Group dynamics in the *contrada* communities of Siena, Italy

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Abstract

The *contrade* are 17 communities that divide the historic city centre of Siena, Italy, and they hold great potential to shed light on human group dynamics. Here we provide a systematic description of these communities, drawing on published materials and on a series of field-based studies, combined with a workflow grounded in open research practices. We estimate that the contemporary *contrada* system involves on the order of 30,000 individuals. Our survey ($n = 508$) indicates that membership is linked to strong familial and other social ties. Assessment of the attitude of members ($n = 42$) reveals variation shaped by the relationships between the groups (as alliance, neutral, or rivalry). This pattern is reflected in how members behave, collectively and individually, in the course of a ritual event (185 person-hours of GPS data). In this contemporary urban setting, then, social interactions within and across group boundaries are shaped by symbolic divisions rooted in history.

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1 Introduction

Twice over the summer months, thousands of visitors descend on the Italian city of Siena to attend the *palio*, a bareback horse race held in the central square, *Piazza del Campo*.¹ Each event involves ten of the 17 *contrade*, the communities that divide the historic city centre. The race over, and extravagant celebrations underway among members of the winning *contrada*, some visitors may leave Siena with the impression that the *palio* is a seasonal performance for the benefit of locals and tourists. Those visitors may not appreciate that the *contrade* carry great emotional significance, and that they shape interactions among their members throughout the year.

This socio-cultural phenomenon has attracted the attention of scholars since the nineteenth century (e.g. Heywood 1899), and it holds great potential to shed light on human social behaviour within and across group boundaries — a topic of ongoing interest across the evolutionary social sciences (e.g. De Dreu and Triki 2022). However, this potential remains to be fully realised: the scholarly literature has tended to focus on the *palio*, and it is largely qualitative. Here we provide a systematic description of this phenomenon, with a focus on the *contrade*, combining qualitative and quantitative evidence. We show that interactions within and across the boundaries of the contemporary *contrade* reflect symbolic divisions rooted in history: for example, these divisions shape the attitude of members towards the different groups, and how members behave, collectively and individually, in the course of a ritual event. In the process, we develop a workflow to analyse, archive, and share the information we collected that is open and reproducible, and which extends the benefits of open research to field-based studies of human behaviour.

We begin by outlining background information to Siena and to the *palio* (Section 2). We then provide a primer on the contemporary *contrada* system, drawing on published materials and on field-based observations (Section 3). Next, we summarize key insights we obtained through a survey of *contrada* members, a questionnaire assessing the attitude of members towards the *contrade*, and investigation of a ritual procession through field-based observations and GPS data (Section 4). We conclude by discussing how the insights derived from this system contribute to our understanding of human group dynamics, and the significance of our findings against the body of work demonstrating variation in human social interactions based on group affiliation (Section 5).

The workflow we developed as part of this paper includes detailed supplementary information, a codebook, and extensively commented R software (v. 4.0.2, R Core Team 2020). Data and code are available for download from <https://doi.org/10.5281/zenodo.5896645>.

¹We introduce Italian terms, italicized for readability, and we provide literal translations where appropriate (abbreviated as “Ita.” for “Italian” and “lit.” for “literally”), applying relevant rules for pluralization (e.g. singular “*contrada*” becomes plural “*contrade*”). For clarity, we limit this practice to terms that are particular to the Siennese context.

2 Background to Siena and to the *palio*

Located in the region of Tuscany in central Italy, Siena is a city with a population of approximately 55,000 (Comune di Siena 2017). The historic city centre is divided into three areas called *terzi* (lit. “thirds”): *Camollia*, *Città*, and *San Martino*. *Terzi* used to
40 represent important military divisions in the medieval period, but they are currently of limited functional significance (Dundes and Falassi 1984:29–31). The three *terzi* comprise 17 territories, the *contrade* (Figure 1). Three main areas within the city centre are not part of any *contrada* territory: the Siena Cathedral, the central square plus the city hall, and the Medici Fortress.

Colloquially, the term *contrada* is used to describe both the territory and the social
45 community composed of *contrada* members (Ita. *contradaio*). Technically, the *contrada* territory is called *rione* (lit. “neighbourhood”). In this paper we use the term *contrada* to refer specifically to the community, and we designate the cathedral, central square, and fortress as non-*contrada* territories.

The central square is the location of the *palio*, a horse race held every year on 2
50 July and on 16 August. Each race is the culmination of a four-day festival, also termed *palio*, in honour of the Virgin Mary. In addition to the two “ordinary” *palii*, some years include an “extraordinary” one, to mark a significant event (e.g. the millennium in the year 2000). The *palio* is occasionally suspended: for example, the events in 2020 and
55 2021 were cancelled due to the COVID-19 pandemic. Detailed information about the festival and the race is in Dundes and Falassi (1984: Chs. 3–6). In this paper we use the term *palio* to refer specifically to the horse race.

The race involves three clockwise laps of the square, lasting approximately 75–90
seconds in total. The victorious *contrada* secures a silk banner, also called *palio*, de-
60 picting the Virgin Mary or the significant event (for ordinary and extraordinary *palii*, respectively). The *palio* festival is an event heavily imbued with ritual and symbolic significance, and is the highlight of the *contrada* calendar (Dundes and Falassi 1984: Ch. 9; Handelman 1998; Parsons 1997; Pomponio Logan 1978; Silverman 1989; Solinas 1987). Emotions are heightened in the days before, and the moments during and after,
65 the *palio*. For example, fights (Ita. *cazzotti*, lit. “punches”) regularly occur around the period of the *palio*, when competition intensifies (Drechsler 2006; Operti, Lampronti, and Sgourev 2020). The current *palio* format developed in the eighteenth and nineteenth centuries (Dundes and Falassi 1984:23), but competitive events linked to distinct local groups are documented as early as the twelfth century (Hook 1979:223).

In the days preceding each *palio*, earth brought in from the countryside is laid in
70 the square to form a track, and infrastructure (e.g. viewing stands) is built. Only ten of the 17 *contrade* take part in each event, due to the limited space on the track. The ten *contrade* include the seven which did not participate in the corresponding race the previous year, plus three from the remaining ten drawn at random just over a month

Figure 1: The territorial boundaries of the 17 *contrade* of Siena. The three non-*contrada* territories are (A) the fortress, (B) the cathedral and its square, and (C) the central square plus the city hall and tower. Boundaries traced by A.R.K., based on multiple sources; see Section A.1. Dashed line represents location of boundary according to a previous reproduction (Fiorini 1986: pull-out map). Base map data from OpenStreetMap (www.openstreetmap.org/copyright).

75 before the *palio*.

Horses are provided by local breeders. The *contrade* are randomly assigned a horse through a draw, conducted publicly in the square, four days before the race (Dundes and Falassi 1984: Ch. 3). Jockeys, who are typically professional riders and not *contrada* members, are subsequently hired to ride and represent the *contrada*. A *contrada* assigned
80 a horse perceived to be of higher quality has an incentive to hire a more skilled jockey, who commands higher fees.

Secretive deals (Ita. *partiti*) are often made between *contrade* in the days preceding the *palio*, and/or directly by the jockeys at the starting line, in order to influence the outcome of the race (Dundes and Falassi 1984: Ch. 4). Deals are not publicly recorded,
85 so details are unknown. Generally, they involve the promise of money in exchange for favours during the race. For example, a common tactic is for a jockey to position his horse to block another horse at the starting line. The outcome of the race is influenced by these deals, and by variation in skill both among the horses and among the jockeys, as well as by several other factors, including luck. The *palio* is a source of pride and joy
90 for members of the winning *contrada*, and of grief and distress for members of the losing *contrade*.

3 The contemporary *contrada* system

The primer on the *contrade* is informed by previous accounts, notably Dundes and Falassi (1984), Park (1992), Parsons (2004), and Pomponio Logan (1978). Descriptions in the
95 literature were corroborated by fieldwork, most of which was conducted by A.R.K. while he was based in Siena for approximately 14 months between August 2016 and August 2018 (Section C). In this section we refer to interviews held and observations made during this period. First, we provide basic information relating to the *contrade* (Section 3.1), followed by a discussion of membership (Section 3.2) and life as a member (Section 3.3).
100 We then detail an important annual festival observed by each *contrada* (Section 3.4). Finally, we outline the different relationships between *contrade* (Section 3.5). Further details of the *contrada* system are in Section A.

3.1 Historical sketch and basic elements

The *contrade* have a long history, with antecedents in the medieval period (Silverman
105 1979). Beginning in the twelfth century, territorial divisions in Siena were loosely associated with parishes, subsequently serving as units for military recruitment (Cecchini and Neri 1958:10–13). Entities broadly comparable to present-day *contrade* emerged over the period from the end of the fifteenth century until their formalisation in the eighteenth century (Savelli 2008: Chs. 2–4). Specifically, fatal clashes in the early eighteenth century
110 led to the establishment of a commission with the aim to delineate formal boundaries,

Table 1: Characteristics of the 17 *contrade* of Siena¹

<i>contrada</i> ²	name (symbol) ³	colours ⁴	festival ⁵	ally ⁶	rival ⁷
<i>terzo di Camollia</i>					
<i>Bruco</i>	Caterpillar	green, yellow	July 2	<i>Istrice, Nicchio, Torre</i>	—
<i>Drago</i>	Dragon	red, green	Apr 29	<i>Aquila</i>	—
<i>Giraffa</i>	Giraffe	red, white	July 2	<i>Civetta, Istrice, Pantera</i>	—
<i>Istrice</i>	Porcupine	red, black, blue, white	Aug 24	<i>Bruco, Giraffa, Chiocciola, Civetta</i>	<i>Lupa</i>
<i>Lupa</i>	She-wolf	white, black	Aug 16	—	<i>Istrice</i>
<i>Oca</i>	Goose	white, green	Apr 29	—	<i>Torre</i>
<i>terzo di Città</i>					
<i>Aquila</i>	Eagle	yellow	Sep 8	<i>Civetta, Drago</i>	<i>Pantera</i>
<i>Chiocciola</i>	Snail	red, yellow	June 29	<i>Istrice, Pantera, Selva</i>	<i>Tartuca</i>
<i>Onda</i>	Wave (dolphin)	white, pale blue	July 2	<i>Nicchio, Tartuca, Valdimontone</i>	<i>Torre</i>
<i>Pantera</i>	Panther	red, blue	Aug 29	<i>Giraffa, Leocorno, Chiocciola, Civetta</i>	<i>Aquila</i>
<i>Selva</i>	Forest (rhinoceros)	green, orange	Aug 15	<i>Chiocciola, Tartuca</i>	—
<i>Tartuca</i>	Tortoise	blue, yellow	June 13	<i>Leocorno, Selva, Nicchio, Onda</i>	<i>Chiocciola</i>
<i>terzo di San Martino</i>					
<i>Civetta</i>	Owl	red, black	June 13	<i>Aquila, Giraffa, Istrice, Pantera</i>	<i>Leocorno</i>
<i>Leocorno</i>	Unicorn	white, orange	June 24	<i>Pantera, Tartuca</i>	<i>Civetta</i>
<i>Nicchio</i>	Shell	blue	Aug 7	<i>Bruco, Onda, Tartuca</i>	<i>Valdimontone</i>
<i>Torre</i>	Tower (elephant)	burgundy red	July 25	<i>Bruco</i>	<i>Oca</i>
<i>Valdimontone</i>	Ram	red, yellow	Apr 26	<i>Onda</i>	<i>Nicchio</i>

¹ Information from Dundes and Falassi (1984:32,36,47).² *Contrade* arranged by *terzo*, one of three areas in the city centre.³ Symbol only shown if different from the translated name of the *contrada*.⁴ Does not include decorative colours.⁵ Date of patronal festival.⁶ All alliances are reciprocal. Order of allies as per the *contrada* column.⁷ All rivalries are reciprocal except that between *Onda* and *Torre*.

culminating in the issue of a decree in 1729. The boundaries remain nearly unchanged to this day (Silverman 1979). See Section A.1 for details of the boundaries.

Each *contrada* has an official title (Table 1; full titles are in Table A1, see Section A.2). Colloquially, the title is shortened, e.g. *contrada della Torre* (lit. “*contrada* of the Tower”) becomes *Torre*. *Contrada* symbols feature an animal, real or imaginary, and a distinctive set of colours. In most cases the animal appears in the title (Table 1).

Governance follows a written statute, with a governing structure (Ita. *seggio*, lit. “seat”) elected biennially (Dundes and Falassi 1984:43–44); details of governance are in Section A.3. The leadership is responsible for the running of the *contrada*, including management of its assets (e.g. residential property). A subset of the leadership is in charge of involvement in the *palio*. A church, a clubhouse, and a museum linked to the *contrada* are located within its territory (Figure 1).

3.2 *Contrada* membership

Historically, being born in *contrada* territory was the key criterion for membership. Exceptions to the birth criterion applied to the nobility, with children acquiring membership on account of a long-standing relationship between their family and the *contrada*, and to non-native residents of the territory involved in *contrada* activity over a period of several years (Park 1992).

In current practice, membership criteria can be grouped into three broad categories: birth, kinship, and choice (see analogous scheme in Parsons 2004:129). Following a decline in the practice of home birth, the birth criterion has extended to encompass residence of the child’s parents in *contrada* territory. The other two criteria apply to individuals not born in *contrada* territory, whether resident in the territory or not. These criteria grew in importance following social and demographic changes that occurred in the twentieth century (Park 1992). The kinship criterion is based on family ties (e.g. typically the children of *contrada* members). The choice criterion is based on sustained involvement in *contrada* activity and acceptance by the community.

The three criteria apply broadly across *contrade*, but the statute of each *contrada* may spell out specific additional requirements (e.g. loyalty towards the *contrada*, in the case of membership by choice) and outline relevant procedures. The attainment of membership is marked by a secular baptism (Ita. *battesimo contradaio*, lit. “*contrada* baptism”; see discussion in Parsons 2004:121–123).

Today, membership is effectively linked to the status of *protettore* (lit. “protector”), which involves payment of an annual fee (Ita. *protettorato*). The fee varies by age and by role (e.g. lowest for young children and for the elderly, highest for those with official positions within the *contrada*). In particular, *protettore* status confers members certain rights relating to governance of the *contrada*, such as participation in the general assembly, the ability to vote in elections, and eligibility for official positions (typically subject

to age and other restrictions, e.g. tenure as a member for a minimum number of years).

150 Members who are not current on payments forfeit such rights.

Membership size is not systematically reported by the *contrade*. We derived estimates from two sources; full details are in Section B. In 1981, a total of 21,818 Sienese declared themselves to be *contrada* members (Falassi 1983:13,79). The number ranges from 287 (*Civetta*) to 3,871 (*Istrice*). The second set of figures relates to the number of *protettori* in 2012–2013, from a series of interviews published in a local newspaper (Siena Free 2012).
155 Across the 16 *contrade* for which information is available, the total number of *protettori* has an upper bound of 33,694. The number ranges from approximately 750–800 (*Selva*) to 3,000–4,000 (*Istrice*) and approximately 3,500 (*Nicchio*, *Torre*).

Comparison of the two sets of figures is complicated by the fact that residence in Siena, *contrada* membership, and *protettore* status do not overlap completely (Park 1992; see
160 Section B.3). It is important to note that both sets of figures likely overestimate the number of people who are active participants in *contrada* life. These issues notwithstanding, the figures indicate that membership size varies across *contrade*, from a few hundred to several thousand individuals. Overall, the data are in line with the common
165 perception of an increase in the number of members and/or *protettori* over recent decades (e.g. Boos 2020). Most strikingly, they underscore the extent of the phenomenon: the contemporary *contrada* system involves on the order of over 30,000 individuals — men and women, old and young — who identify as *contrada* members and/or contribute to the *contrade* financially.

170 3.3 Aspects of *contrada* life

The *contrada* is a source of symbolic and emotional attachment for members across their lifetime (Park 1992; Pomponio Logan 1978). A member’s birth is marked by the display of an unfurled flag with a blue or pink ribbon in the *contrada* territory. At death, a furred flag with a black ribbon is placed outside the *contrada* church, and a service is
175 held to commemorate the deceased; the grave may be decorated with *contrada* symbols.

During fieldwork, members often described the *contrada* using kinship terms, such as *famiglia allargata* (lit. “extended family”). For example, a *Civetta* member interviewed in May 2017 stated, “It’s very obvious to me that the *contrada* is something natural like the family.” The familial symbolism is, to a degree, based on actual links between members,
180 even yet-to-be realized ones, as connoted by a *Leocorno* member in July 2018, “In the flag [of the *contrada*] I see an orange thread that passes from my grandparents and will extend to my children” (the *Leocorno* flag features the colour orange; Table 1).

Emotional attachment is fostered by participation in *contrada* activities from a young age, and reinforced by exposure to relevant symbols, songs, and expressions. The *Civetta*
185 member from the above interview spoke of their niece, whose first word was a clipping of *Civetta*, “Her mother opened the window and [the niece] saw the *Civetta* emblem above

the church and went 'etta!' The *contrada* is also a system of institutional and social support, for example by providing financial aid to members in need.

Unsurprisingly, then, membership skews interactions towards members of the same
190 *contrada*, and strong intra- and inter-generational ties emerge both through family connections and through involvement in activities year-round. Aside from the *palio* (Section 2) and other annual rituals (see Section 3.4), activities include communal meals (Section A.4). Generally, these are open to all members of the *contrada*, and they take place either in the clubhouse or on the streets adjacent to it. At one end are small informal
195 gatherings held on a regular basis; at the other end are large formal gatherings like the dinners hosted on one of the three days preceding the *palio*.

Friendships, bounded by age and sex, are often within *contrada* (as demonstrated in Section 4.1). Marriage is also influenced by membership, but there is no prescribed endogamy. This pattern is supported by analysis of surname distributions (Vienna et
200 al. 1998) and of genetic markers (Fuciarelli et al. 1997), which both indicate romantic relationships across *contrada* boundaries.

Demographic changes as described above mean that people increasingly interact outside the *contrada*. Of course, members interact with individuals affiliated with different *contrade*, or individuals with no *contrada* affiliation (e.g. at school, in the workplace).
205 Furthermore, they express their collective identity on the internet (e.g. by creating websites, Boos 2017, 2020), in part a response to increased tourist and media interest (Warner 2004).

3.4 The patronal festival and the procession

If the *palio* festival is the most important event in the *contrada* calendar, the patronal
210 festival (Ita. *festa titolare*, lit. “titular festival”) takes a close second place (e.g. Falassi 1983:28–29; Parsons 2004:110–111). Held annually to celebrate the *contrada*’s patron saint, it spans a week or longer, ideally to include the weekend nearest the day devoted to the saint (Table 1). As a result, beginning with *Valdimontone* in late April and ending with *Aquila* in early September, most weeks feature a patronal festival.

Several events take place during the festival, including the secular baptism of new
215 members, and cemetery visits to pay respect to the deceased. The culmination of the festival is the *giro* (lit. “tour”), a day-long procession around the city centre (Dundes and Falassi 1984:136–137; Parsons 2004:110–111). We use the term procession, rather than parade, due to the religious nature of the patronal festival and the visitation of
220 sacred sites during the procession. On the whole, however, the event is far from solemn: members walk through the city bearing colourful flags and symbols of the *contrada* and make noise with repetitive drumming and collective singing. There is also plenty of eating and drinking.

The procession departs from the *contrada* church in the morning around 8:00, to

225 return in the evening around 20:00; a break takes place in the early afternoon. It is led by a group on the order of 100 members dressed in costumes based on renaissance attire (Boos 2020; Parsons 2004:72–73), collectively called *comparsa*. The majority of the *comparsa* are men in the role of flag-waver (Ita. *alfiere*) or drummer (Ita. *tamburino*). The remainder are in the role of page (Ita. *paggio*, a generic term also applied to all 230 costumed representatives); one man bears a large ornate *contrada* flag, several boys or girls distribute a commemorative poem about the event to onlookers. Following the costumed representatives are members of the *contrada* leadership (Section A.3), then women, children, and older men — all in plain clothes but generally dressed formally, and typically wearing a large neckerchief (Ita. *fazzoletto*, lit. “handkerchief”) emblazoned 235 with the *contrada* symbol and decorated in the *contrada* colour(s) (Table 1).

The procession pays a visit (Ita. *omaggio*, lit. “honouring”) to each area of the city centre, excluding the fortress and the territory of any rival *contrada* (Table 1). An additional visit is paid to a church in the city centre that has a connection to the patron saint, which we term “patronal site”. Minimally, the visit features a display involving drumming 240 and a choreographed flag-toss (Ita. *sbandierata*) performed by costumed representatives taking part in the procession. There is however variation depending on the location. For example, all drummers and all flag-wavers take part in the display performed outside the cathedral and in the central square, and in the one performed outside the *contrada* church to mark the end of the event. Conversely, the one performed outside the *contrada* church 245 at the start of the event, and at either end of the afternoon break, involves only a subset of the costumed representatives in those roles. The visit to the patronal site opens with a short sermon delivered by the *contrada* priest at the altar, followed by performance of the display featuring as many drummers and flag-wavers as can be accommodated inside the church. During the visit to another *contrada*, the procession enters the *contrada* church, 250 and members of the procession sing a brief hymn to the Virgin Mary. A display is then performed outside the church, involving a subset of the drummers and of the flag-wavers; two or more members of the host *contrada*, in plain clothes, typically join the flag-toss. Refreshments are provided by the host *contrada* after the display. Additional information is provided in the analysis of two such events (Section 4.3).

255 3.5 Relationships between the *contrade*

A key factor shaping interactions between the *contrade* is the relationship type (Filiani and Zaffaroni 2002:3–7). The default type, which we term “neutral”, involves no formal relationship. The other two types, alliance and rivalry, are formally recognized — that is, the relationship is stipulated in the official statute of each *contrada*, with alliances 260 additionally sanctioned by a treaty (Filiani and Zaffaroni 2002:3). All such relationships are reciprocal, with one exception (*Onda* stipulates *Torre* as a rival, but not *vice versa*; Table 1). Rival pairs may feature a common ally (e.g. *Aquila* and *Pantera* are rivals, and

each is an ally of *Civetta*; Table 1).

265 All *contrade* feature at least one formal relationship: 15 of the 17 *contrade* have at least one ally (the range is between one and four allies; Table 1) and 13 have a rival (no *contrade* have multiple rivals; Table 1). Thus, two *contrade* have no allies, and four have no rivals.

270 Alliances and rivalries can exist for centuries. For example, the rivalry between *Oca* and *Torre* emerged in the seventeenth century (Filiani and Zaffaroni 2002:5). All current alliances and rivalries have been in place for at least 50 years. However, relationship status is subject to change. A recent analysis found that 46 alliances formed and 33 ended, compared to 11 rivalries formed and six ended, over the period 1743 to 2011 (Sgourev and Operti 2019).

275 Except for *Oca* and *Torre*, rival pairs share a boundary, suggesting that territorial disputes contribute to the establishment and maintenance of this type of relationship (Filiani and Zaffaroni 2002:5–6) (Table 1 and Figure 1). Rival *contrade* denigrate each other in expressions and songs memorized from a young age (Dundes and Falassi 1984:39–43, 51–53). Alliances usually entail a number of commitments throughout the year, such as honouring an ally during certain rituals and sharing feasts (Falassi 1983:29); see
280 Section 4.3.

The relationship type is most visible during the *palio*, and the proceedings of a race can influence the status of a relationship. It is almost a given that rival *contrade* will attempt to prevent each other from winning the *palio* (Dundes and Falassi 1984:78). In circumstances where a rival stands a good chance of victory, the chosen strategy may be
285 to direct effort towards thwarting the rival during the race, rather than aiming to win themselves. This is possible through deals (Section 2), in particular with allied *contrade*, which can be relied upon to make advantageous agreements (Operti, Lampronti, and Sgourev 2020). Aggression (e.g. altercations during or after the race) is more common between rival than allied pairs — both for members and for jockeys (Drechsler 2006;
290 Operti, Lampronti, and Sgourev 2020). By extension, among neutral *contrade* there is little expectation for positive exchanges, such as the advantageous deals between allies, and fewer negative behaviours (e.g. fights) than between rivals. The relationship type is also visible during the procession (Section 3.4). For example, a *contrada* with which the visiting *contrada* has a neutral relationship offers a selection of drinks and snacks,
295 whereas an ally hosts a sit-down meal. Any rival *contrada* is not even paid a visit during the event.

4 Insights from fieldwork-based research

In this section we present original research relating to the *contrade*, using data we collected during fieldwork. See Section C for more background information and Table C1

300 for a timeline.

Five *contrade* agreed to take part in the fieldwork-based research, with the data presented here collected with them between February 2017 and August 2018. The five *contrade* include *Civetta*, *Leocorno*, and *Torre*; we do not name the others to protect their identity, and to preserve the anonymity of participants (we disclose names if the
305 identity of the *contrada* can be inferred from other information we provide).

The general data collection procedure was the same across the research elements presented here. Research participants were members aged 18 years or older of one of the five *contrade*. Informed consent was obtained from all participants. Data collection occurred in sessions that coincided with events held by a *contrada*. Within each session
310 we recruited participants and administered the relevant paper-based questionnaire to them. Events were selected following discussion with a contact from each *contrada* acting as collaborator, who assisted with the logistics of the studies. Data were collected by A.R.K., aided by paid research assistants for some sessions.

First, we describe the composition of the *contrade* using a survey we conducted with
315 a convenience sample of members from the five *contrade* (Section 4.1). Then we demonstrate the significance of group relationship in the Sienese context, through a psychological item measuring members’ attitude towards the *contrade* (Section 4.2) and GPS data from two *contrade* collected during their annual *giro* procession (Section 4.3). For each research element, we summarize and discuss the results together. Complete information
320 — i.e. data, analysis, results, and discussion — for each element is in Sections D to F.

4.1 Survey of *contrada* members

Between February 2017 and August 2018 we recruited 526 members across five *contrade*. Participants were provided a paper-based questionnaire, which featured a series of questions relating to demographic factors, and to their relationship with Siena and with the
325 *contrade*. Following exclusions, we analyzed between 461 and 507 responses per question across 508 questionnaires. We emphasize that we have a convenience sample, which limits generalisations to the entire population of members or of *protettori*.

Broadly, the demographic composition of the sample is in line with ethnographic portrayals, which emphasize variation in age (e.g. Dundes and Falassi 1984:35). The
330 mean age was 42.3 years ($SD = 15.5$ years, range 18–84 years), the variation capturing the regular scene of multiple age cohorts taking part in *contrada* events. In terms of gender, 36.7% of respondents selected “female”. The ethnographic consensus is that the *contrada* is primarily the province of men (e.g. Handelman 1998; Pomponio Logan 1978). At the same time, the limited data available on membership indicate that just under half
335 of *protettori* in one *contrada* are women (Voltolini 2012; see Section B). One possibility is that opportunities for participation in *contrada* events decrease disproportionately for women, as responsibilities linked to adulthood increase with age (e.g. Figliola 2002:26).

340 Around 80% of respondents were born and currently live in Siena. Relatedly, membership was commonly conferred by birth in the *contrada* (22.2% cited the birth criterion, loosely defined to include residence of parents in the territory of the *contrada* at birth), although kinship ties were most prevalent (53.2% cited the kinship criterion). Therefore, the *contrada* remains largely a “domain which is exclusively Sienese” (Park 1992:92), but not entirely. Reflecting demographic and social changes in the twentieth century (Park 1992), 80.3% of respondents do not live in the territory of their own *contrada*. A notable proportion of the membership was born outside Siena (20.8%) and/or a member by choice (24.6%). The common perception of an increase in the number of members, discussed in Section 3.2, is likely driven by membership acquired in recent decades.

350 Data relating to participation in the social and organisational life of the *contrada* indicate that the community is active throughout the year. Members socialized frequently during the winter and the summer, although participating at least every week was less common across responses collected during the winter (44.9%) than across those collected during the summer (53.9%). Furthermore, the survey indicates assortativity in friendships: 67.0% indicated that three or more of their five closest friends, and thus a majority, were members of the same *contrada*. Frequent participation and interaction among members may explain why 65.8% of respondents agreed or strongly agreed with the statement that their *contrada* is better than most. Generally, then, the final set of survey results echo previous comments, “[e]ach individual seeks to perpetuate *contrada* power and unity by his or her membership, friendships, and involvement in *contrada* life throughout the year” (Pomponio Logan 1978:57).

360 4.2 Evaluation of attitude towards the *contrade*

We assessed the attitude of *contrada* members towards the 17 *contrade*. Specifically, between July 2017 and July 2018 we recruited 42 members (age: $M = 35.1$ years, $SD = 14.9$ years, range 18–82 years; gender: 2 or 4.8% indicated “female”) across three *contrade* (*Civetta*, *Leocorno*, and *Torre*). We asked participants to state their general attitude towards the 17 *contrade* on a 7-point scale from 1 (very negative) to 7 (very positive). Results are to be considered preliminary, in that they relate to a small convenience sample that is strongly biased towards men.

370 Overall, there is patterned variation in the attitude of members by *contrada* status (as own vs. other) and by relationship type (as alliance vs. neutral relationship vs. rivalry; Figure E1). As expected, mean attitude was higher for own *contrada* ($M = 6.8$, $SD = 0.7$) than for other *contrade* ($M = 3.8$, $SD = 1.5$; Wilcoxon signed-rank test, $V = 856.0$, $< .001$). For other *contrade*, the variation was linked to relationship type, with mean attitude highest for alliance ($M = 4.6$, $SD = 1.4$), followed by neutral relationship ($M = 3.9$, $SD = 1.4$), followed by rivalry ($M = 1.6$, $SD = 0.9$). There was a significant effect of *contrada* classification on attitude (mixed-model ANOVA, $F(3, 652.9) = 143.0$,

< .001), with significant differences between all contrasts (Table E1). At the same time, there were differences in attitude across individuals, which may reflect personal interactions with members of the various *contrade* — including one’s own.

Additionally, the data for the 19 *Torre* participants are suggestive of a departure between attitude and classification. The mean attitude was 1.4 ($SD = 0.8$) towards *Onda*, a *contrada* with which *Torre* has a neutral relationship (Table 1), and 1.7 ($SD = 1.0$) towards *Torre*’s rival (*Oca*). This is linked to asymmetry in the relationship between *Onda* and *Torre*, and its mutable nature over time (Section E.4).

The results are in line with existing ethnographic accounts. For example, the finding that responses for own *contrada* and for rivalry tend to cluster at the positive and negative ends of the scale, respectively, maps onto the observation that “the degree of love for one’s *contrada* can only be exceeded by the degree of hate for the rival *contrada*” (Dundes and Falassi 1984:49). Overall, the results support the notion that relationships between *contrade* are, at the same time, long-lasting and mutable (Section 3.5).

4.3 Quantitative description of a ritual procession

We investigated the day-long ritual procession (Section 3.4) of two *contrade*, *Civetta* and *Leocorno*. We combined observations by A.R.K. with data obtained using GPS devices carried by *contrada* members taking part in their respective event in June 2018. Specifically, we analyzed the movement of 12 *Civetta* and six *Leocorno* costumed representatives (age: range 21–46 years; gender: all indicated “male”). Limitations of the study include the small sample of participants and the accuracy of the GPS data.

The general features of the two processions were similar (Table F1). Both events lasted around 10 hours, with a lower bound of approximately 12 km on the overall distance covered. Each event paid a visit to 19 locations, namely the processioning *contrada* itself, all other *contrade* except the rival, the cathedral, the central square, and the patronal site; see Figures F1 and F2 for the order of visits.

Individual routes for all participants are shown in Figure 2 by event, together with the mean time spent in each area. Pooling the data across the two events, the mean number of minutes spent was higher for own *contrada* territory ($M = 57.8$, $SD = 7.3$) than for the territory of other *contrade* ($M = 28.0$, $SD = 19.8$). Across other *contrade* by relationship type, the mean number of minutes spent was highest for alliance ($M = 61.5$, $SD = 10.1$), followed by neutral relationship ($M = 24.2$, $SD = 8.1$), followed by rivalry ($M = 9.2$, $SD = 3.8$). We estimated that none of the participants entered the church of the rival *contrada*, and that, on average, most or all participants entered the church at least once in the case of own *contrada*, alliance, and neutral relationship. See Tables F2 and F3 for a breakdown of the time spent in each area and the number of participants who entered the *contrada* church.

Overall, we suggest that participation in the procession — which involves physical

Figure 2: The *Civetta* and *Leocorno* procession. The 17 *contrada* territories and the three non-*contrade* areas are shaded by the mean time spent in each one across participants. The GPS route of each participant is shown in orange. Labels are only included for own *contrada*, allies, and rival. The location of each *contrada* church, the clubhouse of each ally, and the patronal site are indicated. The patronal site of *Civetta* and *Leocorno* are different churches located in the territory of *Giraffa*.

exertion, synchronous movement, and emotional arousal — may promote solidarity of
415 members towards own *contrada*. The results also highlight the significance of relation-
ship type in shaping the procession (Section 3.4); at the collective level, participation may
reinforce the existing relationship between the *contrade*. Naturally, the effect of relation-
ship type is likely to be particularly strong in the context of a ritual event, compared to
420 the activities that *contrada* members engage in as they go about their day. At the same
time, conversations during fieldwork suggest that movement is constrained, particularly
with respect to a rival. For example, a *Civetta* member interviewed in June 2019 stated,
“But even when you’re a child, you don’t go to play in [the rival *contrada*] [...] I’ve
always been afraid to go beyond [church at the boundary between the *contrade*], down
there in that nasty place. We used to stop there, as far as I can remember, we never
425 went any further [...] we would stay there.”

5 Discussion

Together with the *palio*, the 17 *contrade* of Siena, Italy, form a distinctive socio-cultural
phenomenon, and one that holds great potential to inform our understanding of human
group dynamics. Drawing on published materials, we have shown that on the order of
430 over 30,000 individuals identify as *contrada* members and/or contribute to the *contrade*
financially (Section 3.2). The number of affiliates spans an order of magnitude, from a
few hundred individuals to several thousands. Despite this variation, the *contrade* share
key elements of institutional structure and ritual practice (Section 3.1), and they are
relatively homogeneous across a range of features that commonly delineate groups in our
435 species, such as ethnic, religious, and political composition. Therefore, the contemporary
contrada system is especially well suited to the study of human social behaviour within
and across group boundaries.

In this system, boundaries that were originally territorial in nature have increasingly
given way to symbolic ones. In the past, most members lived in the territory of their
440 *contrada*, and thus in the historic city centre (Section 3.2). The results of our survey of
contrada members point to a departure from this arrangement: across five *contrade*, only
about a third of respondents selected the city centre as their place of residence, and they
were split roughly equally between the territory of their *contrada* and that of another
(Section 4.1). These findings reflect social and demographic changes that occurred in the
445 twentieth century (Park 1992), leading to the decoupling of membership from residence
in the territory of the *contrada*. The survey results also show that, despite these changes,
membership remains linked to strong familial and other social ties. For example, over half
of the respondents indicated that they acquired membership through kinship, and around
two thirds reported that three or more of their five closest friends were also members of
450 the *contrada* (Section 4.1). To this day, then, “each individual’s conceptions of self and

of others are patterned by *contrada* membership and participation, and this conception patterns Sienese social interaction” (Pomponio Logan 1978:62; the observation relates to fieldwork conducted in the first half of the 1970s).

We have shown that this dynamic is reflected in both psychological and behavioural outcomes for *contrada* members. Our evaluation of the attitude of members towards the *contrade* revealed variation patterned by *contrada* status (as own vs. other), and by the type of relationship between *contrada* pairs (as alliance vs. neutral relationship vs. rivalry). Across three *contrade*, mean reported attitude was more positive towards own *contrada* than towards other *contrade*; by relationship type, it was highest for alliance, followed by neutral relationship, followed by rivalry (Section 4.2). Our investigation of a key ritual in the *contrada* calendar (i.e. the day-long procession around the city centre held as part of a *contrada*’s annual patronal festival; Section 3.4) showed that the behaviour of members during the event varied systematically with territory type (as own *contrada* vs. other *contrade* vs. non-*contrada*) and, for other *contrade*, with relationship type. Across two *contrade*, over the course of the day the procession spent comparable amounts of time, around an hour on average, in own *contrada* territory and in the territory of allies, but less than half that time in the territory of *contrade* in a neutral relationship (Section 4.3). The time spent in the territory of the rival was negligible, around ten minutes on average, and comparable to the time spent in the three non-*contrada* territories (i.e. the cathedral, the central square, and the fortress; Figure 1).

These findings contribute to a large body of work demonstrating variation in human social interactions based on group affiliation. For example, across the social sciences there is extensive experimental evidence of a positive bias, in cooperative behaviour and other outcomes, towards members of the in-group compared to members of the out-group (see review in Böhm, Rusch, and Baron 2020). Much of this evidence relates to laboratory-based studies, often involving artificial groups (see meta-analyses in Balliet, Wu, and De Dreu 2014; Fischer and Derham 2016; Lane 2016). Our work indicates that variation in social interactions based on group affiliation also applies to natural groups in a contemporary urban setting. In particular, we have shown that, in this context, symbolic boundaries shape the attitude of members towards the different groups, and the behaviour of members during a ritual event involving physical effort and emotional arousal. Our work also points to the possible interplay between these psychological and behavioural outcomes: for example, the positive attitude reported towards the in-group is likely reinforced through participation in the ritual. The broader literature on group affiliation suggests that this pattern may extend to other outcomes in the *contrada* context, such as identification with the group (e.g. Purzycki and Lang 2019), prosocial behaviour and other forms of social support (e.g. Doğan, Glowacki, and Rusch 2018; Pisor and Ross 2021; Power 2017), and the adoption of norms and skills (e.g. Boyette et al. 2022; Bunce and McElreath 2017).

490 In closing, we wish to highlight the benefit of combining multiple sources of evidence, quantitative and qualitative, in the study of human group dynamics in a field-based setting. For example, in interpreting the findings we have emphasized the salience of the relationship between *contrada* pairs, and in particular classification of the relationship as alliance, neutral, or rivalry (Section 3.5). However, the attitude reported by
 495 members of one *contrada* towards a specific other are suggestive of a departure from such classification (Section 4.2). Accounting for this pattern in the data required careful consideration of ethnographic, historic, and other sources documenting the relationship between those two *contrade*, corroborated by extensive fieldwork observation (Section E). On a methodological note, we contend that open research practices can assist with the
 500 task of bridging quantitative and qualitative approaches in the context of field-based studies. For example, the analytical code that accompanies this paper balances the need to preserve participant anonymity against the goal to remove as little information as possible from the ethnographic description (Kraft et al. 2020; Meyer 2018). The code is licensed as free and open source software, thus enabling other researchers to run, study,
 505 modify, and distribute copies of it (Fortunato and Galassi 2021). As such, the workflow we developed as part of this paper can serve as a template towards improved reporting of field-based research into human behaviour.

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Author contributions

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