



The Social Life of Iron

A Cross-Cultural Study of Technological, Symbolic, and Social Aspects of Iron Making

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Abstract. – Activities and tools connected with iron almost everywhere seem to be symbolically loaded. On one hand there seems to be striking cross-cultural similarities in symbolism constructed around the smelting process in the furnace. On the other hand this symbolism contrasts dramatically with the one constructed around the forging process in the smithy. Iron symbolism is ambiguous as it may be associated with contrasting ideas – destruction versus production, death versus birth, male versus female. By exploring three case studies (Fur, Fipa, and Nepal), we shall search for conditions underlying universal similarities as well as culture specific variations in iron symbolism. [*Sudan, Tanzania, Nepal, Fur, Fipa, blacksmiths, caste, iron symbolism*]

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1 Introduction

The invention of iron smelting technology revolutionized man's means of destruction. With the possible exception of ornaments, the first iron artifacts were daggers, followed by spear-points, and swords, while iron tools like hoes and axes occur later. In many of the great civilizations, it is the destructive (not the productive) aspects that people generally associate with iron. The general impression is that iron tends to be associated with males, with strength (physical as well as mental) and dominance. Interestingly iron objects predominantly also are associated with evil forces. On this background it seems intriguing that iron smelting activities are generally metaphorically associated with sex and procreation, and the smelting furnace with females. This is a puzzle we shall address in this article. Although there are variations in the "webs of significance people spin" (Geertz 1973) around objects and activities involved in iron smelting, there seems to be global metaphorical similarities that are difficult to explain only as a result of diffusion of ideas or migration of people. We are not denying the importance of such processes, but we think there are panhuman experiences underlying cross-cultural similarities in metaphorical associations. In order to explore this, we shall look at the concrete practices involved in iron smelting.

On the basis of three cases, we shall analyze the interconnection between the tools and practical

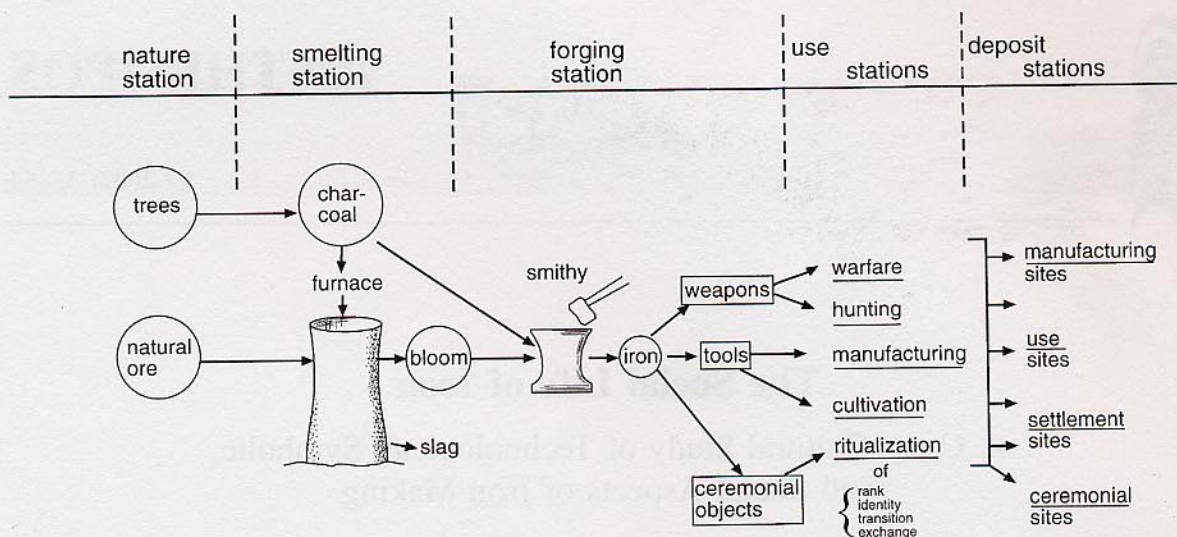


Fig. 1: Trajectories of iron.

tasks iron smelting involves, the social organization of its execution, and the symbolic processes it is embedded in.

2 Analytical Perspectives

As a starting point for our analysis we shall draw in Barth's argument that we need to "understand behavior *simultaneously* in two, differently constituted, contexts. One is the semiotic one, where strings of events are shaped by actors so as to embody meanings and transmit messages and thus reflect the rules and constraints of codification. But the same events also enter into the material world of causes and effects, both because acts have consequences and because persons must relate to others who also cause things to happen" (1981: 3).

This advice we shall combine with Appadurai's ideas about the social life of things – "it is things-in-motion that illuminate their human and social context" (1986: 5). We shall focus on iron and its movement from raw natural ore through various stages of extraction, manufacturing, use, and deposit. In order to understand the practical concerns behind the movement of iron objects through their trajectories, we have to place both the producers and the consumers of iron products in technological and organizational contexts, as well as in the context of symbolic structures informing peoples understanding of the "movement." "It is only through the analysis of these trajectories that we can interpret the human transactions and calculations that enliven things" (Appadurai 1986: 5). Appadurai has emphasized that at "stations" close

to production we may expect to find culturally standardized recipes for fabrication, while there may be far less standardized knowledge at later "stations" in the trajectories of things (Fig. 1). In the diagram we have tried to illustrate important "stations" on the trajectories of iron products from their occurrence as ore in nature; to the furnace where iron ore is transformed to bloom and slag; to the smithy where the bloom is forged to iron artifacts; to the situations where the artifacts are used for specific purposes; and finally to the place where the artifacts are deposited. What takes place at different "stations" (nature, smelting, forging, use, deposit) may evoke different kinds of metaphoric associations and may stimulate cultural constructions of different symbolic connections. An important point is the extent to which people in specific communities link the associations developed at different "stations" to each other in conceptual relations of similarity and contrasts.

At the first "station," iron ore is separated from its natural location. From there it is brought to the smelting "station," the furnace, where ore is smelted to iron bloom. Cross-culturally we find that the objects and activities involved at this "station" are loaded with subjective as well as objectified symbolic meanings that metaphorically may be connected to very different domains of social life. Objects and activities in the forging "station," the smithy, will only be sketched for the simple reason that we have fewer observations in this field. Concerning the fourth "station," where iron objects are used, we shall only draw on them to elaborate specific points where we have reasons to believe that objects and activities involved "feed

back" on the meaning of iron in general. Throughout the paper, we will try to interpret the meaning of objects and activities involved in iron making by exploring their symbolic position in wider systems of signification.

In our analysis of the trajectories of iron products we are struck by the extent to which we not only find gross similarities in distribution of technical knowledge at the smelting "station" among culture-historically widely separated communities, but that we also find gross similarities in meanings the actors confer on objects and activities at this "station." As we move through the trajectory towards the right in the diagram, the variation in symbolic meaning among different communities increases. In our analysis of symbolic variations we shall draw on perspectives developed by Lakoff and Johnson (Lakoff and Johnson 1980; Johnson 1987, 1993; Lakoff 1987).

The trajectories of iron are caused by certain actors moving objects according to a plan for reaching a goal. What takes place at the smelting and forging "stations" shares the features that Lakoff and Johnson (1980) say characterize a prototypical case of direct causation, implying that objects through human manipulation are transformed from one kind of thing to another kind of thing. What was natural ore has after the smelting in the furnace become bloom; what was bloom has after forging in the smithy become iron objects for practical and symbolic use. Through such transformations iron objects acquire different form and function and are categorized as different things. The transformations at the smelting and forging "stations" are instances of *making* and this is different from the kind of direct manipulation that take place at the use "stations" and deposit "stations." Changes from one state into another Lakoff and Johnson conceptualize in terms of the metaphor *the object comes out of the substance* (e.g., he made bloom out of the ore, he made spears out of the bloom) or by the metaphor *the substance goes into the object* (e.g., he made bloom into spears). "These two metaphors for *change* which are used as part of the concept of *making*, emerge naturally from as fundamental a human experience as there is, namely birth. In birth, an object (the baby) comes out of a container (the mother). At the same time, the mother's substance (her flesh and blood) are in the baby (the container object). The experience of birth (and also agricultural growth) provides a grounding for the general concept of *creation* which has at its core the concept of *making*, a physical object, but which extends to abstract entities as well" (Lakoff and Johnson

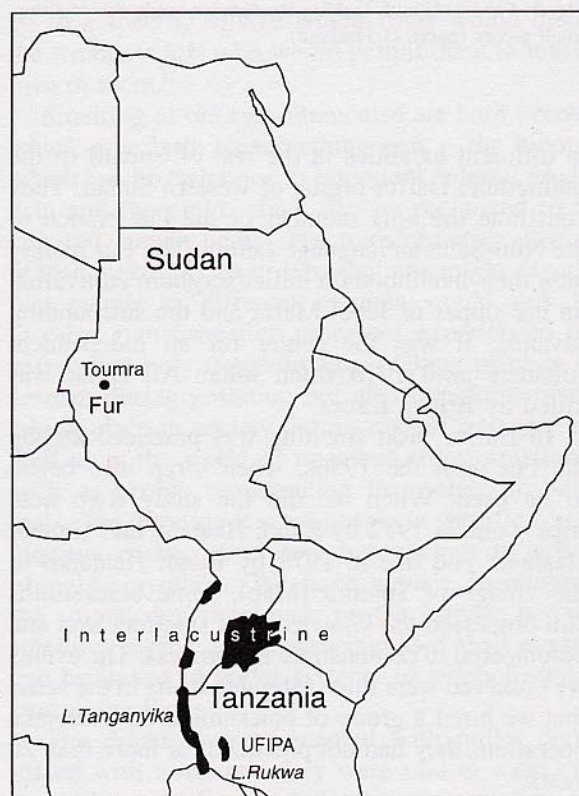
1980: 74). The webs of significance people spin around iron in its different manifestations is from this perspective grounded in basic experiential *gestalts* that also may be manifested in imagery connecting different aspects of iron working to other objects and activities, e.g., procreation, use of fire, pottery making, and cooking.

3 The Case Material

Descriptions of the physical iron producing structures (the furnace and the tuyeres), the inputs (ore and charcoal), the transformation process (smelting by fire), the human activities in the transformation (blowing the bellows), and the output (the bloom) in three case studies (two from Africa and one from Nepal) provide the basis for analysis of the organizational and symbolic contexts at the second "station," the furnace.

3.1 Fur of Western Sudan

The Fur are the largest ethnic group (about two million people in Darfur and probably just as many



Map: Main localities mentioned in the text.



Fig. 2: Fur blacksmith making the furnace ready for smelting. Note the women in the background to the left, crushing iron into small pieces (photo G. Haaland).

in different localities in the rest of Sudan) of the multiethnic Darfur region of western Sudan. They constitute the only member of the Fur branch of the Nilo-Saharan language family. The Fur mainly base their livelihood on millet/sorghum cultivation on the slopes of Jebel Marra and the surrounding savanna. It was the center for an independent sultanate until 1916 when sultan Ali Dinar was killed by British forces.

In Darfur, iron smelting was practiced among the Fur until the 1950s, when scrap iron began to be used. When we did the study (two field trips – one in 1972 by Randi Haaland and Gunnar Haaland, and one in 1978 by Randi Haaland) in the village of Toumra (Map), some blacksmiths still possessed the knowledge of smelting iron and volunteered to demonstrate the process. The events we observed were thus instigated by us in the sense that we hired a group of blacksmiths to undertake operations they had not practiced for more than 20 years.

3.1.1 The Technological Context

The blacksmiths constructed a simple shaft furnace with a slag-pit. A shaft less than 1 m high made of clay soil was erected on top of an excavated pit 50 cm wide and 60 cm deep. The furnace walls were 4–5 cm thick and were made of clay from soil found in the village surroundings.

Radiating around the small furnace were 4 holes for the tuyeres. Each hole held two tuyeres each (7 holes for big furnaces). The tuyeres (30 cm long) were made of heavy red clay and moulded around a wooden stick before they were left to dry without being fired. Sheep or goat skin was used for the bellows, which were attached to the tuyeres. When the furnace was completed, plant fibers were tied around the shaft to prevent it from cracking during the smelt. By using millet/sorghum flour mixed with water, the blacksmiths painted some crude animal figures, said to represent camels, on the outside walls of the furnace. According to the smiths, the drawings served to protect the smelt from the evil eye (Fig. 2). The important point

is not the particular animals the blacksmiths said they were drawing, but the material they used for the paint (in the Fur language, such mixture is called *bora fatta*, literally meaning "milk white," i.e., mother's milk – a most important element in Fur symbolism of solidarity and support).

About 100 kg of large lumps or blocks of iron ore were crushed into smaller pieces before the smelting began. The crushing was the only task in the smelting process where females (the wives of the blacksmiths) participated. When the ore had been crushed, the furnace was made ready for smelting to begin. Stalks of millet were put at the bottom of the furnace pit, then wood and half a gasoline tin of charcoal, followed by the same amount of ore. The smelting was done as a work-party. All the participants were blacksmiths (*mir* in Fur language). When the smelt was completed, the furnace was broken up and the iron bloom removed from the bottom of the pit.

The main focus of our fieldwork was to explore the amount of charcoal required to transform a certain amount of ferrocrete sandstone to a certain amount of iron and slag, with a view to estimate how much firewood would be required to make the charcoal needed to produce specific amounts of iron and slag. On the basis of the ethnographic material from Darfur we were able to establish a set of important causal ecological linkages related to the smelting "station." Given the smelting technology and the quality of the ferrocrete sandstone ore, we were able to make fairly realistic estimates of the amount of wood required to make the amount of charcoal required to transform a certain amount of ferrocrete sandstone to specific amounts of iron and slag. By comparing the rate of forest off-take involved in iron smelting with the rate of forest regeneration, we got a basis for evaluating the impact of iron production on vegetation cover. In Darfur we could not see any indication that iron production had led to deforestation and ecological imbalances.

3.1.2. The symbolic Context

The few observations we made of symbolic aspects of iron smelting we shall now try to connect to more general symbolic structures in Fur society. Drawing on Lakoff and Johnson, we shall start with the assumption that since both mother and furnace have container shapes, and since in both containers different *kinds* of things are made – in one case babies and in the other iron – the metaphoric association between iron making and birth

is close at hand. In cases where such associations are made one would expect further metaphoric connections relating iron smelting activities to sexual intercourse. Such connections may be of very different orders. It is one thing that subjective sexual associations are evoked, or triggered, when tuyeres are put into the holes of a furnace and air is rhythmically pumped into it. It is another thing that smelting and intercourse is made into an objectified conventional symbolic connection expressed in songs, proverbs, vocabulary, and furnace shape. The subjectively experienced association may stimulate creation of objectified symbolic expressions, but not necessarily.

Let us first look at the more subjective level of associations, which the observation of iron smelting made on us, and we believe, on the participants as well. It does not take much imagination to associate the tuyeres and the attached bellows with the penis, and the blowing of bellows with sexual intercourse. During the blowing operation, the blacksmiths occasionally worked themselves up in rather ecstatic rhythm towards a climax after which they returned to a more leisurely pace. These phases were accompanied by intense singing and exchange of challenges between the bellow blowers. Smelting songs contain very explicit sexual references – in one encouraging the participants to go to a specific village where "they would meet the women's *faki* who would permit them to make love to them."

Smelting of ore and intercourse are both events which give birth to something new – the bloom which can be fashioned to important cultural products and the child which can be socialized to a cultured human being. The transformative aspect of iron making is so striking that one might expect that people in different cultures would link it to other transformative processes experienced in nature, not only transformations taking place in a woman during gestation but also transformations taking place in society during *rites of passage*, as well as in the world of imagined transformations such as people transforming themselves to animals. The question is what people in specific communities make out of such associations in terms of public symbols. We have already mentioned the animal drawings made on the furnace before smelting begins. These drawings, we shall argue, can be linked to wider systems of symbolization among the Fur.

The drawings were painted with millet flour mixed with water and they were said to ward off the evil eye. In Fur symbolism, such a mixture of flour and water is called *bora fatta* (milk white)

and is generally metaphorically associated with mother's milk which is seen as a metonym for solidarity in its prototypical form, namely the relation between mother and child (G. Haaland 1969, 1972, 1998). The *bora fatta* complex contrasts with two other qualities assumed to be present in human relations, namely betrayal in its prototypical manifestation as witchcraft (*kar*) and envy manifested in the idea of evil eye (*nungi toké*). *Bora fatta* symbolism is typically invoked during events of critical importance in Fur society like birth, circumcision, sickness, rain rituals, and war rituals. The power of the symbolism has its roots in the nurturing and security experienced in the mother-child relationship, and in the contrast of this relationship to forces (mystical, social, and natural) which are conceived as threats to human well-being. The technical process of iron smelting is a critical event like childbirth. It may go wrong and leave the iron not properly separated from the ore. Worries about such failure were expressed as a fear of other peoples' evil eye. Use of the *bora fatta* associated item, millet flour mixed with water, in the context of Fur symbolism, is the appropriate protection against such evil forces. We will again strongly emphasize that the salient symbolic aspect of the drawings is not the animals drawn – in fact the blacksmiths did not care much about stylistic elements in the picture drawn or similarity to the animal they said it represented.

The blacksmiths thus engage in a critical technical transformative process which is metaphorically associated with critical phases in the human reproduction process – processes which both are protected by *bora fatta* symbolism.

The transformative aspects of blacksmiths' activities are further elaborated in the common belief that blacksmiths are able to transform themselves into animals like hyenas, dogs, and lions – animals that are both feared as unclean and dangerous. Beliefs in the mystical power of blacksmiths is also manifested in the idea that they have power to control thunder and lightening, and that the blacksmith can kill wrongdoers such as thieves by a strike of lightning.

In order to get further into symbolic aspects of iron making, we shall explore the webs of significance people have spun around the blacksmiths who execute this task. Blacksmiths are labeled by the strongly derogatory term *mir*. The *mir* constitute an endogamous group where males are associated with blacksmith occupation and females with pottery making. Iron working and pottery making are seen as two complementary activities intimately connected within the *mir* category (R.

Haaland 1985). The two activities and the objects they deal with have features that convincingly can be used to symbolize similarities as well as differences in other domains of experience. Both involve transformation of natural things (ore to iron, clay to pot) by the use of the same transformative agent – fire. The transformation of ore to iron does take place in a container (the furnace) similar to the pot – both are constructed from clay but they differ in the sense that the furnace is sun-dried while the pot is fired. The two containers are similar in the sense that they are vessels for transformation of natural items (ore and grain) to cultural items (iron and porridge or beer).

The potter, like the blacksmith, is a master of fire. It is with the fire that one controls the passage of matter from one state to another (Eliade 1962: 78). The male and the female domains of the *mir* category are on the one hand very different but on the other hand bound together by "earth" and fire. An important subjective associative linkage between the female body and the pot is that both can be conceptualized as sources of food – the women produce food with their own bodies during lactation and they continue provisioning from the content of the pot. Among the Fur this is explicitly recognized in the sense that pots often are spoken of as mother (*eja*), and sometimes they are decorated with nipple-like protrusions called breasts (*nansu*).

We do not have material which show association between iron tools and human fertility among the Fur. We do, however, have data that show a mystical connection between iron weapons and fertility. At certain places men have for ages sharpened their iron knives on particularly hard rocks. At these places women wishing pregnancy are said to perform rituals at night involving smearing of butter in the slit in the stones where knives are sharpened.

Another ritual may also express underlying ideas relating gender symbolism to iron. In a crisis, particularly warfare, certain ritual activities including *bora fatta* symbolism are performed at subterranean nests made by a special ant species. The nest is easily recognizable as a round cleared space on the ground with a slightly elevated entrance to the underground ant colony. Into the entrance hole the ants can be seen carrying seeds from domesticated and wild plants. The above-ground shape of the ant nest is explicitly associated with the vulva, and thus symbolically links earth and mother. In connection with the war ritual three iron spears were said to be placed next to the ant nest. In these rituals *bora fatta* symbolism links

mother-based symbols for group solidarity to male courage and bravery expressed in the symbolism of iron spears with their connection to virility and power.

3.1.3 The Social Context

Blacksmith identity cannot be adequately understood only by looking at how it is symbolically constructed. One also has to explore how it is shaped by processes in the political economy of the community.

The *mir* not only constitutes an endogamous group, this group is also highly stigmatized. *Mir* identity is ascribed by birth. Skills and knowledge required for smithing are transmitted within the family context and recruitment to blacksmith occupation is from father to son, and for the potter occupation from mother to daughter. *Mir* identity puts severe limitations on the type of relationship a blacksmith can have with other members of the community. In addition to not being allowed to marry from non-*mir* community members, a *mir* is set apart in other situations associated with intimacy like dancing and eating. One should not eat with *mir* or accept food from them – they are regarded as unclean and in a sense untouchable. The caste-like position of the *mir* is also seen in the physical layout of the marketplace where blacksmiths and potters sell their products (iron tools and pots) at designated places a distance from sellers of respectable products. Furthermore, they live either in separate villages or in separate parts of the village. In features of material culture like dress, personal decoration, houses, etc., they are not differentiated from the rest of the community.

That a simple activity like pottery making is considered the occupation of a specialized stigmatized group, the *mir*, cannot be explained as just a consequence of the symbolic potential this activity may have. Nor is the symbolic potential of iron making sufficient to explain why male members of this group are blacksmiths and why blacksmiths are stigmatized. To explore this we shall argue that we have to place iron production in the context of the interconnected processes of political centralization and division of labor. Although iron production requires certain specialized skills, in the case of the Fur technology these are so simple that an ordinary farmer with some practice should be able to learn and perform them. There seem to be several paradoxes involved here: Iron is a democratic metal in the sense that it is within the reach of almost everybody to get

the ore and learn the skills required, but still it is a specialized activity; the specialists produce artifacts of critical importance for the political as well as the economic survival of the community, but still the blacksmiths are often placed close to the bottom of the social hierarchy. The caste-like position of the *mir* emerged under conditions very different from those existing today, most importantly a multicentric economic structure where the ruler's redistributive power was a major factor in the circulation of goods and services. Nachtigal's description of the Fur sultanate as he observed it in 1874 (Nachtigal 1971) provides a valuable contribution to our understanding of how this worked.

Nachtigal states that within the Fur sultanate there was an administrative position called *mirong sayal*. "He was the chief of the smiths and had to deliver their taxes of lances, throwing irons, knives, axes, etc. from which he derived his income." During our fieldwork in Darfur, the blacksmiths also referred to a sultan of blacksmiths who once had his residence near Jebel Tayu. In Nachtigal's description from the neighboring and culture historically related Masalit sultanate he elaborates further on the position of the blacksmith: "In himself of little importance, but nevertheless enjoying precedence in many respects, even so far as to be treated like a real sultan, the King of the Smiths, *sultan el-haddadin*, a kind of shadow sultan, has the emblems of a sultan, but is without any real power. His wives, like those of the ruler, are called *hababat*, and his daughters princesses, *meïram*; he has the privilege of appearing before the sultan with head uncovered and wearing a burnus, and of sitting on a carpet. The smiths are placed under his unfettered control, ... and he alone has the right to administer justice for them. He must be well-read in the Quran, is the physician for the whole royal family, and as such permitted to enter the harem. As already noted, it is his melancholy duty, at the beginning of a new reign, to blind the sultan's brothers, nephews and cousins. He also has the task of shaving the sultan's head weekly, and he has to prepare the body of a dead sultan for burial. From his quasi-subjects, he has to collect the shovels, hatchets, lances, knives and chains, which are paid the king as taxes – the number runs to several thousands of each kind – and he retains for himself a quarter of the objects which he hands over to the king. The low social status of the smiths in Wadai and Darfur, as well as in Bornu, and especially among the Tubu tribes, I have already described elsewhere. ... In Wadai they marry only amongst themselves. No one would eat with a

smith, and to be called a smith is a deadly insult" (Nachtigal 1971: 179).

This account demonstrates important processes which have served to define the special position of blacksmiths in the states of the Sudan savanna belt. It clearly shows that the blacksmiths were part of the redistribution system of the state. They had to deliver large quantities of tools and weapons to the political center from where it was redistributed to the sultan's military forces as well as to farmers. The political and economic power of the sultan to a large extent rested on his control of these means of destruction and production. Ideological association of smithing with low rank and the social inconveniences (marriage, access to land, commensality) implied by this served to restrict other peoples' willingness to engage in activities that might have eroded the sultan's control of the redistributive network. At the same time the ideology of inherited blacksmith identity served to maintain a supply of specialists who could only survive by engaging in an occupation which stigmatized them, but which was of crucial economic and military importance for the state. The special position of the sultan of blacksmiths in the royal court further emphasizes their ambiguous position in Fur conceptualization.

3.1.4. The Fur Case and Its Methodological and Comparative Implications

Our exploration of the Fur case has been based on the methodology of progressive contextualization (Vayda 1983), i. e., we started by observation of concrete events of activities involved in iron smelting. We then tried to explain these events in wider *causal* and in *semiotic* contexts. This search was guided by generalized analytical perspectives drawn from ecosystem thinking, from general anthropological contributions (Appadurai 1986; Barth 1981; Geertz 1973), from cognitive studies (Lakoff and Johnson), and from comparative ethnographic material.

In our analysis of the Fur material we have tried to establish some generalizable analytical dimensions, relevant for exploring the interplay of universal cognitive structures and culture-specific processes of symbolization and social organization.

The salient features of iron smelting technology in Darfur are the form of the furnace and the blowing activities and tools involved in making of draft. These features, serving technological functions, are metaphorically connected in a far-reaching web

of signification. We have explored this web from the assumption of a panhuman container schema. However, the specific semiotic chains developed among Fur are not reducible to this schema but have to be analyzed with reference to how they fit into the metaphoric pattern characteristic of Fur culture – a pattern where the *bora fatta* complex dominates.

Reading of comparative ethnography opened our eyes to how the container schema linked furnace and smelting to pot and cooking, and to the ambiguities so frequently found in iron symbolism. Smelting and pottery making are in certain respects similar to containers, in other respects they are profoundly different. Pottery is unambiguously placed in the life-giving context of motherhood, nurturing, and human reproduction (R. Haaland 1997). Iron working on the other hand is ambiguously placed in a context of destruction (weapons) as well as in a context of production (tools). It is universally placed in a male domain dominated by activities usually taking place at the outskirts of the village or in the market place. In contrast to the more confined female-dominated pottery making activities, the smithy is of a more public character with its closer association with killing in hunting and warfare. Iron products are also ambiguous because the productive life-giving tools like hoes and axes are used by both males and females. The productive aspect of iron tools are in many African communities (several groups in the Nuba mountains and the Pare of eastern Equatoria) linked to fertility and human reproduction. Iron hoes or rather stylized objects (with no practical use, but with a shape which gives association to the penis and penetration) called *rwoikweri* (i.e., hoe) are among the Pare an important component in their bridewealth transactions (Storaas 1978). The two different types of iron objects called *rwoikweri* (one for practical cultivating use and one for bridewealth use) symbolically link the fertility of the fields and the fertility of women. Among the Fipa of western Tanzania cultivating hoes (*ise* – large hoe, and *impalanga* – small hoe) as well as spears (*isumo*) are used in bridewealth transfers as well as in other transactions (Willis 1981: 143).

As the material transformation of ore to iron is set apart from other economic activities as something loaded with symbolic significance, so are the transformers of iron among the Fur set apart from other community members. It may seem paradoxical that the producers of items of fundamental productive and military importance should be placed in a caste at the bottom of the

social hierarchy. We have argued that this does not follow from the symbolism of iron, but from the political economy of the Fur sultanate. In fact this seems to be the case in states of the whole Sudan savanna belt, in Ethiopia, in the Middle East, in the Indian subcontinent, and in Tibet and China. We have in this connection particularly emphasized the importance of iron as a source of power in these states. The ideologically based low ranking of the blacksmiths has also spread to people not organized in state societies like the Nilotic people of Sudan and East Africa.

An important dimension worth exploring is the connection between rise and fall of early states and ecological consequences of iron smelting. Although the Darfur material did not allow us to draw any conclusion in this field, Randi Haaland used the conversion rates estimated in Darfur to interpret archaeological material from the old Kingdom of Mema in Mali. There she found that slag heaps, left in a period between A.D. 800 and A.D. 1100, had a volume which would have required a yearly forest off-take rate which far exceeded the botanists' estimates of the rate of forest regeneration under the natural conditions prevailing at that time, indicating that iron production had been a major cause of deforestation as reflected in pollen analysis (R. Haaland 1980, 1985). Interestingly processes of increased deforestation seemed to correlate with the decline of the old Kingdom of Mema.

Using the same approach might throw light on a possible relationship between iron smelting induced desertification processes along the Nile and the decline of the Meroitic civilization.

3.2 The Fipa of West Tanzania

The Fipa people inhabit west Tanzania in the mountain plateau between Lake Tanganyika and Rukwa (see map). They are one of many Bantu-speaking groups in the area. The Fipa practice a complex and labor-intensive compost-mound type of cultivation. Their main crops are millet and maize (Willis 1981).

Studies of the Fipa people and their iron production is quite extensive and they have been the subjects of many commissioned ethno-archaeological field studies. Many features of Fipa iron smelting technology were described by Wyckaert in 1914. Later contributions include Greig (1937), Wise (1958a, b), Willis (1978, 1981), Wembah-Rashid (1969) and Barndon (1992, 1996 a, b). The above-mentioned

publications as well as Randi Haaland's own fieldwork (July 1991) contain much more explicit and elaborated descriptions of symbolic aspects of iron working than what we have presented in the Fur case.

3.2.4 Technological Context

Let us now look at the performance staged for Randi Barndon and Randi Haaland during our fieldwork in July 1991. By daily supplies of chickens, local beer, and other consumer items we persuaded the "master smelter," his son assistant, and a few other local farmers to repair a big natural draft furnace, to construct a small forced draft furnace, and to perform the smelting operations. Compared to the Fur the smelting technology of the Fipa is thus much more complex and requires more specialized skills.

The last remaining master or chief smelter (*mwami* in Fipa language) demonstrated the smelting techniques for us as he earlier had done for Wembah-Rashid. However, iron smelting as part of regular Fipa village activities had been abandoned in the 1950s when scrap iron became readily available.

The master smelter is the leader of a crew of assistants, ordinary village people, or other blacksmiths, and we were told he had supreme knowledge about iron smelting since he possessed the *intangala* basket. The *intangala* is a ritual object in the form of a small basket containing items said to be the soul of the whole iron smelting process. It contains various ingredients ranging from parts of animals, birds, reptiles, fish, trees, and two animal horns containing powdered medicine. The knowledge of smelting is thus represented in the *intangala* in a sacralized material form. Transfer of this knowledge is based on work as assistant to the master smelter and is recognized when the master smelter hands over the *intangala* "certificate." The assistant (*msole*) is usually the son of the master smelter or a close relative, and the *intangala* is passed on to the assistant when the master smelter retires. Possession of the magical substances in the *intangala* is said to give the master smelter the special power necessary for smelting iron. The magical knowledge is a guarded secret which serves to control the blacksmith occupation.

Fifteen to twenty villagers were working with the master smelter on the construction of the furnaces and the blasting activities in the second stage.

Iron smelting, as practiced by the Fipa, involves a two-stage process employing two furnaces. The first stage takes place in a large three meter tall primary furnace (*iluungu*) which operates by natural draft and produces large quantities of slag and a mass of incompletely smelted very crude iron (*intaale*). The second stage takes place in a half a meter tall secondary furnace (*icinteengwe*) where this mass is resmelted by bellow blowing draft. The whole production phase from preparation of the furnaces to the appearance of iron takes about one month.

The smelting operation requires input of labor and raw materials for a variety of operations. Preparation of charcoal, sufficient for both steps in the smelting process, was the work of 5 men for one week. The scarcity of trees in the area and the need for special permits for tree cutting made charcoal production a rather cumbersome task. The wood was cut in large logs that were piled up on top of each other on the ground and covered with soil before being ignited. The burning process is slow and took about two days to complete.

The iron ore was taken from low-lying marshy areas, not far from the village. It had a low ferrous content and can be classified as "bog-iron" or limonite. To make it easier to smelt, it was spread out on the ground for drying and then crushed into small pieces.

According to descriptions given by other scholars (Greig 1937; Wise 1958a; Wembah-Rashid 1969; Barndon 1992), clay for construction of the large kiln (*iluungu*) was mostly taken from anthills. The blacksmiths and their wives kneaded the clay with their feet and mixed it with water to get the right structure. The wives also assisted in carrying water and charcoal. Before construction of the kiln began, the foundation for it was properly dug in the form of a round ditch, about 10 cm wide and 20 cm deep with a diameter of roughly 2.5 meter. The building of the furnace was supervised by 4 men – two inside and two outside. As the construction of the furnace progressed, the blacksmiths scraped the clay walls to make certain they were smooth and not prone to collapse. The diameter inside the furnace narrows gradually from 2.5 meters at the bottom to about 2 meters at the top. Ten holes serving as ventilators were made at regular intervals round the base. One hole called *mama iluungu* (mother door) oriented towards the west was larger than the others. This hole also served as an entrance for the master smelter or his assistant to crawl through when they prepared for the smelt. The small ventilator hole opposite the *mama iluungu* was called the *baba iluungu* (the

father door). A small inspection hole was made high up on the furnace wall in order to allow the master smelter to monitor the smelt process. While the furnace was drying, it cracked in several places and had to be plastered with mud. When it was about half finished, a scaffold was erected around it with a ledge about one and a half meter up for the builders to stand on when completing its upper wall. A small peephole was made at this level for the smelters to check on the fire after the kiln had been ignited. Because of its size drying of the furnace is a major problem. According to estimates by Wise (1958a), the drying process takes about 2 days, while Wembah-Rashid in his observations recorded 5 days.

After constructing or mending the large draft furnace, the blacksmiths constructed the smaller (0.5 meter high and 40–50 cm in diameter) blast furnace (*icinteengwe*). The same type of clay was used to build this small kiln. It was constructed on a sloping ground to facilitate the outflow of slag. At the base of the furnace the smelters made three holes for tuyeres to be inserted and one larger hole (called *palinyina*, also meaning mother door according to Barndon [1992]) for the outflow of slag. In the front of this larger hole a small channel served to direct the flow of the slag down the slope. Along the sides of the channel two leg-like protrusions called *impamba* (inner thighs) were made.

Tuyeres were made of gray heavy clay containing no organic material, quite different from the clay used for the furnace which was heavily mixed with organic matter. More than 100 tuyeres were made for each smelt. The tuyeres were shaped along a long pole which was put up horizontally between two sticks. The wet clay which covered the pole was cut into appropriate tuyeres length of about 30 cm each. The tuyeres were then taken off the pole to dry in the sun.

When the *iluungu* furnace was dry and all the materials were ready at the site, it was filled. The assistant, *msole*, entered the furnace through the large western door (the mother door) where he started to arrange the tuyeres on the floor inside the furnace to facilitate circulation of the natural draft which entered through the ten holes in the furnace. Some of the tuyeres were placed horizontally in a bottom layer while others were placed in a top layer at right angles with the lower level tuyeres. The top level tuyeres were attached to the furnace inlets with clay. Around 20 tuyeres were placed for the larger western door while the other inlets had about five tuyeres. The assistant remained inside after the tuyeres had been fitted (Fig. 3). The material needed for the smelt was handed to

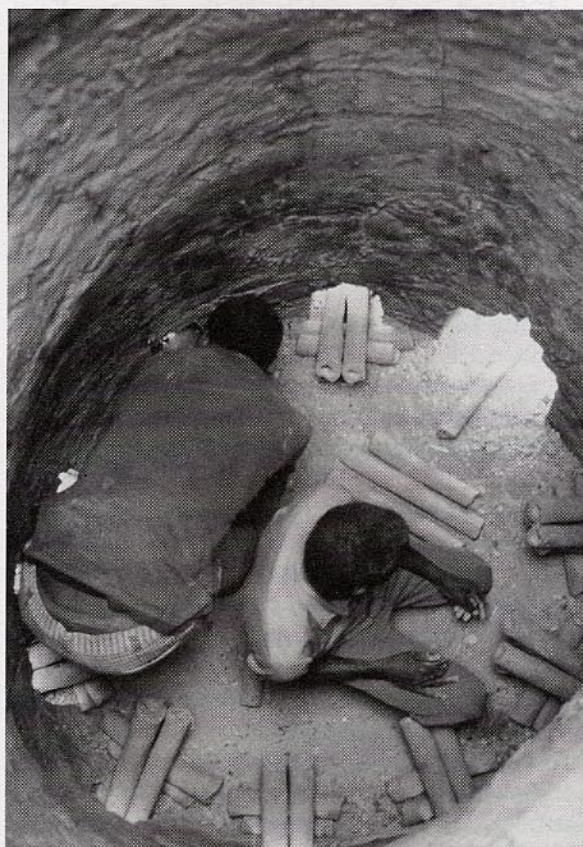


Fig. 3: Tuyeres put in place inside the *iluungu* (photo R. Haaland).

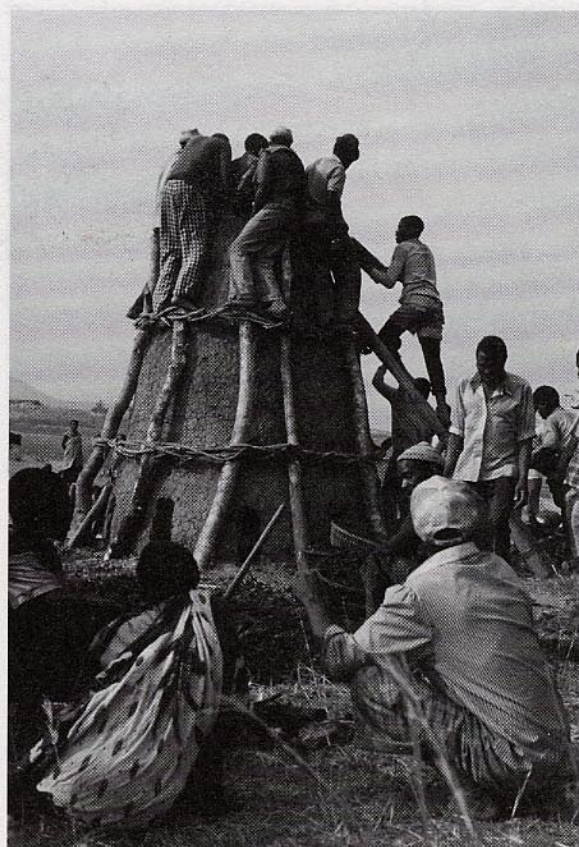


Fig. 4: The large furnace (*iluungu*) ready for smelting (photo R. Haaland).

him from the top in baskets, starting with charcoal (*ikala*), followed by iron ore (*inyiimbo*), and then green firewood. This was repeated several times until the kiln was full and ready to be fired at the top (Fig. 4). It was ignited and left to burn naturally for a day and a night. The master smelter occasionally inspected the process through the hole at the back of the kiln. In total the kiln held around 70 basketfuls of ore, about 50 baskets (the volume of a basket is approximately one cubic foot) of charcoal, and about one cubic meter of wood.

Smelting at the *iluungu* furnace produce a sponge of crude iron (*intaale*), slag (*amkaango*), and charcoal. This *intaale* was brought to the *icinteengwe* furnace and crushed before the final smelting where the outflow of slag separated the bloom (*ululu*). After 4 hours work by three men the slag began to flow. When the slag stopped running, the iron was ready and the red hot bloom was lifted out.

Our observations do not allow us to make any evaluation of environmental impacts of iron production neither at present nor in the past.

3.2.2 Symbolic Context

The Fipa smelting operation is thus technologically quite complex and in terms of “stations” in the trajectory of iron the smelting “station” actually consists of two “substations” – the “*iluungu* station” and the “*icinteengwe* station.” Symbolically these two “stations” seem to be metaphorically associated with phases in a woman’s reproductive career – first the social arrangement of marriage and then the physiological process of reproduction from intercourse to birth.

At both “stations” there is a strong ritual emphasis on sexuality. According to Wise (1958b) the master blacksmith (*mwami*) must sleep with his wife with the *intangala* under the bed the night before he leaves for the bush to start the *iluungu* furnace construction. In addition to the ingredients in the basket the blacksmith will also add some new ones for each smelt. The content of the basket is spread on the kiln foundations. In the morning, the *mwami* takes a glowing ember from the fire and drops it into a water pot, i.e., mixing two most

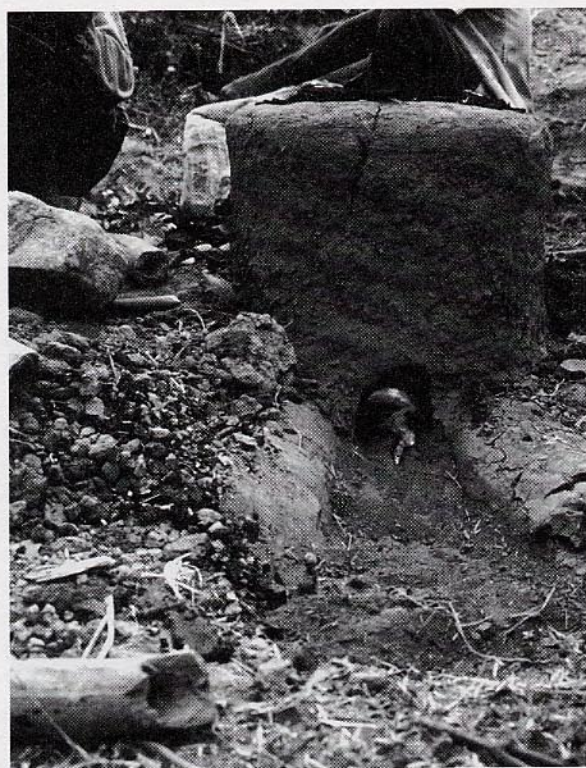


Fig. 5: Slag is starting to flow from the small secondary furnace (*icinteengwe*) (photo R. Haaland).

potent archetypal symbols of sex and fertility. This piece of charcoal then becomes part of the *intangala*.

The *iluungu* furnace is explicitly talked about as a virgin, and rituals from the first activities in its construction to its completion clearly convey associations of sexual purity. The first ritual recorded by Wise (1958b), Wembah-Rashid (1969), and by Barndon (1992) is performed when making the foundation of the furnace. According to their descriptions, a young boy and a girl, aged 10–12 years, should come to the site at daybreak. Since they have not reached puberty they are regarded as ritually pure. In the description of these activities Wembah-Rashid states that it is the *mwami* who put the protective medicine on the foundation. Wise (1958b) and Barndon (1992: 103–105) claim that this is being done by the young boy and girl – the *mwami* will give one part of the ingredients to the boy and one part to the girl who puts the medicine in the basket and the clay pot respectively before they put it on the kiln foundation. This is followed by sacrifice of a cockerel. The boy cuts the throat of a young cockerel and the blood is then sprinkled around the foundation. The head of the cockerel is put in a black cow-horn

and placed in the middle of the furnace floor, facing east, while one of the wings is saved and put above the mother door when the furnace is completed (Barndon 1992: 104). After completion it is said to be like a bride and is decorated along the rim with small yellow flowers (*kalulu*) and the above-mentioned wing of the cockerel. Finally it is again sprinkled with white millet flour. During the “wedding” of the *iluungu* the men who built the kiln danced in a circle around it while drinking beer and singing (Wembah-Rashid 1969; Barndon 1992: 106). Other features of the *iluungu* furnace are also linked to gender symbolism like the naming of the two openings in the wall as “mother door” and “father door” respectively. It is through the “mother door” the male blacksmith enters when he fills the furnace with raw materials for the first step smelting. When the natural forces of fire and air (natural draft) in the *icinteengwe* furnace have formed the crude iron material the next symbolic reproductive phase starts.

This takes place in the small *incinteengwe* furnace. This furnace is said to be like a woman giving birth. The symbolism of the activities and objects being used in its construction is loaded with sexual associations. According to Barndon (1992: 108) pieces of bark from a tree that emits a white juice symbolizes semen. This was not observed by Wembah-Rashid (1969) or Wise (1958b). However, Wise describes how some crushed powder from the contents of the *intangala* basket are sprinkled over the charcoal and on the ore when starting the actual blasting.

Both the insertion of tuyeres into the *incinteengwe* furnace (as opposed to the arrangements of tuyeres inside the *iluungu* furnace) and the blowing operations have clear sexual associations. During our observations of smelting such associations were evident both in speech and behavior. The blowing of the bellows was explicitly associated with the “heavy breathing during intercourse.” It does not require much imagination to see iron smelting as analogous to the reproductive act, particularly since the furnace is shaped like a female body with thighs in the form of two clay lumps between which the red hot slag is channeled (Fig. 5) like a baby emerging from a woman’s body. People quite explicitly make this metaphorical connection between biological reproduction of humans and cultural production of the iron.

It is interesting to note the contrast between the placement of tuyeres in the *iluungu* and the *icinteengwe* furnaces. For the *iluungu* the placement is inside the furnace and this facilitates an internal process of transformation (ore to cindered)

by natural means, while in the *icinteengwe* tuyeres are inserted from the outside to facilitate externally enforced process of transformation (from crude iron mass to bloom) by cultural means (the socially organized blowing operations). This technologically/functionally generated contrast can easily be seen as consistent with the metaphorical contrast between the *iluungu* virgin and the *icinteengwe* mother being impregnated and giving birth.

Smelting takes place not only in a context of rich sexual metaphorizations, it is also surrounded by taboos imposing constraints on mixing the fertility of women with the fertility of the kiln. The blacksmith is prohibited from having sex from the start of furnace construction until the iron bloom is produced, and fertile women are kept away from smelting in progress. It is important to emphasize that it is not women as such who pose the danger, it is women in their reproductive age – girls and postmenopausal women are not excluded – a point which Herbert (1993: 79) has emphasized in her discussion of Fipa blacksmithing. The compulsory celibacy for the smelters makes sense on the background of the symbolic identification of the *icinteengwe* furnace with the wife of the smelter, and the metaphoric association of the second smelting with sexual intercourse. Sexual intercourse with “real” women is looked upon as committing adultery towards the metaphorical “*icinteengwe* furnace wife” (Wise 1958b). It is difficult to see, however, that such metaphoric associations underlie the taboo on sexual intercourse during construction of the *iluungu* furnace. Since the construction of the *iluungu* furnace starts with ritual intercourse and use of objects apt to symbolize sex and fertility, and since the furnace itself is considered a virgin, it seems plausible that processes at this “station” in the trajectory of iron is conceptualized as analogous to the life trajectory of a woman from the moment she was conceived until her wedding.

Wyckaert's account of Fipa explanations of cases of failed iron smelting indicates something about the universe of cosmological ideas, in terms of which the Fipa at the beginning of the 20th century explained certain events of misfortune occurring during the technological process of smelting: “What does the chief do then? Does he check his ore if it is good quality? Does he check his flux to see if it is suitable to the quality of the ore? Will he try to find out if some natural cause has upset the operation? Occasionally yes; he will ask himself questions. Ordinarily, no! He will simply say with resignation, ‘some spirits does not want this. Let

us appease him with a sacrifice.’ Or else he will say with resignation: ‘My medicines are not worth anything anymore, let us find some others.’ And he will really work very hard at coming up with rarer bones and more extraordinary feathers and the skin of an even nastier snake. Most often he will cry angrily, ‘Again our women are behaving badly in the village’” (Wyckaert 1914: 375, translated into English in van der Merwe and Avery 1987: 169). What is emphasized here are the effects of spirits on the outcome of the operation; the importance of appeasing them with sacrifices of bones, feathers, and snake skin; and most importantly the mystical connection between immoral behavior of women in the village and failed execution of a technical task at the furnace.

3.2.3 The Social Context

The activities related to iron working among the Fipa clearly take place in the male domain. The activities we have described, whether related to technology or symbolism, were all performed by men (the exception was the women bringing charcoal, water, and tuyeres to the smelting site, and the kneading of the clay for making the furnaces).

Like the Fur case, Fipa smithing is also an occupation practiced by a specific social category called *asiluungu*, i.e., those who work with the *iluungu* – the large furnace (Barndon 1992: 188). Also like the Fur, they are associated with mystical force but, unlike the Fur, their mystical force is directly connected with the power to make iron, represented in their ownership of *intangala* and not with ideas of capacity to transform themselves into animals. Furthermore, the *asiluungu*'s monopolization of the blacksmith occupation among the Fipa is based on practical knowledge of a much more complex smelting process and on their possession of the magical power represented in the *intangala* and not on social stigma and position in a politically sanctioned caste-like division of labor. The *asiluungu* are free to take daughters from non-*asiluungu* fathers as their wives, there are no restrictions on commensality, and there are no special restrictions on other occupations that a person of *asiluungu* descent may practice. Iron making and pottery making are not connected as complementary activities practiced by male and female members of a specialized *asiluungu* category, i.e., *asiluungu* is not the name for a basic social identity, but a name for the specialized work of blacksmithing. The *asiluungu* are part-time craftsmen who also practice subsistence

hoe cultivation. Production of iron hoes is very important as a source of income in exchange with non-blacksmiths. Hoes are also important since they are used as bridewealth (Willis 1981: 139). The association of the fertility of the hoed field, with the role of the hoe in bringing in fertile women to reproduce the exogamous groups is implicit.

Contrary to the Fur case the occupational status of an ironsmith among the Fipa is an honored one. The master smelter is regarded as the leader of the village. The power of the smith is also expressed in situations where a person accused of homicide could find sanctuary in the ironsmith's forge until his case had been tried (Willis 1981: 150). According to Willis (1981) it was customary for the blacksmith to pay the first hoe produced from each smelt as a tribute to the rulers. This can be seen as a transaction where the hoe is compensation for the wood used for charcoal during the iron smelting (Willis 1981: 150). Iron implements were obtained from an ironsmith in exchange for labor, or in exchange for livestock, grain, salt, or commodities like cloth. Production was thus largely oriented towards subsistence, barter, and tribute. Every village (of some size) had its marketplace, where food and commodities were exchanged. The largest markets were in the two royal capitals. Iron implements such as the hoe also served as currency in the commodity market system (Willis 1981: 157).

3.2.4 The Fipa in Comparative Perspective

If we look at the transformative aspects involved in iron smelting, they do not seem to have served as source of metaphorization like we saw among the Fur. The master smelter does not appear to have any functions in connection with rites of passage such as birth, puberty, or death. However, he used to have ritual functions in the investiture of the king. Among people of the Interlacustrine area there also seems to be a strong association between iron working and leadership. This is often expressed in the idea of the king-smith. This does not necessarily mean that the king was a smith but, as de Maret has stated, they had an ideological-political link with iron working (de Maret 1985). This link is expressed among other ways in the close association of the king with the main tools of the smithy – the hammer and the anvil – and is manifested in the use of such items in the investiture of kings (Sassoon 1983) or in kings' grave goods (de Maret 1985). It is tempting to

interpret this as based on an association of creation (forging) of power in the political field with the forging of tools in the smithy.

As we have seen, container metaphor with its sexual linkages is quite explicit among the Fipa. If we compare with the Fur, we can see a clear family resemblance. However, this resemblance in cultural meanings does not reflect similarity in the social position of the blacksmith. In the Fur case he is at the bottom of a centralized political system of redistribution. In the Fipa case he occupies an honored position in a politically weakly centralized system in an agriculturally poor region.

We suggest that the special position of the blacksmith among Bantu groups originated with the expansion of Bantu-speaking people from Cameroon into the Congo rain forest. In the Sudan savanna belt the most important use of iron was as means of destruction, i.e., a use which affected the survival chances of competing states, while in the forest area the main use was as means of production, i.e., a use which made it possible to clear the forest for cultivation purposes, opening-up a previously unexploited agricultural niche in the rain forest. This expansion apparently took place as gradual decentralized expansion of farmers along an open frontier. The consequences of this is well formulated by Maquet (1972: 83): "This importance of iron is shown in the exceptional position given to blacksmiths in the societies of the forest clearings: master of fire, he is not only a specialized artisan, the only one in the village, he also possesses magical powers for which he is feared and respected." Vansina has drawn attention to an additional difference in the use of iron in the two regions. In the rain forest (where cattle does not thrive) iron fulfilled the role that cattle played in the savanna regions as "currencies, standards and repositories of value, social payments ranging from bridewealth to fines or fees, and prestige objects, such as jewelry. . . . Hence much of the power of a leader depended on the size of his metal stores. No wonder that everywhere in this area masters of smelting and smiths enjoyed an exceptional position, practically second to none" (Vansina 1990: 60).

The ideological emphasis on the high position of the blacksmiths which was developed in the rain forest was maintained as Bantu-speaking people expanded into the grasslands of eastern Africa where they encountered cultural traditions related to the Sudano-Ethiopian states – traditions which even among acephalous groups like the Masai ideologically placed blacksmiths in a low ranked position. The ideology of the blacksmiths'

ritual power was among Bantu-speaking people developed into an important means of legitimating political power, and was maintained even among groups who had adopted animal husbandry and developed large-scale states.

3.3 Nepal

Nepal is a country where two great language traditions, the Indo-Aryan and the Tibeto-Burmese, meet. Different groups are explicitly identified with one or the other of these traditions and are among the people of the region generally assumed to fall into contrasting racial stereotypes, Caucasoid and Mongoloid, respectively. All groups are placed in a comprehensive system of ranking legally codified in the so-called Muluki Ain of 1854 (Höfer 1979). This law code, clearly structured by principles derived from the Hindu *varna* ideology, classifies the groups in different ranked divisions of ritual purity – Brahmin, Chetthri, Matwali, and Pani Nachalne. Groups in the divisions of Brahmin, Chetthri, and Pani Nachalne are generally Indo-Aryan-affiliated groups, while Matwali division contains groups derived from the Tibeto-Burmese tradition. The whole system of ranking clearly is derived from ideas in Hindu religious traditions, and most groups also follow ritual prescriptions current in this rich cultural tradition, although some Matwali groups are followers of Buddha.

Our presentation is primarily based on material collected and analyzed by Suman Rijal in 1997 and 1998 in the village of Lohakot (Rijal 1998), in the Arun valley of Eastern Nepal, and on material collected in 1995 in the village of Jajarkot in western Nepal (Rijal 1995). There are only minor variations between the two regions as to the size of the furnace and the type of iron ore used, but there is some variation in symbolism and rituals surrounding iron production.

3.3.1. Technological Context

Iron working was once widespread in the district and slag can be seen scattered on the surface around Lohakot village. There are two iron mines in the village itself, and 12 mines all together in the district. In the past, there were 20 furnaces in operation in the region. It is more than 50 years since the last iron smelting was performed in the area. There are, however, two elderly blacksmiths, who are brothers and who had been regular smelters in

their younger days. Although the blacksmiths do not smelt iron today, they still work in the smithy either producing or repairing iron implements. For this purpose, they use scrap iron or bar iron imported from India.

The area contains several very rich deposits of iron ore. Each mine has dozens of vertical shafts, some of these are up to 35 meters deep. Horizontal tunnels extending from the shafts are up to one kilometer long. Inside the tunnels the blacksmiths used chisel and hammer to break off the blocks of ore. They fetched 350 kilos for one day's smelt. The ore is hard, and four men require three days to collect the 350 kilos. The collected ore was brought back to the village and hammered into small pieces for the smelt. In Jajarkot village of western Nepal, the ore was taken from the surface and they only used simple hoes for its extraction. The labor involved in extracting the ore in Jajarkot is thus much less than in Lohakot where they have to work hard in hammering and chiseling the ore out from the deep tunnels.

Charcoal is made from hardwood trees like Rhododendron or from *sal* (*Shorea robusta*) and pine. There are two techniques used for charcoal preparation, one a slow burning process that takes 11 days to make or a fast burning one made in one day. The furnace is made of clay and is of the slag-tapping type. First a pit, 90 cm wide and 90 cm deep, was dug in the ground. A trench around 120 cm long was made for tapping the slag, two stone slabs are put at the ground level, which act as a base of the furnace above the slag pit. The furnace is made from red clay mixed with straw and water. The height of the furnace is 120 cm, the diameter of the furnace at ground level is 100 cm, and it gradually narrows towards the top to get a chimney-like shape (Fig. 6). The furnace wall is about 10–12 cm thick. It takes around 3–4 days to make a furnace, because the furnace walls would collapse if they were erected by more than a foot per day. After each day's work a fire was set from the bottom of the trench so that the clay walls could dry faster. After the furnace was completed, it was burned for more than three hours and then left to sundry for three days.

Two holes were made at the bottom of the furnace for tuyeres to be inserted. In Lohakot they used bamboo sticks as tuyeres. However, in Jajarkot they used the same type of clay as for the furnace. These were shaped around a wooden stick. Then, the tuyeres were put above a fire and turned around from time to time, in the same manner as grilling meat. The tuyeres were then inserted into the bellows.

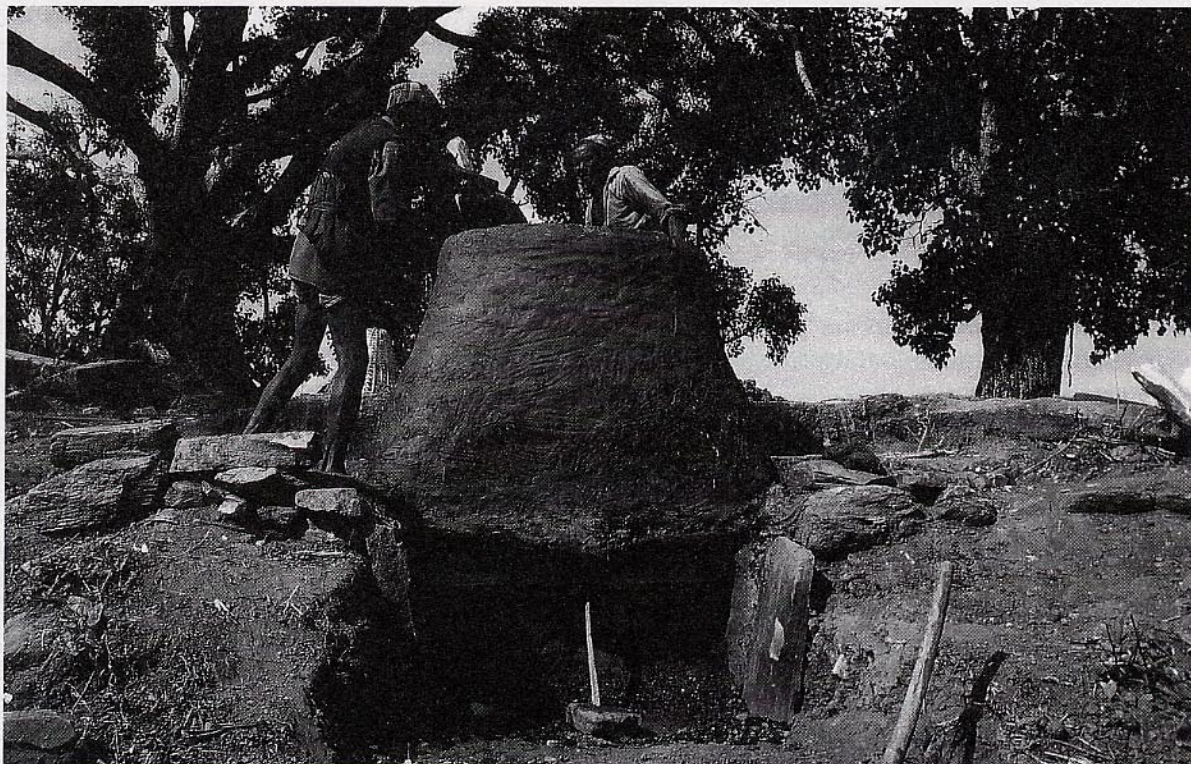


Fig. 6: The shaft furnace ready for use, in the village of Loharkot (photo S. Rijal).

The furnace was filled up to the top with charcoal and ore. It was ignited by putting burning charcoal into the holes made for the tuyeres. The bellows were then worked for 10 minutes, and a burning flame was introduced from the top. The charcoal picked up the fire instantly and four men (two at a time) work the bellows continuously. Another man checks the quantity of ore and charcoal in the furnace. Generally, ore and charcoal are added into the furnace every 15 to 20 minutes. The flow of slag from the furnace is monitored by regularly piercing holes in the clay, which has been put in place between the two stone slabs. This opens up the furnace for the slag to flow. The smelting lasts for about 11 hours. The sponge of iron is left in the furnace and the furnace walls are broken for the bloom to fall out of the furnace. For every 25 kilos of iron, 350 kilos of ore and 200 kilos of charcoal were required. When the iron was reheated in the smithy, around 5 kilos of slag and charcoal were separated from the sponge iron.

The differences between Jajarkot and Lohakot in the smelting procedure was that clay tuyeres were used in the first case and bamboo sticks in the latter. Thus the tuyeres made from bamboo are gradually decreasing through the smelt.

3.3.2 Symbolic Context

If we now look at the symbolic aspects of iron smelting in Nepal, the importance of sacrificial rituals is striking. Sacrifices are performed during different stages of the iron smelting. (Unless otherwise stated, the argument presented below is based on material from Lohakot.) First, the day before the smelt a sacrifice of a rooster and a hen was offered to the gods and goddesses of the forest and the mines. These two fowls had to be male and female, and *chokho* (ritually purified). The hen was offered to the god of the mine, who was considered to be male and the rooster to the goddess of the forest. The fusion of the male and female blood of the two fowls is expected to help in the next day's smelt.

The second offering of a rooster was made to the furnace (conceptualized as female) during the smelting operation. For this sacrifice, too, the fowl had to be ritually pure (*chokho*). There, thus appears to be a male-female dichotomy in the sacrificial rituals. The third sacrifice was done to the smithy where both the smithy and the iron working tools were sprinkled with blood.

Certain norms relating to time and place had to

be followed in the sacrificial ritual. The smelting should be on a Wednesday, and the sacrificial ritual to the gods of the forest and the mines should be performed after sunset. The blacksmiths believe that any type of ritual activity on Wednesday should be carried out after sunset, as it is considered inauspicious to perform the ritual during the day. The offering made to the furnace during the smelt had to be done after sunrise during the smelt (the smelting work began 4.30 in the morning, before the sun had risen and it was still dark).

The places where the sacrifices are offered are strictly regulated. Sacrifice to the goddess of the forest was performed in the woods, while sacrifice for the mines took place at the mouth of the mining tunnel. Blood was sprinkled all over the furnace and on the iron working tools in the smithy.

A key element of the sacrificial ritual is the sprinkling of the blood of the animals killed. The transfer of blood is seen as the transfer of life. The blacksmiths of Lohakot chant while sacrificing the fowl to the goddess of the forest "O Goddess! You are a hunter, you demand blood. If I offer you this blood, you will not require mine." By offering a sacrifice (blood) to the goddess, he believes he is reducing the chance of accidents. The sacrifice serves as medium to prevent misfortune, as the gods do not require any human blood since they have received their share of sacrificial blood. This is a belief held not only by the blacksmiths but among people in Nepal in general. Another example of this belief can be seen in the custom of offering blood to a new vehicle, a sacrifice which is said to prevent accidents because the vehicle is satisfied with the blood it received. After the sacrifice, some part of the animal like the liver and the heart are eaten by the smelters who performed the sacrificial ritual. This is said to serve as a means of communication between the sacrificer and the sacrificed. Before the sacrifice, the object of sacrifice has to go through a ritual in which different kinds of grain (millet, rice, and red ochre) are put on its head along with some water which is important because the animals sprinkled with water tend to shrug it off. When the animal shakes/shrugs itself, it is understood that it has accepted itself to be sacrificed. No sacrifice in Nepal can be performed without this ritual (known as *parsnu* in Nepali).

The shrugging-off of the water from the body of the animal or bird also serves as a medium of communication between the sacrificial victim and the sacrificer. In a way it is seen as the consent of the animal to be sacrificed. After this the sacrificial animal is considered to have been bestowed with

new qualities acquired by the action of sacrifice. Thus, by eating part of the sacrificed animal's body, the sacrificer assimilates into himself its sacrificial purity. In the same manner, by sprinkling the sacrificial blood on the furnace and the tools, these also are charged with sanctity.

Sacrifice thus has an important role in smelting and in working with iron. In order to ensure a successful smelt, the blood of animals has to be sacrificed to the gods. In our case, it was fowls which were sacrificed. However, sacrifices of animals such as female goats and even male buffaloes may also take place. It was reported that once a local blacksmith had to sacrifice a goat and a buffalo to the god of the mine after a wall had collapsed because people believed that the walls collapsed because women had entered the mine. This was a forbidden act and it had angered the gods.

3.3.3 The Social Context

Craft specialization is intimately connected to social identity, similar to what we saw in Darfur and, like in Darfur, craft specialists fall at the bottom, in this case in the Pani Nachalne division. In Nepal, however, the division of labor is far more comprehensive, with many different occupations being allocated to specific categories called *jat* (generally translated as castes). Integration of the different occupational specialists in a comprehensive division of labor was traditionally based on the so-called *jajmani* system – an institutional arrangement centered on a dominant landlord who attached different occupational specialists needed to undertake practical and ritual tasks when required by the landlord in return for a stipulated share of the harvest. Hinduism provides a strong religious legitimization for the association of occupation with *jat* identity, and this has served to maintain the supply of occupational specialists to the communities even after the decline of the *jajmani* system.

Iron working in Nepal is performed by the Kami *jat*. According to the Muluki Ain legal code, the Kami belong to the group of the Pani Nachalne division. Members of higher divisions must not accept any food cooked in water from members of a Pani Nachalne *jat*. The Pani Nachalne division comprises a number of subgroups or *jat*, beginning with the Kami and ending with the Chyame (sweepers). Traditionally the Kami are not allowed into the houses of the upper castes, but they are linked in a web of social relationships to other

members of the society. The blacksmiths were supported by their patrons through the grant of food such as grain and cash during the harvest season and during feasts and festivals. It was the duty of the blacksmiths to ensure a regular supply of iron implements to their patrons, as well as their repair. Although this form of exchange still prevails in many parts of Nepal, it has lost some of its importance at present, and such relations have become rather loose, as cash is generally used for transactions.

In Nepal iron smelting is performed by men, as is the case almost everywhere. The only female participation in the smelting in Lohakot was to grind the seeds used in making the bellows, while in Jajarkot it was to carry charcoal to the smelting site. Smelting in Nepal is also regarded as an act of procreation and the furnace is regarded as a female where gestation takes place. The blacksmith has to refrain himself from having sex with his wife during the smelt as this is considered an unfaithful act towards the furnace, which symbolically is seen as his "wife." If one did not observe these sexual taboos, one could enrage the ancestors and thus risk ruining the smelt.

Placing the tuyeres in the furnace is considered a highly sexual-like act. This is evident both in speech and in behavior. The smelter has to be naked while inserting the tuyeres in the furnace, and nobody is allowed to watch. The furnace is symbolically perceived as the wife of the smelter, the nakedness of the smelter being associated with the intimacy of the sexual act. The tuyeres are termed *tora*, which is a slight modification from the Nepali term for male genitalia which is *turi*. The blowing of the bellows is seen as the "heavy breathing during intercourse." Among the Agaria of India there is a saying that the "woman gives birth and the man cares for it" which means that the iron was born in the furnace and must now be refined in the forge (Elwin 1991: 195).

The product of iron smelting, the bloom, is regarded as sacred and one should treat it piously. Iron has symbolic meanings attached to it, e.g., iron rings are used to ward off evil spirits. The shaman uses an iron knife or sickle when treating a patient by swinging the tool over the body. In the Vedas, the oldest known Hindu hymns, one also finds the mystical power of iron expressed as a means of counteracting witchcraft "O witchcraft! go away ... we have good metal in the house (iron)" (Chacrabarti 1992).

The Nepal material demonstrates a very explicit elaboration of the container metaphor as manifested in the explicit analogy between birth and

iron extraction. Like the Fur case the blacksmith has a position at the lower end of a politically centralized redistributive system.

3.3.4 Nepal in Comparative Perspective

Comparing Nepal with Fur and Fipa there are some striking similarities in iron symbolism particularly with regard to primary metaphoric associations between furnace and woman, smelting and sex. We have argued that these similarities are all constructed on a panhuman container schema. However, there are wide-ranging differences in the way the three people have made use of these primary metaphoric associations for "spinning secondary webs of significance" linking iron symbolism to various cultural premisses and concerns.

Such differences to some extent relate to differences in the social organization of iron production. We have argued that in early state formations a fundamental principle for division of labor was caste-like identification of occupation with total social identity connected to central redistribution of goods and services. Such identification of occupation with total social identity is legitimized by ideologies which justify the position of craft specialists in the social system. Nepal and Fur are similar with regard to the structural aspect of the blacksmith's position in society, but they are vastly different in the ideologies which legitimize this position, a difference which has consequences for secondary symbolic linkages people have spun around iron symbolism in the two places. Although we have argued that the low rank of the blacksmith and the symbolism justifying this, emerged in the politico-economic context of state formation, this does not imply that an ideology of blacksmith stigmatization cannot spread to non-state communities.

4 Conclusion

Our concern in this article has been to emphasize that there is no necessary relationship between furnaces and female bodies just as there is no necessary relationship between pots and female bodies. "Meaning is something conferred on an object or an event by a person, not something enshrined in that object or event – that is, it arises in the act of interpretation" (Barth 1993: 170). Yet meaning "is not merely a matter of arbitrary fanciful projection from anything to anything without constraints. Concrete bodily experiences not only constrain

the 'input' to the metaphorical projection, but also the nature of the projections themselves, that is, the kind of mappings that can occur across domains" (Johnson 1987: xv). The metaphorical projection from female body to features of pot forms are grounded in experiential structures of meaning where the role of the woman as nurturer *par excellence* is pronounced. For an observer of iron smelting associations of sexual intercourse are easily evoked as tuyeres are inserted into the body of the furnace by male blacksmith and as the bellows are blown. With the slag flowing out of the taphole, the association of this with women giving birth to the iron bloom is in many cases explicitly recognized.

An important thing to note is that the kind of symbolism that is "good to spin" around the smelting "station" (the furnace) in the trajectory of iron, is different from the kind of symbolism that is good to spin around the forging "station" (the smithy). Smelting as we have seen in the three cases is hedged in by restrictions – taboos and protection against the evil eye – that serve to surround it with a certain amount of secrecy or separateness. The most fundamental feature of the concrete processes taking place in the furnace is their transformative character, and the most striking feature of the objects and activities involved in this transformation is their potential to evoke association of sexual intercourse and gender imagery.

We think that one reason for the emphasis people in African societies have given to furnace imagery may just be that initiations play such a large role in production of status structures and that this imagery so convincingly can be applied in rituals establishing individual's position in these structures.

Let us now look at the forging "station" – the smithy – and the kind of symbolism attached to objects and activities involved there. The most important feature of the process taking place in the smithy is of course the activity of forging cultural products by the use of anvil and hammer. As opposed to the smelting, activities in the smithy are not hedged in by restrictions on observations. People can see how the blacksmith by his own activity creates a useful orderly shape out of an amorphous mass (the bloom), while the transformations taking place inside the furnace are hidden from the human eye. The activity of the smithy is thus "good to spin" symbolism which can be made relevant to understanding domains related to the theme of giving shape and creating order. We have not presented material on this theme, but we

have referred to how anvil and hammer are used in royal rituals of investiture (Sassoon 1983; de Maret 1985; Reid and MacLean 1995). Smithy imagery of course is a very apt way of communicating the idea of the importance of the king in creating social order – the king as forging orderly social life out an amorphous mass of individuals.

At the fourth "station" – the arenas where tools and weapons are used – the scope for symbolic imagery is much wider, particularly by associating iron products with a wide range of other objects, activities, and social relations. We have only alluded to this in our discussion of the Fur material, but we think this constitutes an important field for further investigation.

There is also a fifth kind of "station," namely the places where iron products are deposited as grave goods or hoards. We have not touched on imagery at this "station" at all here, but we think investigation of symbolic elaborations at the "station" may further elucidate the way people have developed metaphoric imagery around iron at other "stations" in the trajectory.

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