

## Short report

# EARLY BREAKDOWN OF ISOLATION REVEALED BY MARRIAGE BEHAVIOUR IN A LADIN- SPEAKING COMMUNITY (GARDENA VALLEY, SOUTH TYROL, ITALY, 1825–1924)

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**Summary.** The aim of this study was to investigate marriage behaviour from 1825 to 1924 in an Alpine valley inhabited by Ladin speakers (Gardena Valley, South Tyrol, Italy), where the particular geographic, linguistic and economic characteristics may have influenced the level of reproductive isolation. A total of 2183 marriage acts from the two main parishes of Santa Cristina and Ortisei were examined. Birth and residence endogamy, inbreeding coefficients from dispensations and from isonymy, birth place distribution of the spouses and isonymic relationships were analysed in four 25-year sub-periods. All the indicators considered point to a lower level of reproductive isolation at Ortisei, a main centre for the woodcarving industry, which appeared to be experiencing an early and effective breakdown of isolation. Marriage behaviour in the Gardena Valley between 1825 and 1924 seems to have been mostly influenced by socioeconomic factors rather than linguistic and cultural ones.

The Gardena Valley is a remote valley in the South Tyrol province, enclosed within the eastern Italian Alps and belonging to the Ladin linguistic minority. The Ladins speak variants of a Romance language that evolved following Roman penetration into the Alpine territory, then inhabited by the Reti. About 25 km in length, the Gardena Valley is bordered to the east by the Sella Massif, communicating with the Ladin valleys of Fassa and Badia, while to the west it opens out onto the Isarco Valley, the main route towards Germany. The three major settlements, from west to east, are Ortisei (1236 m), Santa Cristina (1428 m) and Selva Gardena (1563 m).

Studies on DNA polymorphisms have revealed low gene diversity (Pichler *et al.*, 2006) and high levels of linkage disequilibrium (Marroni *et al.*, 2006) in the Gardena Valley, probably due to strong genetic drift. A high genetic differentiation has been detected, not only between Ladin- and non-Ladin-speaking valleys but also between one Ladin valley and another, indicating that geography was the most important

isolating factor for the Ladins. The same conclusions were reached by a study on the distribution of surnames obtained from telephone directories in 60 Ladin and non-Ladin localities (Caravello *et al.*, 1999). However, within the framework of the South Tyrolean municipalities, the Ladin ones tend to cluster together (Lucchetti *et al.*, 2005).

In contrast to its geographical and cultural isolation, the Gardena Valley experienced exceptional economic and demographic development in comparison with other remote South Tyrolean valleys. The economy was traditionally based on cattle breeding and agriculture. Such activities were organized into farms where the buildings and land were considered an inseparable unit normally inherited by the first-born son. During the 19th century, the already present activity of woodcarving became a mainstay of the economy. The art school that opened in Ortisei in 1872 attracted numerous pupils and favoured a new trend in the production of holy art objects, which gave the valley new impulse and renown.

Tourism began in the mid-19th century with the arrival of climbers, followed at the beginning of the 20th century by the first skiers. As income from other activities increased, agriculture was progressively abandoned, sooner in Ortisei than in the rest of the Gardena Valley. Between the end of the 19th and the first 30 years of the 20th centuries cultivated areas decreased by 50% (Demetz, 1968). In 1856 a carriageable road was built connecting the Isarco Valley and Ortisei, although this was not extended to the rest of the Gardena Valley until 1890. By 1867 the Brennero Railway was running through the Isarco Valley, while a railway between the Gardena and Isarco Valleys was completed in 1916.

A considerable increase in population size was recorded at Ortisei between the Austrian census of 1869 (1096 inhabitants) and the Italian census of 1921 (1968 inhabitants), whereas the population size was stable at S. Cristina-Selva (1776 inhabitants in the year 1869 and 1766 in 1921).

The Gardena Valley's particular geographic, linguistic and economic characteristics may have affected its biodemographic structure. The aim of this study was to investigate changes in reproductive isolation between 1825 and 1924 by analysing the evolution of marriage behaviour in the valley's main parishes. To facilitate comparisons, indicators widely used in biodemographic studies of Alpine populations have been considered.

A total of 2183 marriage acts from the parishes of S. Cristina (including Selva) and Ortisei were examined. The very small parish of Bulla was excluded from the analysis due to the low number of marriages. Birth and residence endogamy (%), inbreeding coefficients from dispensations ( $\alpha$ ) and from isonymy (method B; Crow, 1980), as well as birth place distribution of the spouses, were analysed over four 25-year sub-periods (1825–49, 1850–74, 1875–99, 1900–24). The coefficient of relationship by isonymy  $R_i$  (Lasker, 1977) between the two parishes was calculated for each sub-period. From the  $R_i$  coefficients' matrix a bidimensional representation was obtained using non-metric multidimensional scaling. To avoid underestimating isonymy, surnames were corrected using the help of publications (Videsott, 2000) and local experts, restoring to the original Ladin form surnames that had been translated into German for administrative purposes (before its annexation to Italy in 1918, Gardena Valley was under Hapsburg dominion).

The number of marriages celebrated in the two parishes increases over time (Table 1), particularly at Ortisei between 1850–74 and 1875–99 (75%). In the first sub-period endogamy was very high at S. Cristina (93% per residence and 90% per birth), while at Ortisei it only reached 52%. Over time, values decreased in both parishes; at Ortisei the increasing gap between birth and residence endogamy values indicates increasing pre-marriage migration. In the first two sub-periods the vast majority of spouses were from the Gardena Valley (on average around 97% at S. Cristina and 90% at Ortisei), but the last two sub-periods found a higher percentage of spouses born in non-Ladin and other Ladin areas, markedly at Ortisei (Table 1).

The value of  $\alpha$  was similar in the two parishes in the first sub-period, but at S. Cristina it rose constantly, reaching  $3.8 \times 10^{-3}$  in 1900–24. At Ortisei variations were extremely modest, with a maximum in the third sub-period of  $1.6 \times 10^{-3}$  followed by a slight decrease.

The random component of inbreeding,  $F_r$ , which depends on surname distribution, and is in turn conditioned by the contrasting effects of genetic drift and gene flow, has higher and increasing values at S. Cristina, while at Ortisei it tends to diminish in relation to a strong increase in the number of surnames both for brides and grooms. The non-random component,  $F_n$ , which measures the deviation from random mating in the current generation, is generally low or even negative, in line with the scarce socio-cultural propensity to consanguineous marriages already evidenced in populations of South Tyrol (Riegler *et al.*, 2008). The changes through time of  $F_t$  and  $F_n$  appear less consistent than those of the other indicators. However, these changes depend on variations in the frequency of isonymic marriages, which are shown to be non-significant in both parishes according to the results of a two-sample proportion test performed on the highest and the lowest proportion.

The bi-dimensional representation of isonymic relationships in four sub-periods is presented in Fig. 1. The first two sub-periods show close genetic relationships between the two parishes. As of 1875–99 surname structure evolves at Ortisei while remaining static at S. Cristina, from which Ortisei tends to separate.

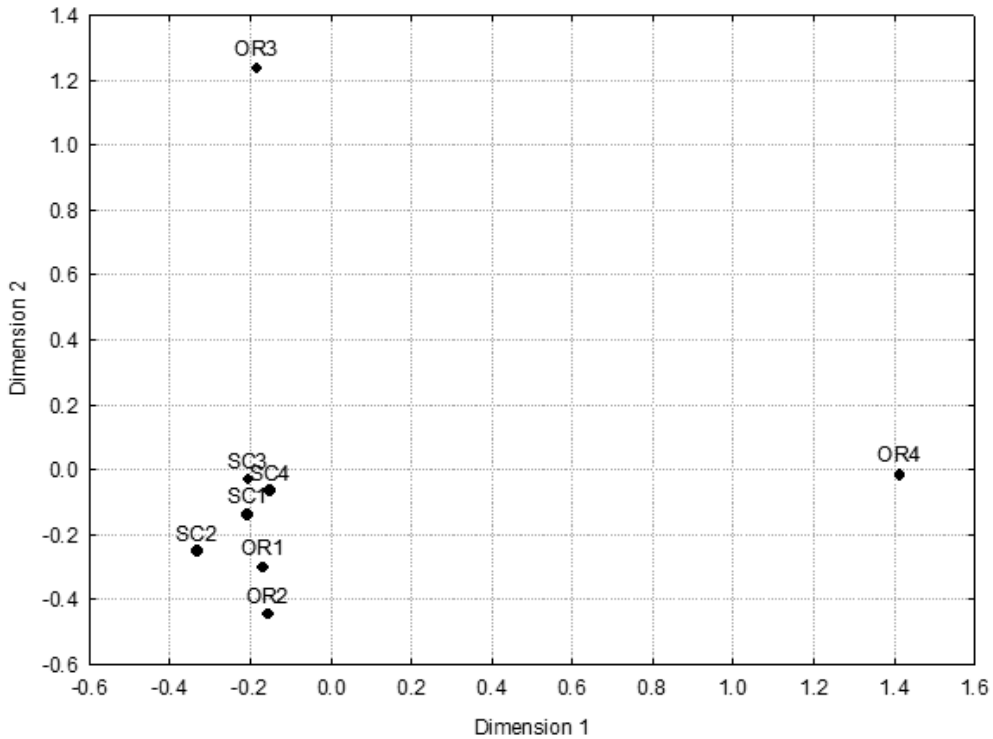
The biodemographic indicators have highlighted a different level of reproductive isolation between the two main parishes in the Gardena Valley although they are only a few kilometres apart and both belong to the same linguistic community. Indeed, when compared with S. Cristina, Ortisei reveals much lower levels of endogamy, different inbreeding trends, a higher percentage of spouses coming from non-Ladin areas and greater variability and evolution in surname structure.

Marriage behaviour substantially reflects the different characteristics of the two parishes in terms of socioeconomic development and travel communication facilities. While S. Cristina-Selva is situated higher up the valley, bordering exclusively on Ladin parishes and valleys, Ortisei, on the edge of the Ladin community, is closer to the gateway of the Isarco Valley, for centuries and still today a popular commercial route.

The economy of Ortisei, already a focus for the wood industry, was notably boosted during the second half of the 19th century due to both new job opportunities and improved travel communications towards and through the Isarco Valley. Economic development brought about a considerable population increase and an even more pronounced rise in the number of marriages. Indeed, the gradual withdrawal from agriculture may have removed the deterrent to marriage represented by the right

**Table 1.** Biodemographic indicators in two parishes of the Gardena Valley, South Tyrol, Italy, 1825–1924

	S. Cristina				Ortisei			
	1825–49	1850–74	1875–99	1900–24	1825–49	1850–74	1875–99	1900–24
Marriages ( <i>n</i> )	244	234	298	329	168	187	327	396
Birth endogamy (%)	89.8	72.6	68.1	62.6	51.8	47.6	37.0	29.8
Residence endogamy (%)	93.0	73.9	71.1	67.5	51.8	48.7	44.0	43.4
Spouses born in Gardena Valley (%)	96.7	97.2	91.8	90.0	92.6	87.7	73.9	70.2
Spouses born in other Ladin areas (%)	2.0	1.7	6.0	5.5	3.9	9.4	13.8	12.6
Spouses born in non-Ladin areas (%)	1.2	1.1	2.2	4.6	3.6	2.9	12.4	17.2
Consanguineous marriages (%)	11.9	21.8	15.1	20.4	14.3	8.6	9.5	9.6
$\alpha$	0.0011	0.0023	0.0030	0.0038	0.0010	0.0013	0.0016	0.0014
Isonymous marriages (%)	6.6	6.0	4.4	4.0	2.4	3.2	2.1	3.5
$F_t$	0.01654	0.01498	0.01076	0.00962	0.00593	0.00807	0.00536	0.00890
$F_r$	0.01260	0.01441	0.01409	0.01525	0.00679	0.00525	0.00473	0.00424
$F_n$	0.00399	0.00058	-0.00338	-0.00572	-0.00086	0.00283	0.00064	0.00467
Male surnames ( <i>n</i> )	47	34	57	60	72	70	111	150
Female surnames ( <i>n</i> )	55	42	63	72	58	68	109	143



**Fig. 1.** Bidimensional representation of isonymic relationships between two parishes of the Gardena Valley (OR = Ortisei; SC = Santa Cristina) in four sub-periods. 1: 1825–49; 2: 1850–74; 3: 1875–99; 4: 1900–1924.

of primogeniture. Santa Cristina was more marginally affected by these changes, showing a certain increase in the number of marriages and a decrease in endogamy.

Endogamy and inbreeding values at S. Cristina are within the range observed in German-speaking populations in South Tyrol (Riegler *et al.*, 2008), confirming a pattern of higher endogamy and lower consanguinity compared with the Italian-speaking communities and linguistic minorities of the neighbouring province of Trento (Pettener *et al.*, 1994; Martuzzi Veronesi *et al.*, 1996; Guerresi *et al.*, 2001).

Ortisei shows endogamy and inbreeding values among the lowest found so far in the Alps and also representing an exception to the known relationship between temporal changes in inbreeding and population size (Pettener, 1985). Previous findings in the eastern Italian Alps of a lack of increase or even a diminishment in  $\alpha$  values in the 19th and early 20th centuries, accompanied by a decrease in endogamy, generally refer to populations whose size was decreasing, such as the Upper Sole Valley (Martuzzi Veronesi *et al.*, 1996) or the village of Curon (Riegler *et al.*, 2008). In these cases, due to the practice of virilocality, the reduced isolation inferred by the marriage acts recorded in the bride's parish in fact simply reflects an increase in emigration of brides, with no substantial changes in the surname structure of the population remaining in the valley (Guerresi *et al.*, 2000). At Ortisei, instead, the scant evolution and

subsequent reduction in inbreeding originate in a population that was undergoing a steady increase in size. Here, the increase in the number of both male and female surnames and the evolution in isonymic relationships indicate that immigration is a component in demographic growth and that the population between the 19th and 20th century was indeed breaking out from its secular isolation, sooner in fact than generally observed in the eastern Italian Alps (Gueresi *et al.*, 2001).

On the whole, the evolution of marriage behaviour and reproductive isolation in the period 1825–1924 in the Gardena Valley appear to have been mostly influenced by socioeconomic factors rather than linguistic-cultural ones. However, the high percentage of spouses born in the Gardena Valley recorded in both parishes points to major geographic isolation of the valley as a whole until after the mid-19th century.

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