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Fabienne Wateau

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An object and the social order: From a graduated reed for measuring water to the principles underlying a rural Portuguese community.

Fabienne WATEAU

CNRS UMR 7186, Paris Ouest Nanterre la Défense

Abstract

This cognitive interpretation of an instrument for measuring water – a graduated reed used in north-western Portugal during the summer irrigation season – brings to light the principles and values that shape a rural community. Water distribution does not follow a rationale based on the physics of water-flow or the economics of profit-making. Instead, it uses a social rationale based on the population's distribution over the land and on principles such as seniority, authenticity, hierarchy, deference and fairness.

Keywords: cognition, deference, fairness, hierarchy, irrigation, Portugal, measuring techniques

The cut reed is a singular measuring instrument for sharing out summer irrigation water. Its use has been observed in Melgaço, a wet mountain district in north-western Portugal where the land is used to grow mixed food crops, maize and grapes. The technical, practical and social interpretation of this reed brings to light some of the rules and working principles of the community in which it is used. How can a society be understood through an object? How should we read and interpret the marks made on the reed, explain the intervals between them, or understand the meaning of an idiomatic expression that is constantly repeated during the irrigation season? What is the social rationale underlying the distribution of turns to take water, and what shared principles and values does the practice of irrigation require and involve in Melgaço? These are the questions that this article seeks to answer¹.

An object: the reed

In north-western Portugal, reeds known as *canas* are used to measure and share out the irrigation water contained in reservoir ponds of irregular size and shape. The use of canes as water-measuring instruments is not specific to this region: it can also be observed in Spain (in Galicia and Andalusia) and Morocco (Chiche 1984)². However, although they respect the same principles of sharing, these measuring tools can be of different materials, shapes, sizes and adaptations³. They are used to gauge the quantities of water available; to divide a reservoir of common water into a number of shares.

The *canas* of Melgaço are straight reeds: woody, cylindrical, hollow and rigid. They are entirely stripped of leaves and divided into two parts: the lower section, which is long and regular, is used for measurement; the upper section is bent over and used for attachment. The lower part, about four-fifths of the total length, is marked by short sticks that are trimmed and inserted into it and/or knotted cords made of plants or twigs; this is the part actually used for measuring. The upper part, the other fifth of the reed, is bent horizontally, to form a right angle with the lower part. This is wedged under a heavy stone on the edge of the pond to hold the instrument in position. The height of the reeds depends on the depth of the ponds in which they are going to be used; in Chaviães, they are between 150 and 230 cm long (Figure 1).

The ponds, known locally as *poça* and *charco*, vary in both shape and capacity. They collect rainwater, spring water and water from channels fed by mountain streams. They all have an outlet hole with a plug (usually a thick stick) and, in summer, a *cana* to measure the quantity of water they contain. The outlets are regularly opened and closed for the purposes of irrigation. The *cana* is always installed in the same place, near the outlet.

The pond water is measured and shared out by volume: each user has the right to a certain share of the volume of water contained in the basin. On the lower part of the reed, each interval between two of the marker sticks or twigs corresponds to one share of water; there are as many shares as there are intervals, and as many intervals as there are rights-holders. The intervals between the surface of the water (before the outlet is opened) and the first marker, and between the last marker and the bottom of the reed (or the bottom of the pond) also represent shares.

Before being marked, the reed is plunged vertically into the pond at exactly the same spot where it will subsequently be wedged in place during irrigation. The length of reed that is wetted corresponds to the amount of water available for sharing out, and the water shares are then calculated on the basis of this length. The whole length represents a “pondful” (*uma poçada*), half the length is a half-pond (*meia poçada*), half of this is a quarter-pond (*um quarto de poçada*), etc. The shares are not equal: one right-holder may possess a whole pondful (*uma poçada*) while another

¹ This article is an abridged reworking of a paper presented at the conference “Practices and fields of anthropology in Portugal”, Associação Portuguesa de Antropologia, Lisbon, 15-17 November 1999. I would like to thank Joaquim Pais de Brito, Anibal Frias and Jean-Marc Battner for their constructive criticism.

² And probably also in other parts of the world, as this technique of holding water in hillside ponds, pre-Roman in Portugal, is specific to systems of irrigation by gravity (Ribeiro 1987).

³ Movable, made of wood or other plant matter (rowan, fig, pine, reed, etc.) or of iron; fixed and painted or cut into a wall (Argemir Relat *et al.* 1995; Chiche 1984).

may only possess an eighth of a pond (*um meio quarto de poçada*) or less (a sixteenth). A reed leaf is cut to the length of the wetted part of the cane, thus becoming the standard measure representing a full pond of water. This leaf is folded as many times as necessary (in two, four, eight, etc.) according to the shares of each of the rights-holders (a half, a quarter, a “half-quarter” of a *poçada*). The resulting measures are transferred onto the reed, which is notched or knotted at the places indicated by the leaf, so that each person’s share of water is represented. It takes about ten minutes to calibrate a reed in this way.

Once it has been marked, the reed is put back in the pond and the upper part is wedged firmly under a stone on the edge of the retaining wall, so that it can no longer move. The marker sticks or knots are now submerged, and irrigation begins with the opening of the pond outlet. The first person to irrigate uses the water until the level in the pond reaches the first marker, the one highest up the reed. The second person then irrigates the quantity and time between the first and second marker, and so on until the pond is completely empty.

The users of these *canas*, reservoir ponds and summer irrigation water are called *herdeiros* (heirs), because they have inherited water rights from their direct ascendants or acquired them through marriage. These private water rights are subject to partible inheritance. So the shares of each person vary, depending on their family’s wealth and number of children and on whether the inheritance is divided equally or in favour of one particular child (Wateau 2000). Each pondful of water (*poçada*) has a specific number of *herdeiros*, and each *herdeiro* owns the right to a specific quantity of water. On average, each irrigator can use water from a pond every eight to ten days, the time it takes for all the rights-holders to have their turn. This complete cycle is called a *giro* or *roda*. Only the *herdeiros* possess summer water rights.

The reeds are only used during the summer, i.e. from June to September. They are ephemeral objects, discarded once they have been used, sometimes only once, sometimes several times or even during several weeks up until the end of the irrigation season. After September, these measuring objects, abandoned by the side of the ponds, are swept away by wind, rain or roadman⁴.

These canes are also objects of spatio-temporal measurement because, like stones used for sharing out water, sun dials, clepsydrae or sound horns, they enable their users to punctuate and give rhythm to space and time. They contribute to the technique that establishes the linearization of time (Betti 1996: 269).

A principle: rotation

This system of measurement which divides the water into shares, rather than hours and minutes, is well-adapted to the irregular shape of the ponds, their relative silting and their variable capacity. At the beginning of the irrigation season, when surface run-off is still abundant, these ponds fill quickly, but in the height of summer, when springs provide their only supply, the water levels fluctuate considerably. Through this system of division into shares, each person receives their same specific fraction of water, their same percentage, in terms of both their own rights and the rights of others. The ratios of proportion, always exactly the same, are strictly respected. Here, the measurement is one of comparison rather than counting (Crump 1995: 147).

The intervals on the reed that represent these shares are of unequal length because they correspond to assets of different sizes (to beneficiaries and families with different levels of capital). So they do not represent a model of equality in the sharing of water. On the contrary, they clearly mark and display the inequalities between beneficiaries with regard to water rights. This display of inequality is rarely to be found on sticks and canes used for water-sharing outside

⁴ The different water-measuring sticks I have gathered during my stays in Portugal and Spain, made of reed, pine and rowan, with knots or inserted cross-pieces, are kept in the National Museum of Ethnology in Lisbon.

Portugal: in Spain and Morocco, for example, the intervals are equal, regular and equidistant⁵ (Argemi Relat *et al.* 1995; Chiche 1984).

The reed and its intervals represent a different model, inherent to the functioning of the irrigation, which can be observed every time the water is shared out, because there is a *rota* (or a sequence) and a rotation inscribed on the reed: this is the model of fairness.

Each interval corresponds to a person and his position in the order of distribution of the water: he may be in first place (his share is at the top of the reed, between the surface of the water when the pond is full and the first marker), in second place (between the first and second markers), in third place (between the second and third markers), and so on. The reed therefore displays, first of all, the progression of *berdeiros* one after another: an organised sequence of individuals or a *rota*. Over time, this sequence involves a rotation of people who take over from, succeed and replace each other in taking their shares of water.

This rotation is described and respected in an idiomatic phrase. The *berdeiros* sum up its rationale in these few words: “*Quem está a frente, vai atrás*”⁶, which means that the person who was in front on one day (the first to irrigate, in other words) will be at the back on another day. This principle of rotation also applies directly to the cane, because, at the end of each *giro* of the pond, the same three or four *berdeiros* who shared the water on the first day of the first *giro* will again meet up and share the water on the first day of the second *giro*, but this time they change the order in which they take their water. So they will make up a new cane, which will have the same intervals, but in a different order⁷.

This rotation is a *roda*, in the conceptual sense of the term, that is to say that it is not a simple action of alternation or movement, but a structural and structuring principle of the society itself (Brito Pais 1990). In rural, community-based societies, like Rio de Onor in the Trás-os-Montes, *rodas* lie at the very foundation of social organisation, reflecting and explaining the geographical distribution of houses, the organisation of collective work, control of the group, the tasks and responsibilities of each person (*id., ibid.*). This working principle, which has been observed in several places in Europe for stock-herding (Dias 1948; Redclift 1973), in the form of reciprocity during hard tasks like harvesting (Dias 1953; Niederer 1965) or in killing the family pig (O’Neill 1989), in the distribution of glacier water or the use of the communal bread oven (Macherel 1984), is applied to irrigation in northern Portugal (Dias 1953; O’Neill 1984; Wateau 2000). The *rodas* underpin a working rationale of a social nature, using and reflecting principles and values that are shared by everyone, and are for that reason strongly affirmed.

“The concern for fairness” (Brito Pais 1996: 226, our translation) is stronger than the concern for equality. In Melgaço, despite the existing and visible disparities in the possession of water rights (and, by extension, other property), nobody ever argues for an equal share for everyone, or *to each the same share*, but for the same rule for everyone, expressed in terms of rights: *to each according to his right*. It is not inconsistent to assert fairness and at the same time to maintain inequalities (O’Neill 1984). What comes from the ancestors, including the disparities perpetuated over the generations, is not questioned; on the contrary, it is valued all the more. On the other hand, it is intolerable for different practices or behaviours to be applied to an activity, such as irrigation, for example. By constantly repeating this phrase “He who is in front goes to the back”, the rights-holders vigorously assert the respect of a rotation and thereby the establishment and respect of a form of fairness. But this rotation is not an “illusion of equality” or a delusion consisting in making believe that everyone is equal (O’Neill 1984: 201), for it does not mislead anyone in Melgaço, nor does it camouflage the existing inequalities; it may blur them slightly, at the very most. This

⁵ This does not, however, mean that the water owners are equal, for several intervals may correspond to one and the same owner, who therefore has the right to more water.

⁶ Literally: “He who is in front goes behind.”

⁷ Let us take three imaginary rights-holders: Manuel, Emília and Clara. If Manuel was the first to irrigate during the first *giro*, Emília will be the first for the second *giro*, and Clara will start the third. Manuel will be in last place for the second *giro* and in second place for the third. There is a rotation of the beneficiaries, as “he who was in front goes to the back”; the cane is marked differently, because the interval that was “at the front” also “goes to the back”.

fairness, despite or beyond the inequalities, is the first of the collective structuring principles that we can read from a simple reed.

A rationale: seniority

Moving on from the reed in its reservoir pond, a study of the general distribution of irrigation water in a parish helps to explain how, why and following what rationale this fairness – and consequently the rotations implemented in practice and represented on the reed – is established. The principle of fairness is associated with another model and another rationale which, by enabling the combination of inequalities and the strict affirmation of fair rotations, defines, maintains and reproduces the existing social order.

In Chaviães, a parish in the district of Melgaço sandwiched between the river and the trunk road, on a steeply sloping hillside, a network of ditches is also used for irrigation. Following a rationale based on the physics of water-flow, the parcels of land should be irrigated from the top down; following an economic rationale for the optimisation of water, they should be irrigated from the top down and by watering adjoining parcels one after another, to minimise water loss. But in Chaviães, neither of these rationales of distribution is respected.

The distribution follows a seven-day rotation, comprising seven distinct *giros*, involving various different localities in the parish and, for each of these, several groups of parcels and rights-holders. The principle of rotation described above is respected at each of these levels of distribution. Here, there are five levels of rotation. The weekly rotation can be considered the *roda das rodas*, as it encompasses the four others⁸. The water arriving from the highest part of the parish is not used to irrigate the highest parcels first; it goes to irrigate the land around the church, lower down. Then the water “comes back up”⁹ to irrigate the land on either side of the trunk road, at the top of the parish. It continues its course higher up, comes back to irrigate the land near the river, lower down, returns to higher land, passes close to the church and finishes its course at the bottom of the parish, on one of the slopes.

The circulation of water appears quite chaotic on paper (Figure 2), but it does in fact follow a certain hierarchy of areas. The church lands are the first to be irrigated, followed by the lands around the trunk road. All the other land is watered in a relatively regular back-and-forth manner, as if no definitive decision has been taken as to the destination of the water. The first areas to be irrigated are those where people have been settled the longest: the church constitutes an important focal point in the parish, around which houses are concentrated; the road, axis of communication, is the other most densely inhabited zone, for reasons of convenience, trade, contact and the circulation of men and goods. Up until 1996, this was the only road that crossed the district, connecting it with Spain and the rest of Portugal. In other words, the distribution of water through the ditches is based on a certain rationale of seniority in the occupation of land, corresponding to the (original) distribution of the population over the territory. There is therefore an evident, “considered” link between topography, spatial occupation and irrigation.

This representation makes sense on a local and an ideological level. Both on the scale of irrigation and of the society as a whole, the inhabitants like to explain their actions in terms of tradition and

⁸ These levels are: 1. the rotation of herdeiros, described above with the reed, by which the beneficiaries of one parcel or group of parcels succeeding one another and alternating the order in which they take the water. 2. A rotation in the groups of parcels, by which each denominated group of parcels belonging to a same locality (three or four groups, in general) are the first to receive the water at least once. 3. A rotation between the different localities in the parish, involving the circulation of the water back and forth over the whole parish (this rotation, once respected, has now been abandoned; for the sake of convenience, the herdeiros have established a fixed rota, corresponding to the particular social rationale described below). 4. A weekly rotation between two parishes (Chaviães and Roussas) which share the same irrigation water, each parish getting all the water during alternate weeks. 5. A rotation between odd and even years, determining whether Chaviães or Roussas gets the water during the first week of the summer irrigation season (as the season lasts seven weeks, each parish obtains either three or four weeks of water, depending on the year). For more details, see Wateau 2000.

⁹ By means of sluice gates in the ditches, which divert and orientate the water.

ancestors, as if these were endowed with a divine, transcendental and sacred nature (Dias 1948: 86-87). This rationale of seniority and its two corollaries, deference and respect of the hierarchy, have been studied in two other spheres: with regard to goods and property, and with regard to conflicts. The community attaches, for example, greater value to inherited goods than to acquired goods: because the former come directly from one's ancestors and are considered legitimate; because the latter are the result of a personal initiative, carried out during one's lifetime, and feared by the group because they may entail a reorganisation of existing relations. There is a strong dichotomy between inherited goods and acquired goods, the former are accepted (including inequalities in wealth and status), the latter are treated with suspicion. Another example can be found in the case of a conflict between the inhabitants of a mountain parish and those of a valley parish over a question of water management. In this dispute, the seniority that confers legitimacy was used as an argument of selection and distinction. The mountain dwellers, who defined themselves as "authentic" – no doubt because they lived in areas that had, historically, been occupied for longer –, considered the latter as "usurpers" who had displayed a lack of respect towards them by adopting a technical innovation in the valley (Wateau 2000). Again, the inheritance of a tradition and longer-established occupation of the territory prevails in speech and representation over what is (or is considered as being) more recent.

The strength of the model of hierarchy in Melgaço (hierarchy of areas, goods and individuals) is a constituent element of its social order. Deference to the eldest, the "most senior", the richest or the best-educated corresponds to expected behaviour, to a value respected and shared by everyone. It reaches beyond the simple context of irrigation, where the broad lines of these collective representations are carried within the technique, because we are dealing with a "circuit of deference", a course emphasising and recalling the existing social order in Melgaço. The rationale of water distribution is therefore perfectly logical from an ideological point of view: it is neither physical nor economic, but social because it is governed above all by social reasons.

Combined with this powerful principle of hierarchy, the principle of fairness appears to restore a certain balance to social relations and give greater practical flexibility and justice. In spite of everything, it almost certainly also makes it easier to tolerate the disparities within the group. The rotations, the order of which is determined by drawing lots on the eve of the irrigation, arise entirely from the rationale of fairness. Subject to chance and mechanical repetition, they depend, in other words, on something that is detached from individuals and is, for this reason, recognised as being a more neutral and more just way of deciding on the organisation of the most complex tasks, or those that are most difficult to share out – a reliable way to ensure their management and balance. Here, fairness and hierarchy are the two constituent, organising sides not only of irrigation but of the whole society.

Conclusion

The instrument "is not only a term designating a material object, a tool or a mechanism; each activity has its own instruments, its theoretical or material constructions, incorporated in a mechanism, written on paper, recorded on some kind of computer support or quite simply *thought*; the instrument is an *idea* before acquiring a physical dimension" (Betti 1996, our translation). And each individual must acquire a set of collective representations in order to think and act as a member of a community. Language, culture and material production are interconnected (Boyer 1991). This article has sought, through the cognitive interpretation of an object – an instrument for measuring volumes of water –, to elucidate some of the principles and values that govern the social order in Melgaço or, to put it another way, to show how the interpretative analysis of objects can open onto the anthropological study of societies, and more particularly onto the identity of subjects. The reed represents individuals, rights, the measurement of shares, affirmed principles, working models, rationales of organisation, that is to say representations and acts, and therefore a part of the society itself. It is the representation of a

logical principle of social organisation, a moral principle, and almost certainly also a value norm for behaviour.

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