	1 year
	Mayordomo	Watch over the Catholic Church (sleeps at Church, opens it in the morning, freshens flowers, etc.); ring the church bells; sponsor the celebrations of *Semana Santa* (Easter Week)	
Reservados ("Reserves")	Those who have passed the age of 65 no longer serve *cargos*.		

Notes: The *cargo* system consists of a hierarchical ladder of unpaid, civil-religious posts (*cargo*s, lit. "burdens") that each male citizen must ascend over the course of adulthood. *Cargos* marked with "*" denote those in the *cabildo*, or town hall. The men of the *cabildo* work closely during their year of service, for example independently accomplishing small *tequios,* facilitating assemblies, and maintaining public safety. The four committees in Yateé administer public goods: School Committee, Drinking Water Committee, Health Clinic Committee, and Communal Mill Committee. The commissions relate to the annual patron saint festival: Kitchen Commission, Rodeo Commission, Dance Commission, Sports Commission, and Band Commission. Yateé formally gained the legal right to communal land tenure in the 1970s, prompting the creation of the Commissariat of Communal Lands and Supervisory Board. The Commissariat manages the town's communal resources, including land, firewood, and sand. The Commissariat comprises three *cargos*: Treasurer, Supervisory Councilor, and President, rising from the *bi' yez, benne' gole yez*, and *benne' gole xwan* groups, respectively. Each of these *cargos* can replace a *cargo* on the traditional ladder.

3.1.2 Groups

Within the *cargo* system, citizens are organized into age-classes, or "groups" as they are referred to in Yateé (Table 1). Although age-class systems are cross-culturally common (Bernardi, 1985), this feature of Yateé's *cargo* system is unusual within the contemporary Oaxacan context. When a young man stops going to school, he is called to join the first group, *bi wego'* ("Youths"), where he serves his first two *cargos*. Upon marriage, he passes into *bi' yez* ("Young citizens"). As he completes *cargos* in the ladder, he moves into subsequent groups: *benne' gole yez* ("Elder citizens") followed by *benne' gole xwan* ("Elder and older men"). Once he has completed his final *cargo* and reached the age of 65, he retires into the *reservados* ("Reserves"). Groups serve as a locus of organization in several other aspects of civic life, including the Communal Assembly and *tequios* (communal labor).

3.1.3 Communal Assembly

The Communal Assembly of citizens holds the highest power. While the Authorities have influence during their year, the Communal Assembly ultimately rules. The Authorities cannot make big decisions alone– they must bring issues to the Assembly to decide. The Assembly keeps a vigilant eye on the Authorities, swiftly imposing punishment if they err.

During an assembly, male citizens discuss and debate issues, and then vote by raised hand. A quorum (at least 50%) of active citizens must be present for a decision to be made; the decision of the majority prevails. Failure to attend an assembly is punished with a fine. Around 16 regular assemblies are convened per year to discuss public works; plan the annual patron saint festival; and name the following year's *cargo*-holders. The Authorities can also call *ad hoc* assemblies to deal

with pressing issues. Early in the COVID-19 pandemic, for example, the Communal Assembly decided to close town borders, ban social gatherings, and an institute a mask mandate (Figure A6). The Authorities facilitate the meeting from a head table, while citizens sit organized by group (Figure A7). Some decisions are made within groups. For example, the *benne' gole xwan* ("Elder and older men") decide who among them will be named as *Mayordomo* and *Síndico*, the final *cargos* of the ladder (Table 1). Similarly, each group annually decides how much they will fine their members for missing assembly or *tequio*.

3.1.4 Tequio

Tequio is communal labor done for the benefit of the community (Figure 1A). All male citizens must give *tequio*, although older men do lighter labor. *Tequios* are organized by group: each group is assigned to meet a certain goal (e.g. transport 30 bags of sand from the river for a construction project), and they self-organize to accomplish the task. Many important public works in Yateé were accomplished by *tequio*, including the construction of the municipal building, sewerage system, and piped water system. The Authorities may also call an emergency *tequio*, for example to clear a landslide or contain a wildfire. In addition, all citizens do an annual *tequio* to clear the boundary between Yateé and its neighbors. The boundary consists of a 6-meter-wide gap in vegetation (Figure A8). In a region where land is communally controlled and territorial disputes commonly erupt between communities, clearing the boundary ensures that everyone knows where it is. It also helps prevent the spread of wildfire from neighboring communities during the dry season, thus providing an important public good for Yateé. While *tequio* is largely a male endeavor, widows and unwed mothers must give light *tequio* a couple times per year.

3.1.5 Citizenship

The town or village is the primary locus of identity for many indigenous Oaxacans (Dennis, 1987; Martínez, 2013; Monaghan & Cohen, 2000; Nader, 1964), and the people of Yateé are no exception. With this identity comes strict rules of membership. A citizen of Yateé has the right to cultivate communal lands, extract resources such as firewood, and receive drinking water and sewerage service to his or her house. In exchange, citizens must serve and support their community. Active male citizens of the Communal Assembly (men up to age 65) must (1) attend assemblies and vote, (2) serve *cargos*, (3) give *tequio*, and (4) pay *cooperación* (lit. "cooperation", annual cash taxes). Widows and unwed mothers– with no husband to do their part– must likewise give light *tequio* and pay *cooperación*. As in many Oaxacan communities (Martínez, 2013), traditionally only natives of Yateé were considered citizens. However, likely because of the small population and heavy flow of outmigration, today Yateé incorporates immigrant men as active citizens after about

Figure 1. Community members cooperate. (A) Men do *tequio* to clear a small landslide from the main road. (B) Women make bean *tamales* for a *convivio.* They pat out *masa* (corn dough), smear it with bean paste, form *tamales*, and wrap them in banana leaves. Some of this labor is *gozona.* Source: C.M. Curtin.

6 months of residence. After several years, they may gain full rights. In 2022, there were 106 men on the roster of active citizens and an additional 31 men on the roster of "retired" citizens (*reservados*). Migrant men living outside of the community were not included on these rosters, but they still owe *cargos* and *cooperaciones*.

3.2 *Gozona* (mutual aid institution)

Gozona (Yateé Zapotec: *wzon*) is a mutual aid institution. *Gozona* has traditionally been practiced in Zapotec communities throughout the Sierra Norte (Cruz Díaz, 1982; de la Fuente, 1949; Nader, 1964), and similar institutions exist in other Oaxacan groups, such as *guelaguetza* among Zapotecs of the Central Valleys (Beals, 1970; Stephen, 2005) and *saa sa'a* among Mixtecs (Monaghan, 1990). Although little is known about the history of *gozona* in the Sierra Norte, archival and archaeological evidence suggests that *guelaguetza* dates to the Pre-Columbian period among Central Valley Zapotecs (Flores-Marcial, 2015). In Yateé, *gozona* facilitates mutual aid in several domains, including celebrations and agricultural labor.

3.2.1 Celebration gozona

Today, *gozona* occurs most frequently in the context of social gatherings, such as weddings, funerals, and *convivios*. A *convivio* is a festive gathering hosted by a household to which all community members are typically invited. A family may voluntarily host a *convivio*, for example as part of the ritual of donating a bull for the annual patron saint festival. However, many *convivios* are hosted by top *cargo*-holders as part of their formal duties. While a *convivio* may involve music, dancing, and a procession, food plays an especially important role. The hosts feed the community

one or more special meals. The major cost of hosting a *convivio* therefore stems from the need to provision and prepare a huge quantity of food. Here enters *gozona*.

The process of *gozona* begins with a public announcement made over the town's loudspeakers, inviting citizens to the host's house on days when they will need help with preparations. On the appointed day, community members arrive bearing contributions such as cash, dried corn, beans, sugar, coffee, cacao, and salt. The host stations themself in the kitchen to receive the contributions and record them in a notebook. Some people stay to work, which the host also records. Women help prepare the food, wash dishes, clean tables, and serve food to guests (Figure 1B). Men's tasks include carrying firewood, hanging a tarp to protect the *convivio* from the elements, and slaughtering the pig or bull. During the days when people do *gozona*, the host thanks and shows respect by providing them food and drink. At these festive "work parties", workers chat, gossip, share meals, and perhaps enjoy an alcoholic beverage. Notwithstanding, they work very hard.

The hosts ultimately reciprocate *gozona* by "returning the help". *Gozona* does not need to be reciprocated in exact kind– a pound of cacao for a pound of cacao– but it must be reciprocated in a time of need. Bringing by some bread on a normal Tuesday does not count. Rather, the help must be returned when the person is hosting their own *convivio*, wedding, or funeral. The process of returning the help can take years. For example, one informant reported that she was still working on returning the help for a *convivio* hosted as part of her husband's *cargo* over 12 years prior.

Importantly, celebration *gozona* must be given freely. For example, informants describe *gozona* as "help from the heart" and say that it is "our pleasure to help". More to the point, informants make a clear distinction between *gozona* and help that is given as part of a formal duty.

For example, the host traditionally seeks out a woman to serve as the head cook who plans the menu and runs the kitchen. Similarly, the host may request that the *mayordomos* of the church bring a saint's statue to the *convivio*. To make the request, the host brings a gift of food and beverage to "give respect" to the person. However, the help that they provide is not *gozona* because it has been formally requested (in the case of the cook) or is part of formal *cargo* duties (in the case of the *mayordomos*). Instead, celebration *gozona* must be freely offered. It must also be freely and voluntarily reciprocated. People do not speak of celebration *gozona* as being "owed", and a person cannot demand that someone reciprocate it.

3.2.2 Harvest gozona

"Harvest *gozona*" or "work *gozona*" is a traditionally important setting for *gozona*. This *gozona* is used for labor-intensive agricultural tasks that are difficult to accomplish alone, such as harvesting coffee, planting corn, or weeding fields. The mechanics of this *gozona* differ significantly from celebration *gozona*. Here, when a person needs help, he or she approaches a friend, family member, or other social partner to ask if they would like to "do *gozona*". The person being asked can decline. The partners come to an agreement about the exchange. Usually, days of labor are exchanged (e.g. 2 days of labor in the asker's fields, which he or she will reciprocate by working 2 days in the accepter's fields when they need help). Thus, this type of *gozona* is predicated on a more formal agreement. In keeping with the more formal nature, informants speak of *gozona* in this context as being "owed" and "paid". Harvest *gozona* still exists in Yateé, but informants report that it is on the decline.

3.2.3 Other forms of gozona

Yateé engages in music *gozona*– the exchange of bands between communities during patron saint festivals (SA1.1). In the past, *gozona* was also common during housebuilding, but this form no longer exists in Yateé (SA1.2).

4. Methods

Data were collected during 4 months of fieldwork in Yateé as part of a larger research project in the community (April-June & October 2022). We secured permission from the 2022 Authorities to live in the community and conduct research. In total, CMC has spent 8 months doing fieldwork in Oaxaca, including comparative ethnographic work in several other Zapotec communities. Ethnographic data stem from participant observation, focus groups, and interviews in Yateé. This research was approved by the Harvard University Committee on the Use of Human Subjects.

4.1 Social norm vignettes

To quantify normative beliefs about *gozona* and *usos y costumbres*, 45 participants responded to vignettes about norm violations. Women (N = 22) responded to three vignettes about *gozona*, while the men (N = 23) responded to three vignettes about *usos y costumbres*. The *gozona* vignettes featured a protagonist who (1) failed to offer celebration *gozona* when the need was announced, (2) failed to reciprocate celebration *gozona*, and (3) failed to reciprocate harvest *gozona*. The protagonist in the *usos y costumbres* vignettes (1) skipped an emergency *tequio*, (2) refused to serve a *cargo*, and (3) did a poor job in his *cargo* by embezzling town funds. All participants also

responded to three vignettes about norm violations unrelated to *gozona* or *usos y costumbres*, such as beating a dog or disrespecting an elder.

After hearing each vignette, participants were asked to make several judgements about the protagonist's behavior:

1) *Badness:* How good or bad was the action?
2) *Expectation of others' judgements:* How good or bad will other people think it was?
3) *Reputation:* How good or bad of a person will other people think the protagonist is?
4) *Punishment:* Should the protagonist be rewarded or punished?

For each question, participants selected from a visual scale with 5 possible responses (e.g. "extremely good", "good", "neither good nor bad", "bad", "extremely bad".) After the *gozona* vignettes, participants were also asked how likely it was that other people in the community would help the protagonist in the future (5-point response scale, from "very likely" to "very unlikely"). Finally, after each vignette, participants responded to a free-response question, "What do you think of [the protagonist's] action?".

To capture overall strength of normative beliefs, we averaged across all vignettes and responses within each domain, creating a *Gozona* Judgment Index, *Usos y Costumbres* Judgment Index, and Control Judgment Index (details in S2.2). Indices were standardized; higher value indicates a harsher judgment.

4.2 Surveys

Participants also completed surveys that included demographics, prosocial psychology measures, and questions about participation in *gozona* and *usos y costumbres*-related activities.

4.2.1 Prosocial psychology measures

We measured several facets of prosocial psychology. To capture generalized altruism, participants gave their level of agreement with the statement "I would help a fellow community-member, even if they could never return the help" (5-point scale, Strongly disagree – Strongly Agree). As a second measure, we asked participants how likely they would be to donate money to the family of a sick child to help with hospital bills (5-point scale, Very unlikely – Very likely). Finally, to assess perceived fitness interdependence, we used the Shared Fate Scale (Ayers et al., 2023). This 6-item scale asks participants how much they agree or disagree with statements like, "When my community feels bad, I feel bad" and "My community and I rise and fall together" (5-point scale, Strongly disagree – Strongly Agree). Participants struggled with the reverse-coded item ("I don't care whether my community thrives or not"), so we removed it. The remaining 5 items were highly internally consistent (Cronbach's $\alpha = 0.79$ [95% CIs 0.67, 0.86]), so we averaged them to create a Shared Fate Index.

4.2.2 Participation in gozona

To measure willingness to participate in *gozona*, we asked participants how likely they would be to offer aid in a common *gozona* context: the death of a community member. Participants heard a short vignette recounting the hypothetical death of man from Yateé and were then asked how likely they would be "to bring food or other support" to his widow (5-point scale, Very Unlikely to Very Likely). That is, how likely would they be to offer *gozona*?

4.2.3 Participation in **usos y costumbres** *activities*

We measured men's participation in *usos y costumbres* in several ways. First, we assessed willingness to participate in *tequio*. After hearing a short vignette in which a landslide washes out part of Yateé's main road, participants were asked how likely they would be to attend the *tequio* to help fix the road (5-point scale, Very Unlikely to Very Likely). Men were also asked: (1) how often they attend *tequio* (5-point scale, Never – Always), (2) whether they attended the most recent *tequio* (Yes/ No), (3) how often they attend Communal Assembly (5-point scale, Never – Always), and (4) whether they attended the most recent assembly (Yes/ No). Because all but one participant reported attending the most recent assembly, this outcome was not analyzed.

4.3 Priming experiment

Finally, to probe for specific evidence of internalized norms driving cooperation, we employed a priming paradigm. A prime is an unconscious reminder of a concept. Participants played an anonymous 4-player Public Goods Game twice: once after hearing control vignettes, and once after hearing prime vignettes related to *gozona* (women) or *usos y costumbres* (men) norm violations (see SA2.3 for detailed methods). We hypothesized that the unconscious reminder of the institutions would activate internalized cooperative social norms, leading participants to cooperate more in the Public Goods Game.

4.4 Data analysis

We used multiple regression to explore the relationship between normative beliefs about *gozona* and *usos y costumbres* and various psychological and behavioral outcomes. To maximize power in our small samples, we leveraged repeated measures where possible. Questions about

prosocial psychology and *gozona* participation were repeated several months after the initial survey as part of another study, resulting in two observations per participant for these outcomes. Questions about participation in *usos y costumbres* activities were asked only once. However, to maximize power, we standardized and stacked the three continuous measures of *usos y costumbres* participation, resulting in three observations per participant: frequency of Assembly attendance, frequency of *tequio* attendance, and willingness to attend an emergency *tequio*. We then used Linear Mixed Effects Regression (R package lme4, version 1.1–23) to analyze the results. In the basic analysis, for participant *i*:

$$Y_i = \beta_0 + \beta_1 Judgment_i + \theta_i + \sigma_i + \varepsilon_i$$

where:

- Y is the outcome variable, e.g., willingness to offer *gozona* or generalized altruism
- $Judgment$ is either the *Gozona* or *Usos y Costumbres* Judgment Index
- θ is a vector of covariates for participant *i*
- σ is the random intercept for participant *i*
- ε is the error term

As a basic set of covariates, most models include age, educational attainment, and material security. When predicting participation in *usos y costumbres* activities, we controlled for educational attainment, a dummy variable indicating whether the participant does wage labor, and status as a *Reservado* (over 65, no longer required to participate).

5. Results and discussion

Here, we conduct a comparative analysis of Yateé's *usos y costumbres* and *gozona* institutions to elucidate how culturally evolved institutions shape cooperation within groups. First, consistent with cultural evolutionary theory, we establish that *gozona* and *usos y costumbres* are governed by domain-specific social norms. We then show that these costly norms are stabilized in different ways. While reputation plays a role in both institutions, only *usos y costumbres* leverages punishment as a stabilizing mechanism. Finally, we consider whether these institutions tap aspects of evolved psychology, including direct reciprocity and interdependence psychology. Together, our results shed light on the diversity of culturally evolved institutions, demonstrating that even within a single village, different cooperative institutions work in different ways.

5.1 Are these institutions governed by norms?

Our results indicate that social norms govern *usos y costumbres* and *gozona*. Vignette responses revealed that cooperation in these domains represents shared standards of behavior. Participants judged violations in both contexts as "bad" (*gozona* mean = 1.03, bootstrapped 95%CIs[0.88, 1.20]; *usos y costumbres* mean = 1.12[0.99, 1.26]), and expected that other community members would feel similarly (*gozona* mean = 0.89[0.77, 1.05]; *usos y costumbres* mean = 1.13[0.99, 1.29]) (Figure 2). That is, it is common knowledge that people should cooperate in these domains. Importantly, cooperation in *usos y costumbres* and *gozona* is also enforced– we will discuss this in detail below (see Section 5.3).

Free responses add color to these quantitative findings. While some participants tried to offer excuses for the protagonists, others expressed contempt. Participants called the *gozona*

violators "lazy", "ignorant", and "selfish". Some responses to the *usos y costumbres* vignettes reflect disdain for the protagonists' lack of solidarity. For example, he's "taking advantage of the town", "it's a lack of respect […] and a mockery of the citizens", and "the town is a team– to not accept the *cargo* means that you don't want to be part of the team". These results suggest that the protagonists were indeed breaking social norms– failing to live up to local standards of cooperation– and as a result inspiring intense displeasure among participants.

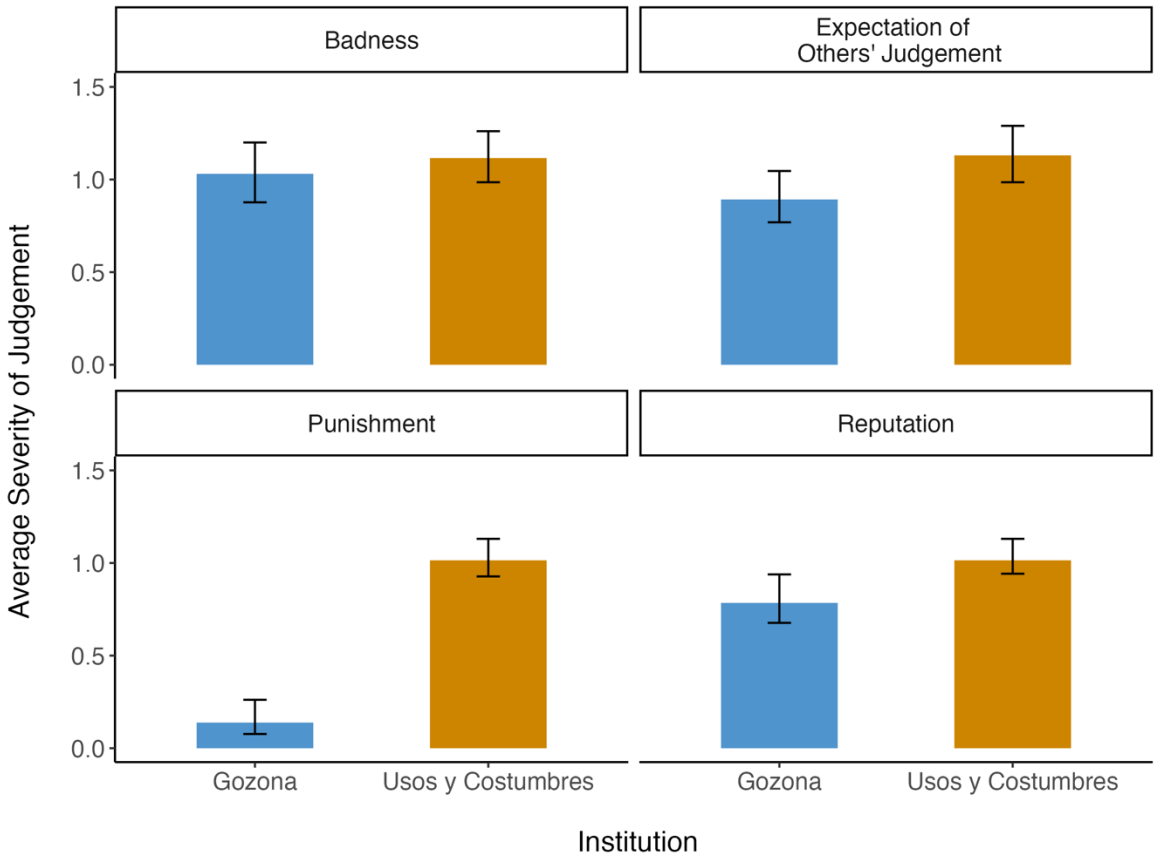

Figure 2. Average severity of judgements about *gozona* and *usos y costumbres* norm violations. Pooling across three *gozona* (blue) and three *usos y costumbres* (orange) vignettes, panels show average judgements about how bad the action was; how bad other community members would think it was; how bad of a person others would judge the protagonist to be; and how severely he/she should be punished. A score of "0" corresponds to a neutral judgement, "1" corresponds to "bad"/ "punished", and "2" corresponds to "very bad"/ "highly punished". Error bars represent bootstrapped 95% confidence intervals.

5.1.1 Suggestive evidence for norm internalization

We found suggestive evidence these cooperative norms have been internalized. First, participants' free responses to the vignettes, using moralizing language to express disdain for the protagonists, give the impression of internalized norms. These responses suggest that external standards of behavior about *gozona* and *usos y costumbres* have become internal preferences. When someone fails to live up to those standards, it inspires a negative gut reaction. Similarly, ethnographic evidence suggests that *gozona*– particularly help and support freely offered in times of need– has seeped into people's identity. People of Yateé view their community as full of respect, welcoming, and supportive, in contrast to nearby towns where "the people are bad" and there is much envy and conflict. One informant revealed her view that this supportive inclination is an intrinsic quality, suggesting that it springs from "a root" from the ancestors. Illustrating that *gozona* is part of the group identity, people often spoke in the first-person plural when talking about it: "here, we help one another", "we are there for one another in times of difficulty and *fiesta*", "here, we support [each other] a lot", "we very much like to [offer] support". Finally, while careful to clarify that *gozona* is not formally required, informants describe feeling that they must engage in it. For example, one man alluded to an internalized sense of duty, noting that "[offering *gozona*] is not required, but one feels obligated." While not definitive, this ethnographic evidence strongly suggests internalized norms facilitate cooperation in the contexts of *usos y costumbres* and especially *gozona*.

To probe for specific evidence of internalized norms driving cooperation, we employed a priming paradigm. Participants played an anonymous 4-player Public Goods Game twice: once after hearing control vignettes, and once after hearing vignettes related to *gozona* (women) or *usos*

y costumbres (men) norm violations. We observed no effect of this priming manipulation (see SA3.2 for details). Although there is no way to know for sure, we suspect that the substantial cognitive load associated with the Public Goods Game wiped out any potential priming effects. Many participants found the game challenging to understand and exerted a lot of cognitive effort during the lengthy instructions and test questions. These null effects are not unprecedented. While many experiments have successfully identified effects of priming on behavioral economics games (see Cohn & Maréchal, 2016, for a review), results have been mixed. Many studies fail direct replication (e.g. Belaus et al., 2018), and scholars have argued that we should expect priming results to depend on contextual and population-specific features (Cesario, 2014). Priming studies with behavioral economics games in small-scale societies have often yielded unexpected (Cronk, 2007) or null (Purzycki et al., 2022) results.

5.2 These norms are associated with domain-specific cooperation, not generalized prosociality

Gozona and *usos y costumbres* norms are domain-specific. The severity of participants' normative judgments about *gozona* and *usos y costumbres* is associated with willingness to cooperate within each respective domain– but not with generalized prosociality. Among women, a one standard deviation increase in *Gozona* Judgment Index is associated with a 0.35 standard deviation increase in willingness to offer *gozona* to a new widow ($\beta = 0.35$, 95%CIs[0.00, 0.70], $p = 0.05$, Figure 3 Panel A). This suggests that women who hold stronger norms about *gozona* are more likely to participate in *gozona*. Likewise, among men, a one standard deviation increase in *Usos y Costumbres* Judgment Index is associated with a 0.21 standard deviation increase in *usos y costumbres* participation– self-reported frequency of attending Communal Assembly, attending *tequio*, and willingness to attend an emergency *tequio* to fix a washed-out road ($\beta = 0.21$ [0.05, 0.37], $p < 0.05$,

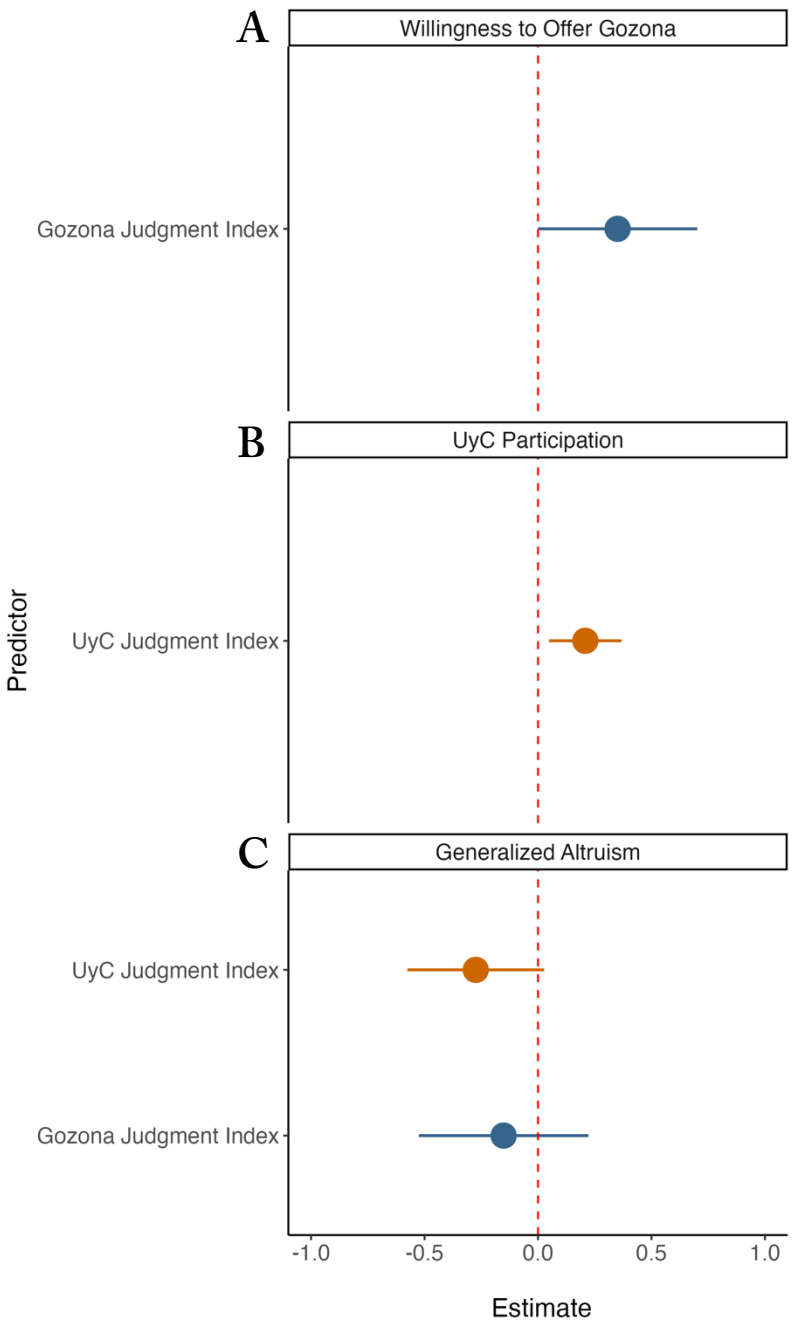

Figure 3. Normative beliefs about *gozona* and *usos y costumbres* are associated with domain-specific, but not generalized, prosociality. Plots show coefficients and 95% confidence intervals from LMER models with random intercepts for participant. **(A)** Coefficients on the *Gozona* Judgment Index when predicting willingness to offer *gozona* to a new widow (2 observations of outcome per participant from several months apart). **(B)** Coefficients on the *Usos y Costumbres* Judgment Index when predicting self-reported frequency of attendance at Communal Assembly, self-reported frequency of attendance *tequio*, and willingness to attend an emergency *tequio* (stacked outcomes, three observations per participant). **(C)** Coefficients on the *Usos y Costumbres* Judgment Index and *Gozona* Judgment Index when predicting willingness to help a community member, even if they could never return the help (2 observations of outcome per participant from several months apart). Models in panels A and C include controls for education, age, and material security. The model in panel B includes controls for education, wage labor, and age above 65. All variables are standardized.

Figure 3 Panel B). This suggests that men who hold stronger norms about *usos y costumbres* are more motivated to participate in their duties as citizens of Yateé.

Interestingly, men who make harsher judgments about *usos y costumbres* norm violations also report a greater willingness to offer *gozona* to a widow (β = 0.38 [–0.05, 0.80], p = 0.07). One possible explanation for this relationship is that men who hold stronger norms about *usos y costumbres* also have stronger norms about *gozona*. Because men did not respond to *gozona* violation vignettes, we cannot directly test this hypothesis. However, among both men and women, the severity of judgment about institution vignettes strongly predicts severity of judgement about control norm violation vignettes, suggesting that people who hold stronger norms in one domain also hold stronger norms in other domains (see SA3.3 for details).

Regardless, neither the *Gozona* Judgment Index (β = –0.15[–0.53, 0.22], p = 0.40) nor the *Usos y Costumbres* Judgment Index (β = –0.27[–0.58, 0.03], p = 0.07) is positively associated with generalized altruism (Figure 3 Panel C). If anything, *Usos y Costumbres* Judgment Index may be *negatively* associated with generalized altruism– participants who make harsher judgments about *usos y costumbres* norm violations report less willingness to help a community member who might never return the help. Similarly, neither index is associated with willingness to donate to the family of a sick child (*Gozona* Judgment Index: β = 0.02 [–0.44, 0.49], p = 0.92; *UyC* Judgment Index: β = –0.06 [–0.40, 0.28], p = 0.72). This suggests that the relationship between norm judgements and domain-specific willingness to cooperate can be explained neither by demand effects, nor by some generalized prosocial inclination. If demand effects or general prosociality were driving the results, we'd expect to see positive associations between norm judgements and other measures of

prosociality. Instead, these results suggest that *usos y costumbres* and *gozona* norms are associated with domain-specific cooperation.

5.3 How are these norms sustained, given than that they involve costly actions?

People spend time, energy, and money to participate in *usos y costumbres* and *gozona*. Celebration *gozona* involves contributing cash or material goods to the host of a social gathering, while both celebration and harvest *gozona* involve setting aside one's own daily work to provide physical labor to another community member. Men do hard, manual labor during *tequios*– hauling gravel from the river, pouring concrete, clearing brush with a machete, digging firebreaks, and clearing landslides (Figure 1A). Meanwhile, *cargo*-holders give up time that would otherwise be spent doing wage or subsistence labor in order to serve the community. Speaking to the costly nature of *usos y costumbres,* informants spoke strongly of service as a burden. Asked whether people "like" serving *cargos*, very few informants agreed. While several mentioned feeling pride in serving their town, most responses invariably invoked obligation, for example: "whether you want to or not, it's required", "it's not that they like it– it's obligatory", "*cargos* are very burdensome, very difficult", and "no one escapes from *cargos*." Given these costs, why do the people of Yateé continue to cooperate in these domains? How are *gozona* and *usos y costumbres* norms sustained?

Here, we show that *gozona* and *usos y costumbres* norms are stabilized by different mechanisms. *Gozona* is stabilized by reputation and indirect reciprocity. Meanwhile, in addition to reputation, punishment plays a central role in *usos y costumbres*. This comparison reveals that different institutions work in different ways.

5.3.1 Reputation and indirect reciprocity

Reputation plays a role in stabilizing both *usos y costumbres* and *gozona.* First, ethnographic evidence reveals that defections carry significant social costs. Men who fail to adequately fulfill their *usos y costumbres* duties lose social status. For example, several informants relayed the story of a man who served as one of the Authorities several years prior. The community felt that he made many errors and judged his performance as unsatisfactory. At the end of his year of service, the Assembly voted to briefly throw him in jail. Since then, the Assembly has rejected him– he has lost his right to speak up in assemblies; no group accepts him; he is not called to *tequio*; and it is unclear if he will ever serve his final *cargo* in the ladder. Describing another recent case in which a top *cargo*-holder failed to adequately fulfill his duties, one informant described the man's great shame and loss of social standing, explaining, "No one pays attention to him, because his image is tarnished– he fell very low." The reputational costs of defecting in *usos y costumbres* are heavy.

Likewise, ethnographic interviews suggest that community members who defect in *gozona* suffer social consequences. In line with the strong local belief that the people of Yateé are welcoming, supportive, and helpful, some informants insisted that people would continue to help a defector in the future. Others, however, reported that community members would withhold support from a person who fails to reciprocate *gozona*. For example: "The people say that it isn't fair, so the people don't go when [the defector] needs a favor." According to some, this is also true of people who consistently fail to offer *gozona*– those who never help will not receive help when they need it. For example, one informant described the situation of a local man who never goes to offer *gozona*. Now, when he hosts *convivios*, very few people go to help him, and he must pay for help instead. Moreover, highlighting the social costs of *gozona* defections, she reports that "we

don't go" when this man hosts *convivios*, not even just to eat and enjoy. In contrast, informants agree that people who do lots of *gozona* get lots of support in return– including after death, during their funeral.

Vignette data corroborate this ethnographic evidence, showing that defections in *gozona* and *usos y costumbres* damage a person's reputation (Figure 2). A man who fails to fulfill his duties of service to the community would pay the largest reputational costs, with participants reporting that community members would think that he was a "bad" person (mean judgment = 1.01, bootstrapped 95%CIs[0.94, 1.13]). A *gozona* defector would receive a little more lenience but would still be judged as a somewhat bad person (mean = 0.78[0.66, 0.92]).

Vignette data also suggest that *gozona* defections can lead to very concrete consequences: the loss of future support from community members. After hearing the *gozona* vignettes, participants were asked how likely it would be for the protagonist to receive future help from other community members. As in ethnographic interviews, participants were a bit divided on this question, with some suggesting that it was "likely" or "very likely" that the protagonist would still receive help. On average, however, a *gozona* defector was judged to be somewhat unlikely to receive future support (mean = 0.55, bootstrapped 95%CIs[0.25, 0.86]). Highlighting the role of indirect reciprocity, *gozona*-related reputational damage is associated with expected loss of future help. When judgements for the three *gozona* vignettes are stacked, LMER reveals that participants who thought that the *gozona* defection would damage the protagonist's reputation also thought that the protagonist was unlikely to receive help in the future. This relationship holds even when controlling for the participant's personal judgement of how bad the action was. A one standard deviation increase in expected reputational damage is associated with 0.28 standard deviation

decrease in the expected likelihood that the protagonist will receive help in the future (β = 0.28[0.07, 0.52], $p < 0.05$). In contrast, expectations of others' judgments about how bad the action was does not strongly predict likelihood of future help when controlling for personal judgements of badness (β = 0.14[–0.07, 0.36], $p = 0.21$). So, the effect is specific to expected reputational damage, providing compelling evidence that *gozona* social norms are stabilized by positive indirect reciprocity.

Men who responded to *usos y costumbres* vignettes were not asked about the likelihood that the protagonist would receive future help. However, providing tentative evidence for indirect reciprocity, one participant spontaneously mentioned the loss of future help in his free response. Discussing the protagonist who refused to serve a *cargo* when nominated, the participant explained, "It is bad to not want to serve, to help. [He'll have] a bad image. When he needs help in the future, we others will not help him."

In line with predictions from formal models of norm stabilization via indirect reciprocity (Bhui et al., 2019; Nowak & Sigmund, 1998; Panchanathan & Boyd, 2004), gossip is an important mechanism for disseminating information about who cooperates and who does not in Yateé. During our time in Yateé, we overheard or were expressly told quite a bit of gossip, often related to *usos y costumbres*. People keep a keen eye out for errors and non-cooperators; in the words of one informant, "the community is watching." When they observe something that doesn't meet their standards, they gossip and complain about it. For example, the Authorities committed several errors, including a snafu involving mismanaged town funds for a public works project. This was the topic of intense gossip and discussion– spilling into several assemblies– and while ultimately resolved, informants reported that the Authorities' image was "very badly tarnished." Although

less evidence about *gozona* emerged, informants did suggest that "everybody knows" who helps and who does not, suggesting a potential role for gossip.

5.3.2 Punishment

Ethnographic and quantitative evidence demonstrate that punishment is an important stabilizing mechanism in *usos y costumbres*, but not *gozona.* While formal punishment never came up when talking about *gozona,* the topic of sanctions frequently arose in interviews and casual conversation about *usos y costumbres.* Some violations merit a predetermined sanction meted out by the citizen's group or the Authorities, while others are subject to the collective decision of the Assembly.

Cash fines are the most common sanction levied against non-cooperators. For example, at the beginning of the year, each group collectively decides how much to fine their members for missing *tequio* or assembly. In 2022, these fines ranged from $100MXN - $300MXN. Each group polices their members, collects fines, and then redistributes the money among the group, rewarding those who attended everything with the largest share– a stick and a carrot. Highlighting the institutionalized nature of these sanctions, vignette free responses revealed a high degree of agreement about what sanction would be appropriate for the protagonist who skipped an emergency *tequio*. Eighty-one percent of participants responded that he should be fined, and another 10% thought he should be fined and put in jail.

The Authorities face extra scrutiny, and the Assembly swiftly punishes errors. Given that the Authorities manage the community's money, the Assembly pays special attention to their accounting. The Assembly convenes for quarterly reviews of expenditures, during which a representative from each group scrutinizes every expense. The Assembly typically fines the

Authorities for any error (e.g. missing receipt) or evidence of potential mismanagement of funds, up to $25,000MXN (~$1,300 USD). Sometimes, the Assembly takes other steps to sanction a member of the Authorities who is not adequately fulfilling his duties. Recent examples include fining and removing an *agente* from his *cargo* due to alcoholism; shaming and removing an *agente* from his *cargo* for failing to fulfill ritual duties; and jailing and stripping an *alcalde* of his rights as a citizen after a bad performance.

Repeat offenders are subject to graduated sanctions. Refusing to serve a *cargo* when nominated by the Assembly offers a prime example. Most informants seemed unable to imagine a resident of Yateé refusing a *cargo*. However, migrants living in Los Angeles, who are also required to serve *cargos*, sometimes refuse. The first couple of times that a migrant refuses, the Assembly fines him $15,000MXN (~$840USD). If he continues to refuse in subsequent years, the community then cuts access to drinking water and sewerage to his house. If he still refuses, he is formally expelled from the community. This means that he may never return to Yateé; his family cannot sell or transfer ownership of his lands; and he cannot be buried in the town cemetery (whereas most migrants are repatriated for burial). The community most recently formally expelled a migrant for repeatedly refusing to serve *cargos* in 2017. Vignette free responses about what punishment would be appropriate for the protagonist who refused a *cargo* capture the variation in possible sanctions on this graduated scale. Sixty percent of participants thought he should be fined, 15% said services to his house should be cut off, and 10% said he should be expelled from the community.

Vignette data confirm that formal sanctioning is an integral element of *usos y costumbres*, but not *gozona*. While norm violations in these two domains were judged as similarly bad and

reputation-damaging, only *usos y costumbres* violations were judged as worthy of punishment. Nearly all participants thought that *usos y costumbres* violations should be punished, while very few thought that *gozona* violations should be punished (Figure 2). Responses to the control vignettes, which were presented to both men and women, suggest that this difference cannot be explained by sex differences in willingness to punish (see SA3.4). Rather, this pattern seems to reflect a real difference in the role of punishment in these two institutions.

As discussed in Section 2.2.2, there are several ways in which punishment can effectively stabilize cooperative norms. Based on our data, we can only speculate about which mechanisms might be at work. Given that some decisions about punishment are made by the Assembly, a role for coordinated punishment (Boyd et al., 2010) seems very likely. During an assembly, citizens voice their opinions, including suggesting specific punishments for the violation under discussion. Others signal their approval with whistles and cheers. This broadcasting of intent to punish is a key feature of coordinated punishment, where individuals only punish when others signal their intent to do so (Boyd et al., 2010). Ultimately, citizens vote by raised hand, providing a final opportunity to confirm that others are choosing to punish. We also see compelling evidence of ostracism (Noblit & Henrich, 2023) in the system of graduated sanctions with the possibility of expulsion from the community.

Finally, some recent research in small-scale societies, including the Enga of Papua New Guinea and Mentawai of Indonesia, has highlighted the role of third-party mediation rather than third-party punishment in restoring cooperation after conflicts (Singh & Garfield, 2022; Wiessner, 2020). Formalized third-party mediation exists in Yateé: the central role of the *alcalde* is to serve as a judge, adjudicating conflicts within the community. He may be called to mediate

marital problems, property disputes, and other interpersonal conflicts. However, we saw no evidence for third-party mediation in the enforcement of *usos y costumbres*, which relies instead on institutionalized, graduated sanctions.

5.4 Do these institutions tap aspects of human evolved psychology?

Cultural evolutionary theory suggests that institutions can exploit aspects of human evolved psychology to further enhance cooperation (Henrich & Muthukrishna, 2021). Here, we show that *gozona* norms likely tap evolved psychologies for direct reciprocity and interdependence. Meanwhile, although *usos y costumbres* seems likely to build interdependence within the community, we find little evidence that *usos y costumbres* norms harness interdependence psychology.

5.4.1.* Gozona *harnesses an evolved psychology for direct reciprocity

Because *gozona* is a reciprocity-based institution, social norms for *gozona* likely tap an evolved psychology for direct reciprocity. The clearest evidence comes from the fact that people meticulously record the *gozona* that they receive when they host a *convivio*, wedding, or funeral. Households keep notebooks tracking *gozona* that must be reciprocated. As they "return the help"– a process that may take years– they cross names off the list. This suggests a strong role for tit-for-tat accounting in celebration *gozona*, facilitated by cultural technology (written records). Similar systems have been observed in other societies, such as funeral gifting among the Chaldeans (Henrich & Henrich, 2007). Illustrating that people in Yateé think about *gozona* in terms of direct reciprocity, one informant laid it out clearly: "If the person doesn't return the favor, well, why

would I go help them again? I won't go anymore. If he came to help me, I'll return the favor. If we went once and they didn't return the favor, there ends the circle of *gozona*."

There is some evidence that third parties play a role in stabilizing *gozona* direct reciprocity. Formal models have revealed that direct reciprocity is not particularly stable under realistic real-world conditions, including when partners make alternating rather than simultaneous decisions (Park et al., 2022) and when perception errors are frequent (Boyd & Mathew, 2021). In communities with shared norms, third-party adjudication can stabilize otherwise flimsy direct reciprocity (Boyd & Mathew, 2021). As we've seen in the vignette results, people in Yateé take an interest in *gozona* violations in which they are not involved– judging these violations and the perpetrators as "bad". Free responses further reveal that third parties strongly disapprove when someone fails to reciprocate *gozona*. Responding to the vignette in which a woman failed to reciprocate celebration *gozona*, 41% of participants invoked reciprocity, saying things like, "it's bad, she didn't go to help knowing that this person had helped her", "she wasn't thinking about the favor that they did her", and "it's bad, one must know how to reciprocate support." Violations of harvest *gozona*, which is predicated on a formal, reciprocal agreement between two parties, elicited mentions of reciprocity from 60% of participants. Comments included, "it was bad because he agreed to do *gozona*– he had to return the favor, or close the *gozona*", "the other person already spent his time, so [the protagonist] needed to reciprocate", and "he doesn't know how to pay his debts." Together, this evidence suggests that third parties play a role in stabilizing *gozona* direct reciprocity in Yateé.

In contrast, direct reciprocity does not seem to play a role in *usos y costumbres.* A priori, there is little reason to expect that direct reciprocity would be involved in *usos y costubmres*, since

this institution facilitates larger-scale cooperation– the provisioning of public goods– rather than dyadic cooperation. In line with this, ethnographic interviews yielded no evidence of reciprocal altruism in *usos y costumbres*. Similarly, none of the participants alluded to direct reciprocity in their free responses to *usos y costumbres* vignettes.

5.4.2 Ethnographic evidence that **gozona** *and* **usos y costumbres** *norms tap interdependence psychology*

Ethnographic evidence suggests a role for interdependence psychology in both *gozona* and *usos y costumbres. Gozona* constructs a web of reciprocal relationships, making it a good candidate for building interdependence within a community. Speaking to this, in her discussion of *gozona* and other reciprocal institutions in the Zapotec community of Talea de Castro, Nader (1964) argued that these institutions build complex networks of "cross-linkages" between community-members. Similarly, Zapotec scholar Luna's (2010) description of the Zapotec worldview evokes something akin to a psychology of interdependence, highlighting the importance of cooperation, reciprocity, and solidarity (which he later links to *gozona*, p. 90-91):

> *"Being born in small human settlements allows us to experience the need for collective survival. In other words, being born in small communities linked to the land made cooperation, reciprocity, [and] solidarity naturally occurring elements of human relationships, and with this, "the we" flourished in the mind, because in truth we depended on others, we could live thanks to others."* (p. 33, translated from Spanish)

While we do not have social network data on *gozona* in Yateé, anecdotal evidence indicates that *gozona* networks are dense. Several informants relayed how many people had offered *gozona* when they hosted a *convivio*. At the low end, one man reported that 26 people did *gozona* when he and his wife voluntarily hosted a *convivio* to celebrate a saint's feast. At the high end, a woman relayed that 90 people did *gozona* when she and her husband hosted an obligatory *convivio* as part

of his *cargo*. According to the 2010 census, 26 people constitute about 8% of all adults in Yateé or representation from 15% of all households, while 90 people constitute about 25% of all adults or just over 50% of all households. Given that there are many *convivios* each year, these numbers indicate that the people of Yateé are enmeshed in a dense network of *gozona* relationships.

Moreover, *gozona* is relevant to fitness. In Yateé, *gozona* is reserved for contexts where the goal cannot be accomplished alone or by a nuclear family: feeding the community, building a house, and doing labor-intensive agricultural work. Building a house and doing subsistence agriculture tasks have clear fitness impacts– one cannot live a healthy life without shelter and food. But what about the most frequent contemporary context for *gozona*, celebration *gozona*? We argue that celebration *gozona* also impacts fitness by alleviating economic strain. Importantly, hosting a *convivio* is an obligatory duty for top *cargo*-holders. *Gozona* substantially reduces the burden of these costly celebrations. For example, the most expensive *cargo*-sponsored celebration is *Semana Santa* (Easter Week). Each year, two men jointly sponsor *Semana Santa* as part of their final *cargo*, *mayordomo*. One recent *mayordomo* estimated that he spent between $40,000MXN and $50,000MXN (approximately $2,050 - $2,500 USD) on *Semana Santa*. Average daily wage in Yateé is about $250MXN (~$13USD), meaning that *Semana Santa* costs an equivalent of 160-200 days of wage labor. However, thanks to cash and in-kind *gozona* contributions, he estimated that his true costs were only $10,000 - $15,000MXN. Moreover, without the *gozona* labor provided by community members, he estimated that his costs would have been closer to $80,000MXN because he would have had to hire people to help. Therefore, *gozona* alleviates a substantial portion of the huge economic costs of serving a top *cargo*.

Usos y costumbres also likely build interdependence within the community. First, through the collective effort of male citizens, *usos y costumbres* facilitate the provisioning of fitness-relevant public goods such as clean drinking water, well-maintained streets and footpaths on steep terrain (Figure A9), and the communal mill for daily grinding of corn (the staple food). Second, under *usos y costumbres*, Yateé functions as a corporate group that collectively owns and controls resources such as land and water. Collective resources are administered by three *cargo*-holders who form the Commissariat of Communal Lands (Table 1 notes). These resources are relevant to fitness. People in Yateé have traditionally relied on subsistence agriculture, cultivating small plots that can be held by a family but ultimately belong to the community. Although subsistence agriculture has waned in recent decades, many people still cultivate. In our sample of 42 households in Yateé, 86% reported cultivating at least one crop in the past year. In addition, residents rely on communally owned forests for gathering firewood, the primary cooking fuel. The communally owned resources also include sand and gravel extracted from the river, which are used in and sold to fund public works projects (Figures A10, A11).

Highlighting the great importance of communal resources, many indigenous Oaxacan towns have long histories of violent inter-community conflict over lands (Dennis, 1987; López-Bárcenas, 2004; Yannakakis, 2008). In 2001, for example, Oaxaca recorded 656 ongoing agrarian conflicts (López-Bárcenas, 2004). Many conflicts are legal in nature, but they can also involve the mobilization of male citizens to invade neighboring towns, burn crops, destroy houses, and set cattle loose, sometimes resulting in injuries and deaths (Cook, 2014; Dennis, 1987). Yateé's most recent violent intergroup conflict dates to the mid-1990s, although simmering tensions persist with the closest neighboring community. Speaking to the long history of intergroup conflict in

Yateé, several versions of the origin story of the town's name (Zapotec *Ya'ade*, "Hill of Ashes", referring a sacred hill) evoke violent conflict. In one version, the community originally settled on the sacred hill, but was forced to move to its current location after a nearby community burnt it to the ground during a territorial dispute. In another version, the people of Yateé defended themselves by throwing ashes in the faces of invaders from a neighboring community.

All in all, this ethnographic evidence suggests that *usos y costumbres* should foster interdependence in Yateé. Through *usos y costumbres*, all male citizens contribute to the provisioning of fitness-relevant public goods and the management and defense of fitness-relevant communal resources.

5.3.3 Quantitative evidence suggests a role for interdependence in gozona*, but not* usos y costumbres

Vignette and survey data suggest that interdependence is implicated in *gozona*. First, women who feel more interdependent with the community hold stronger normative beliefs about *gozona*. A one standard deviation increase in the Shared Fate Index, a psychological measure of perceived fitness interdependence (Ayers et al., 2023), is associated with a 0.54 standard deviation increase in the *Gozona* Judgement Index ($\beta = 0.54$ bootstrapped 95%CIs[–0.08, 1.16], $p < 0.05$). Second, in the full sample of participants who completed the survey (men and women, $N = 48$), a one standard deviation increase in Shared Fate Index is associated with a 0.30 standard deviation increase in likelihood of offering *gozona* to a newly widowed woman ($\beta = 0.30$[0.07, 0.53], $p < 0.05$, Figure 4). This suggests that people who feel more interdependent with the community are more inclined to participate in *gozona*. Shared Fate Index is also positively associated with likelihood of donating money to the family of a sick child, not a traditional context for *gozona* ($\beta = 0.16$[–0.04, 0.36], $p = 0.12$) and general willingness to help ($\beta = 0.18$[–0.02, 0.39], $p = 0.10$),

although these coefficients are smaller and the 95% confidence intervals include 0 (Figure 4). All in all, these results suggest that interdependence psychology is intertwined with *gozona* and potentially other prosocial tendencies.

However, quantitative analyses provide no evidence that interdependence is implicated in *usos y costumbres*. Among men who completed the vignettes, Shared Fate Index is not associated with the severity of judgements about *usos y costumbres* violations (β = –0.12 bsCIs[–0.53, 0.29], p = 0.54). Likewise, Shared Fate Index does not predict measures of participation in *usos y costumbres*

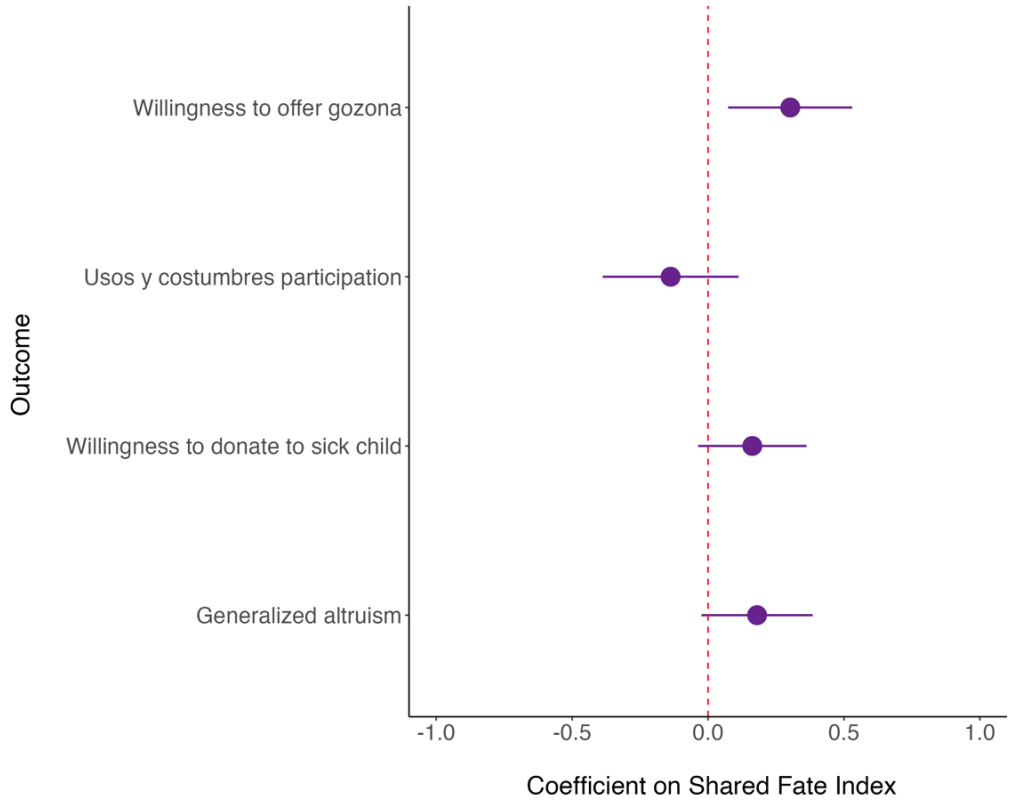

Figure 4. Shared Fate Index is associated with willingness to offer *gozona*, but not participation in *usos y costumbres* activities. Plots show coefficients on Shared Fate Index and 95% confidence intervals from LMER models with random intercepts for participant. Models predicting willingness to offer *gozona*, willingness to donate, and generalized altruism include controls for education, age, and material security (2 observations of outcome per participant from several months apart). The model predicting *usos y costumbres* participation among men stacks self-reported frequency of attendance at Communal Assembly, self-reported frequency of attendance *tequio*, and willingness to attend an emergency *tequio* (three observations total per participant). This model includes controls for education, wage labor, and age above 65. All variables are standardized.

among men, such as frequency of attendance at assemblies and *tequios* (β = –0.14[–0.39, 0.11], p = 0.27, Figure 4). Given the ethnographic context, the lack of association between perceived interdependence and *usos y costumbres* is surprising. Interestingly, these results may reflect a sex difference in the relationship between perceived fitness interdependence and the strength of social norms. Analysis of the control norm violation vignettes– to which both men and women responded– reveals a large, significant interaction between Shared Fate Index and sex on the severity of judgements (β = 1.04, bs95%CIs[0.21, 1.87], p < 0.01). That is, Shared Fate Index strongly predicts the severity of judgments about control norm violations among women, but not among men. This sex difference may be driving the difference in association between *Usos y Costumbres* versus *Gozona* judgements and Shared Fate Index. However, we cannot directly test this hypothesis because men did not respond to the *gozona* vignettes, and women did not respond to *usos y costumbres* vignettes.

6. Conclusions

In this paper, we integrated ethnographic and quantitative data to explore how two institutions sustain cooperation within a Zapotec village. We found clear evidence that both *gozona* and *usos y costumbres* are governed by social norms that drive domain-specific cooperation. In contrast, these norms were not associated with generalized prosociality. This finding is inconsistent with the view that human cooperation results purely from genetically evolved cognitive capacities such as kin altruism or direct reciprocity. Moreover, results revealed that these institutions exploit distinct but overlapping sets of mechanisms to stabilize cooperation. Both institutions harness reputation and indirect reciprocity. Meanwhile, direct reciprocity plays an important role in

gozona, while punishment is integral to *usos y costumbres*. Although ethnographic evidence strongly suggests that both *gozona* and *usos y costumbres* build interdependence, quantitative analyses present a murkier picture, yielding evidence of a role in *gozona* alone. Overall, this study provides support for cultural evolutionary theory, which suggests that as cooperative institutions culturally evolve, they stitch together different cooperation-sustaining mechanisms. We also shed light on the rich diversity of culturally evolved institutions– even within a single, small-scale society, different institutions exploit different mechanisms to stabilize cooperation.

Social structure in Yateé is not static– the future will look different than the present, which already looks different from the past. Several forces are eroding *gozona* and *usos y costumbres*. Market integration, and associated increases in wealth and wage labor, are undermining *gozona*. Housebuilding *gozona* has already disappeared, replaced by several paid construction workers– a pattern that has also been observed in other Sierra Norte towns (Beltran Morales, 1982). Informants report that harvest *gozona* is likewise on the decline. One probable reason is that subsistence agriculture is slowly being replaced by wage labor, whether locally or as a migrant. While most households still cultivate, few entirely rely on subsistence agriculture– whereas informants report that in the "old days" everyone did. Informants often spoke of the need for harvest *gozona* in the past because there simply was no money to pay workers. Meanwhile today, some people decline to do harvest *gozona* because they would prefer to be paid as day-laborers.

Similarly, market integration and migration are slowly undermining *usos y costumbres*. The *cargo* system, wherein men provide years of free labor to the community, is antithetical to full participation in a market economy. So far, the men of Yateé appear to be balancing the opposing demands of achieving economic wellbeing and serving the community. Relatively few men do wage

labor while living in Yateé, but the vast majority migrate to work elsewhere at some point. In a sample of 29 men, only 28% reported currently doing any wage labor, but 86% had a history of outmigration (median duration = 6 years). Informants spoke of carefully planning their *cargo* careers– trying to fulfill several posts in rapid succession during youth, leaving to earn money for several years, then returning to finish the ladder. The Assembly regularly names migrants to *cargos*, at which point they either must return to Yateé or, with the Assembly's blessing, pay another citizen to fill the *cargo*. Some men never return, and many informants lamented the challenges of filling all the *cargo* positions with an ever-dwindling pool of available men. The future of the *cargo* system in Yateé is unclear. Whether it someday crumbles or adapts to the new socioeconomic landscape (e.g. by incorporating women), there is little doubt that it will change. Broadly, these dynamics suggest an interesting tradeoff. While market integration may expand the sphere of cooperation, fostering greater impersonal prosociality (Henrich et al., 2001, 2010; Rustagi, 2023; Rustagi et al., 2010), it may come at a cost to smaller-scale cooperation within the community, as local, culturally evolved institutions that sustain cooperation slowly erode.

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