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Making Daggers and Scouting for Talents: Situated learning in Late Neolithic Scandinavia

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Introduction

Even cursory examination of a collection of Neolithic lithic artifacts will lead to an observation which requires an explanation: for some classes of objects, there are likely to be those which attract our attention and admiration because they are special in some way (Fig. 1). Pelegrin (1990) speaks of elaborate technology when referring to such objects. Had they been unique examples, we would probably explain them as the result of a craftsperson's exuberance or bravado. However, the objects under scrutiny here are not unique – there are sufficient numbers of them to attract our interest and awaken a need to explain why they exist and why we recognize them as special.

Fig. 1. Two thin-butted Neolithic flint axes. Photograph by Bengt Almgren, The Lund Historical Museum.

Fig. 2. An amateur knapper holding an overdimensioned axe he claims to have made. Photograph by the author.

It is conceivable that these extraordinary objects were individual possessions in which their owner for personal reasons invested extra time and care (Fig. 2). A young woman embroidering linens for her dowry might be seen as a nearly contemporary example of such a phenomenon. However, the fact that extraordinary objects occur in some numbers suggests that they might have played a more public role in their contemporary social context. Indeed this is the sort of reasoning archaeologists are fond of using when they identify some artifacts as prestige objects.

We make things for a variety of reasons, most of which involve fulfilling needs. At one end of a hypothetical scale we find needs which are primarily economic; at the other, those which are primarily social. In the first instance objects are involved in economic transactions. A more elaborate item fetches a higher price, while a more common item is cheaper. This model requires demand outside of the family and a scale of production which supersedes family needs. A craftsperson who produces for a market will try to minimize manufacturing time while maximizing prices.

The second kind of demand has primarily social motives. A common explanation for the existence of extraordinary objects, at least in pre-market economies, is that they are prestige objects which served primarily social rather than primar-

ily practical purposes. Enterprising members of transegalitarian societies may use prestige technology in order to transform food surpluses into nonperishable objects that can be used in social transactions. Such objects retain their value as long as they are rare. Aspiring elites are therefore engaged in an ongoing struggle to ensure rarity, thus maintaining control of the prestige objects (Hayden 1995, 18).

Prestige goods are a means by which elites can transform economic surpluses into ways of gaining or maintaining power. The simplest definition of a prestige good is that it is something that everybody wants but not everybody can get. The key attributes, then, are universal desirability combined with limited accessibility. These bear an inverse relationship to each other: desirability *decreases* in direct proportion to an *increase* in accessibility. This is why it is in the best interests of individuals wishing to seize or consolidate power to limit (or at least be seen to limit) accessibility, while at the same time maintaining desirability. Some of the means of limiting the accessibility of crafted objects might be by gaining control over

- sources of raw material
- knowledge
- know-how
- a gifted or talented individual.

In the following, I intend to scrutinize the parameters of know-how and talent in relation to apprentice systems and situated learning. I will explore how know-how is acquired by the individual, and describe two examples of apprentice systems as social structures set up for acquiring know-how. Finally, I will briefly analyze the crafting of Late Neolithic flint daggers in light of the parameters of control mentioned above, in order to evaluate flint daggers as a possible basis for a prestige goods system.

Situated cognition and the many facets of knowing

Jacques Pelegrin (1990) is credited with introducing the concepts of 'knowledge' and 'know-how' into the archaeological discourse (Fig. 3). According to this paradigm, knowledge is situated in the mind and is explicit and declarative, while know-how is experiential and learned by doing (Apel 2001, 27-28). Knowledge can exist independently of individuals, while know-how is inseparable from the practitioner. However, theories of situated cognition, or situativity theory, question this dichotomy. Situativity theory struggles against a functionalist belief in a mind-body dualism. It holds that perception and cognition are not properties or

Knowledge	Know-how
Recipe for action	Embodied practice
Theoretical knowing	Practical knowing
Described by words	Demonstrated by actions
Can be forgotten	Forever part of the body
Can be grasped in seconds	May require years to master
Exists independently from individuals	Inseparable from the practitioner

Fig. 3. The distinction between knowledge and know-how. Based on Pelegrin (1990) and Apel (2001).

possessions of individual minds. Rather they are acts or relations which cannot be disconnected from individual experience within a social context (Kirshner and Whitson 1997; Barab & Plucker 2002). Accordingly, competent action is generated in the contexts of actions, not based on the accumulation of knowledge in individual minds (St. Julien 1997, 261). Thus, it would appear that situativity theory eschews the idea of knowledge as Pelegrin uses it. Theories of situated cognition hold that competence or expertise can only be measured according to the standards set by the context of practice (Barab & Plucker 2002, 169). As the individual develops his/her expertise in a specific domain, he or she gains a more central position in the community (Barab & Plucker 2002, 173). Or as Bereiter (1997) states, 'the course of situated learning typically has the aspect of a progression from being inept and prone to stupid mistakes to being competent and smart' (p. 287). However, expertise in one domain cannot necessarily be transferred to another; expertise is contextually learned and it is also contextually practiced. Although important aspects of what is learned in one situation may transfer to a new situation, the aspects that generally do *not* transfer are those which are involved in 'being smart' (Bereiter 1997). Does this mean that all knowing is contextually bound? Bereiter says no. He suggests that non-situated knowledge does exist. This is knowledge which has been transformed into objects that can be used in an unlimited variety of situations (Bereiter 1997, 298). Therefore it would appear that we may continue to use the concepts of knowledge (explicit and declarative knowing) and know-how (situated and embodied knowing) as Pelegrin proposed them.

Transferring know-how

Knowing, then, is a complicated concept, and how we view knowing has fundamental ramifications for how we think learning takes place. Learning *how* to do something – in theory – is not the same as learning to *do* something – in practice. Crafting, as embodied practice, must be learned by doing. Learning a craft requires practice and more practice until muscles, arms, fingers and brain internalize the know-how necessary for successful performance. The more know-how involved, the more practice will be necessary. The process of embodying know-how requires repetition so that episodes of motor actions become automatic, allowing for the smooth flow which characterizes the proficient performer. Skill acquisition in sports, or in any performance field, involves three stages:

1. Cognitive stage. Learners develop a declarative encoding of the skill. They are exposed to demonstrations of how a skill is correctly performed and they memorize a set of facts relevant to the skill. Declarative knowledge is paramount.
2. Practice stage. Errors in the initial understanding are gradually detected and eliminated and corrections among the various elements required for successful performance are strengthened. In sports, there is rapid improvement at first, less as bodies reach their limits. Procedural and declarative knowledge occur side by side but procedural knowledge dominates at this stage.
3. Automatic stage. Skills become habits and motor responses are automatically triggered. Performance is relaxed, effective, and largely unconscious (Anderson 1990, 259-60; Logan 1985, 369; Vernacchia *et al.* 1992,106).

Repetition progressively frees the mind from attention to details and reduces the extent to which consciousness must concern itself with the process (Moran, 1996, 59). In other words, the greater one's expertise in a domain, the less one needs to think about what he or she is doing.

Giftedness and talent

I have suggested above that achieving control over a gifted individual could be one means of limiting the accessibility of exceptional crafted items. This statement implies that ability is unevenly distributed among individuals and that differences are in some measure present from birth. Is this a viable concept? First, it is necessary to define the terms we are using. Feldhusen & Jarwan (2000, 273-74) define giftedness as a basically genetic endowment that enables the development

of special abilities, aptitudes and talents. Talent is a special ability within a domain of human ability such as mathematics or tennis.

Winner & Martino's (2000) article 'Giftedness in Non-Academic Domains: The Case of the Visual Arts and Music' contains interesting insights which are relevant for individuals requiring flintknapping skills. Winner and Martino claim that children who may be labeled 'gifted' in drawing do not pass drawing milestones earlier than typical children. Rather, these children draw in a qualitatively different way. The authors suggest that these children see the world differently, i.e., in terms of shapes and visual surfaces rather than concepts. In the case of both musically and artistically gifted children the unusual abilities emerge early in the child's life: as early as one to two years of age. Winner and Martino conclude that 'the strikingly early age of the emergence of gifts in art and music, and the fact that high levels of skill make themselves known prior to formal training, are strong pieces of indirect evidence for an innate component' (p. 106).

However, not all gifted children grow up to be experts in their domain. This is because the development of exceptional abilities or talent in a particular domain is the product of a combination of the following factors: individual resources, a supportive environment, hard work, and continuous training or practice (Schoon 2000, 214). 'The personality characteristics associated with success in any field are drive, tenacity, and the willingness to overcome obstacles' (Winner & Martino 2000, 108). Furthermore, as I discussed above, expertise is domain-specific and not a universal property. Therefore it is possible for gifted individuals to possess copious amounts of domain knowledge but be unable to use it effectively if they lack the implicit knowledge of a field (Sternberg 2000, 57).

Does practice make perfect? (cf. Olausson 2008) While deliberate practice can affect differences among individuals, there is no evidence that it can *eliminate* these differences. Sternberg concludes that deliberate practice plays a role in the development of high levels of expertise, but it is a necessary and not a sufficient condition (Sternberg 2000, 59). Schneider adds the factor of motivation to those of individual differences and the amount of deliberate practice as being the three key variables for predicting differences in the level of expertise which can be reached within a given domain (Schneider 2000, 173). A quotation from Sternberg can serve to summarize the present consensus: 'The best evidence is in favor of both genetic and environmental origins of intelligence, interacting in ways that are not, as yet, fully known' (Sternberg 2000, 56).

The community of practice

Because in modern Western thought we tend to view the mind and the body as separate entities, we have placed learning in a separate sphere and called it 'education'. Our education systems tend to favor logico-mathematical and linguistic knowledge over bodily-kinesthetic know-how in their curricula. In Swedish schools there has been a trend toward reducing the time spent on instruction in physical activities such as sports. However, recent studies (Ericsson 2003) have shown that bodily-kinesthetic skills are an important component in promoting *all* learning skills, theoretical as well as practical. Learning is not an isolated aspect of our lives; rather it is a practice in which we – our bodies as well as our minds – are continuously engaged with the world around us. Learning is a social practice and it is an aspect of all human activities (Grimm 2000).

In their book *Situated learning. Legitimate peripheral participation* (1991), Jean Lave and Etienne Wenger focus on learning as social practice. They suggest that the community of practice is an intrinsic condition for the existence of knowledge. Learning involves the whole person and it implies not only a relation to specific activities, but also a relation to social communities. The normal process of learning is by legitimate peripheral participation, in which individuals participate in a community of practitioners. Participation is at first peripheral, but as learning progresses the individual's participation increases in engagement and complexity. Learning occurs through apprentices engaging in the real practices of experts. Through this practice, learners move from being peripheral to becoming fully participating members of a community. Children learning to speak are legitimate peripheral participants in the community of practice defined by all who use the language. Through their active participation in using language, the peripheral participants eventually reach the level of those who have mastered the skill.

Formal and informal communities of practice

In what social context does learning a craft take place? Lave & Wenger define a community of practice as 'a set of relations among persons, activity, and world, over time and in relation with other tangential and overlapping communities of practice' (Lave & Wenger 1991, 98). This is a very broad definition which need not imply conscious control or actions limiting access to a community. I believe it is important to differentiate between formal and informal communities, although Lave and Wenger do not really make this distinction. If we use a broad definition of a community of practice, all or most of the skills necessary will be acquired

by all participants. Through legitimate peripheral participation, all children are transformed/transform themselves from watchers to doers. This process occurs in informal learning contexts of the household and daily life and access to the community of practice is not consciously limited. In this sense we can see childhood as an extended period of legitimate peripheral participation during which children are expected to make the culture of practice theirs. The skills which are acquired can be mastered – albeit with varying degrees of competence – by all members of the community.

Lave & Wenger concentrate instead on formal communities of practice in which access is restricted and there are recognized boundaries to membership. Such communities limit legitimate access, either through family membership or by formal apprenticeship. These are formalized learning contexts which develop in response to a need for control or a need for long legitimate peripheral participation because the skills to be taught require long practice (Lave & Wenger 1991). Learning does not take place in the learner's own household, although apprentices may receive their training in the artisan family or household, as in the case of the guilds in Montpellier in 13th century France (Epstein 1991, 106; Reyerson 1992, 7).

Expertise in relation to creativity

Lave and Wenger also address the conflict which is inherent in practice, namely the conflict between tradition and innovation. One model of informal learning emphasizes 'scaffolding', meaning the scaffold built around the learner to keep him or her from falling. The learner is expected to carefully observe and follow examples of practice. In this model, the learner is so carefully monitored that he or she has no room for error and no chance for experimentation or innovation (Greenfield 2000). However, if absolute adherence to a template were required in all practice situations, there would be no contingency for change. Lave and Wenger emphasize that there is a motor for change built into the community of practice because the community is composed of individuals (Lave & Wenger 1991, 117).

Should expertise in a domain or a community of practice be judged on the basis of how well the individual adheres to the template, or rather on how well the individual can manipulate the skills in new and creative ways? The consensus here is that expert performance involves a creative element which surpasses automatic responses. Expertise is often characterized by a creative contribution that goes above and beyond the competencies of those who mentored the expert (Singer & Janelle 1999, 137). Winner & Martino (2000) note that the skill involved in being a child prodigy is not the same as the skill of being a domain-altering creator. A prodigy is someone who can easily and readily master a domain with expertise,

while a creator is someone who *changes* a domain. They also note that there is considerable evidence that creators do not make domain-altering changes until they have worked at least ten years in their area.

As the community of practice moves through time, newcomers become old-timers and the conflict between the forces that support processes of learning and those that work against them provide the motor of change. Newcomers are caught in a dilemma. They need to engage in the existing practice, which has developed over time. They need to participate in it and to become full members of the community in which it exists. However, they also have a stake in its development as they begin to establish their own identity in its future (Lave & Wenger 1991). I suggest that in this conflict we also find the leeway for individual differences to be expressed and the possibility for the encouragement of gifted individuals. Those possessing both a high degree of know-how and the ability to manipulate this know-how in novel ways are the most talented individuals.

Barbro Santillo Frizell's description of a fraternity of *trullo*-builders yields valuable details about embodied know-how and its social context. Her study focuses on craftsmen in southern Italy who build the so-called *trullo*, a type of conical roof made of limestone slabs and used on traditional rural houses. Craftsmen emphasized that the erection of the domed roof, the most difficult element, requires full bodily engagement and a large measure of know-how. The process of instilling the know-how must begin early in the individual's life in order to ensure its full development. Trullo-building skills are passed on within the family from generation to generation. However, even given the same training and legitimate peripheral participation, not all children in a family become masters at the craft. The informant Santillo Frizell interviewed emphasized that it was important that children have talent for the work. According to him, it was possible to distinguish promising candidates at an early age, and the master's ability to see this was itself described as a skill which could not easily be put into words (Santillo Frizell 2000).

Two examples of learning which is situated in communities of practice

I propose now to illustrate the differences between situated learning in informal and formal communities of practice, respectively, by looking at descriptions of axe-blade-making[1] communities in the Highlands of New Guinea and Irian Jaya.

Several accounts describe axe-blade-making in the Highlands of Papua New Guinea. Among the Tungei, a tribe of about 800 people, axe-blade-making appears to occur in a nonrestricted, informal community of practice. Quarrying

expeditions were carried out about every three to five years. All the men in the quarry-owning clans of the Tungei participated in these expeditions, which meant that about 200 men and adolescent youths took part. Burton writes that all clans had to agree to start an expedition at the same time, which emphasizes the consensus-driven nature of quarrying. For the duration of an expedition, men set aside their personal ambition in order to work cooperatively. Individuals were not empowered to find and hoard good axe stones for themselves. Openness and comradship were placed at a premium during quarry expeditions, and axes were left in the open for others to see freely. Each man would get enough stone to make 10-50 polishable roughouts (Burton 1984). Vial (1940) describes a similar organization for inhabitants of the Jimi Valley, another Highland tribe. Højlund (1979) indicates that the pattern Burton describes characterizes many of the Highland tribes. Every male made his own axes and the first stages were carried out at the quarry, followed by later stages of knapping and grinding at the settlement. These accounts describe a situation in which the community of practice is open and nonrestrictive, at least for male members. Youths learn by their legitimate peripheral participation and access to know-how is available to all male members of the tribes in the area.

Dietrich Stout (2002) has described a more restrictive community of practice among the Langda of Irian Jaya, located west of Papua New Guinea. In 1999 there were only seven men who made adzes. This community of practice was more formalized and restricted and it was run by a head adze-maker. Access to suitable stone from the Ey River was controlled by the villages along the river and the head adze-maker in each village had personal authority over quarrying activities. He regulated access to adze production by collecting and redistributing the roughouts made at the quarry. At the settlement, hammerstones and roughouts were stored at his home. Entry into the community of adze-makers was through a period of apprenticeship of up to five years or more. Access to the community was restricted to the close relatives of the masters, usually 'sons' (Langda terminology does not distinguish between sons and nephews). In traditional Langda society apprenticeship began at 12-13 years of age; today beginning apprentices are usually in their mid-20s. Apprentices are chosen on the basis of two factors. One is the interest shown by the potential apprentice; the other is the master's evaluation of his seriousness and commitment. In some cases the master also evaluates knapping attempts before deciding to accept an apprentice. Although access to the formal apprentice system is restricted, younger 'sons' seem to be able to take part in informal legitimate peripheral participation at an earlier age. Perhaps the most successful/interested of these peripheral participants were those who later were chosen to be apprentices.

In traditional societies, the transmission of knowledge and know-how will occur within the home or close to home. While both open and restricted-access communities of practice provide opportunities for individual differences to be expressed, the opportunity for this to occur should be greater in open communities. However, even in formalized communities where access is restricted and kinship-based, there are often mechanisms in place which encourage individuals perceived as particularly gifted or talented, as well as provisions for bringing in individuals who are not related. Among blacksmiths in Kenya, smithing is a hereditary calling and provisions for admitting apprentices are heavily regulated. In those cases where no apprentice candidates are available within the family, they are taken from outside. However these candidates must always come from a family with smith forbears and it is very rare for an individual without smith ancestry to be apprenticed. Such youths are usually chosen from among the sons of the smith's best friends and age-mates (Brown 1995, 119).

My intention in discussing the theoretical issues here has been to point out that learning is an activity which can only be understood in its social context. In his model for dagger manufacture in Late Neolithic Scandinavia, Jan Apel (2001) envisions a restricted-access community of practice under the control of a production fraternity to which only kin were allowed access. Apel suggests that individual differences in ability would be suppressed in this kind of system. I wish to explore if there are ways in which individual talents or interests may be allowed to be expressed, even in formalized, restricted-access communities of practice. In open, informal communities of practice, to which everybody in the group has access, I would expect greater individual leeway and more rapid change. Because of the conflicts between old-timers and newcomers, no community of practice will ever exactly reproduce practice forever (for example, even the Catholic Mass is no longer said in Latin). It is here that I see an opening for individual talent and innovation being employed in social strategies. In the archaeological case study which follows I evaluate Late Neolithic flint daggers in terms of their suitability as prestige goods. Was it possible for any individual or group to gain control over sources of raw material, knowledge, know-how, or a gifted or talented individual who could make flint daggers?

The Late Neolithic, a time of transition

Scandinavian archaeology does not recognize a chalcolithic period. The period preceding the Bronze Age is known as the Late Neolithic and it is divided into an earlier phase beginning in 2350 BC and a later phase from 1950 to 1700 BC. The Late Neolithic I is contemporary with the middle and late Beaker phases in

the British Isles, the Veluwe and Epimaritime Beaker phases in the Rhine delta, and the Early Bronze Age in central Europe, while the later phase is contemporary with the Unetice culture in Central Europe (Apel 2001, 10). Although copper objects appear in the archaeological material in Scandinavia as early as the late Mesolithic period (Klassen 2000), the first evidence for domestic casting occurs in the Late Neolithic (Vandkilde 1996; 2005).

Some consider Late Neolithic society to be undifferentiated, while others suggest that the hierarchy visible in the Bronze Age is already underway at this time (Apel 2001; Lekberg 2002; Vandkilde 1996). The subsistence base was agrarian and families lived in two-aisled long-houses. Some farmsteads were clustered into small hamlets while others were more isolated. Deceased individuals were placed in stone cists, in a pit, or interred as secondary burial in older passage graves (Apel 2001; Lekberg 2002; Vandkilde 2005).

Late Neolithic flint daggers

A major innovation in flintknapping emerged at about 2350 BC in southern Scandinavia; namely, bifacial flaking. Previous to this, only one isolated example of a bifacial tool type is known. This is the so-called *dolkstav* ('dagger staff'), a long pointed tool of unknown use found in the Early Neolithic Funnel-necked Beaker Culture. Aside from this isolated example, flintknapping throughout the Early and Middle Neolithic periods is based on quadrifacial forms and on making blade and flake tools. While quadrifacial flint axes are still being made during the Late Neolithic, we now see an explosion of bifacial forms. These include daggers, spearheads, sickles and projectile points (Vandkilde 2005). Of these, the daggers are the type which evinces the greatest degree of artistry and elaboration. Contemporary knappers who have attempted to replicate flint daggers say that they are the most technologically complex chipped-stone tools found anywhere in the world during prehistory (Stafford 1998, 338).

When classifying flint daggers, archaeologists use Ebbe Lomborg's (1973) system of six main types (Fig. 4). Each type has at least two subtypes. Types I to III belong to the earlier Late Neolithic and types IV to VI to the later (Vandkilde 2005, 6). Types I and IV contain examples of the most elaborate and well-made objects; the longest type I dagger known is 45 cm in length (Glob 1952, 64). However, very few daggers are found in mint condition. Most of them show signs of resharpening and/or reworking (Lomborg 1973, 21).

Daggers are numerous and geographically widespread. The most comprehensive and up-to-date registration of flint daggers can be found in Apel (2001, Table 9:2), who lists a total of 13,168 daggers. The majority of these can be found in

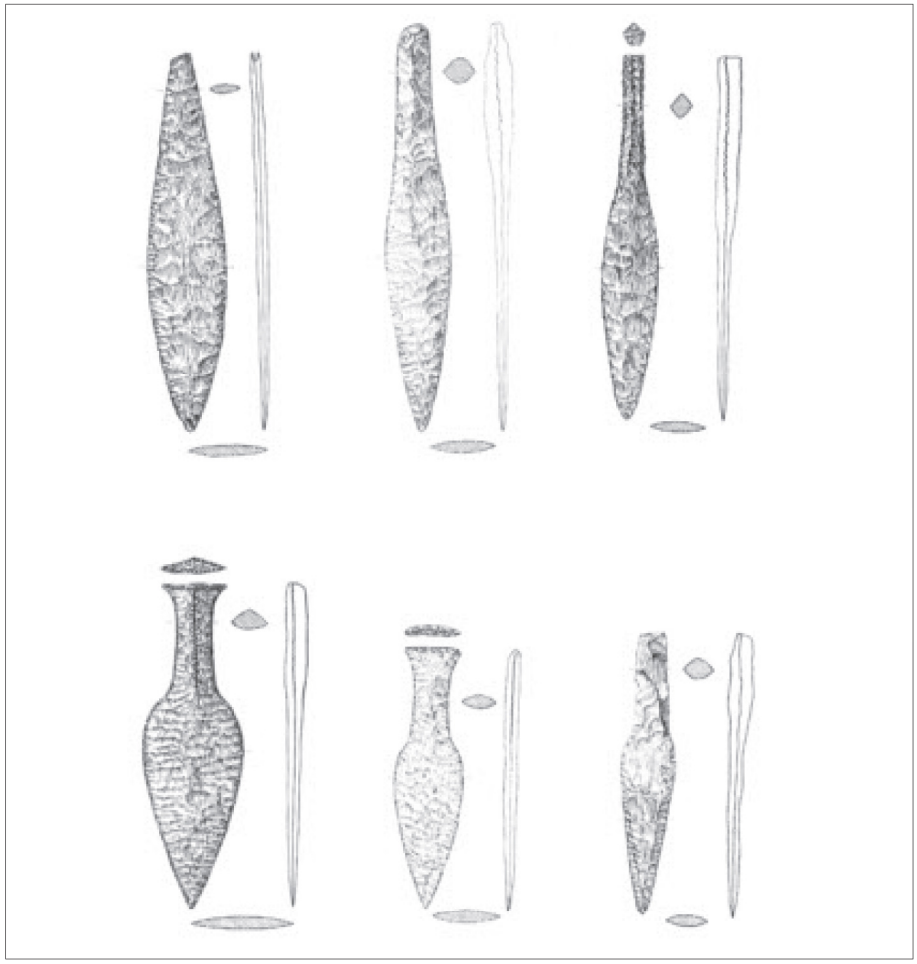

Fig. 4. Lomborg's classification system for Scandinavian flint daggers (reproduced in Apel 2001, Fig. 8:1).

Denmark (*c.* 4200), Sweden (*c.* 4500) and Norway (*c.* 1400), but Scandinavian daggers also occur in Poland, northern Germany, and Finland.

Daggers are more often found in burials and hoards than at settlements (Sarauw 2008). A compilation of the data in Lomborg's catalogue (1973) yields *c.* 430 dagger finds in hoards compared to *c.* 1,360 in burials (no figures for settlement finds are available in this source). Sarauw's investigation of type I daggers showed that most examples in single type hoards are unused or unfinished while most found in burials are resharpened. Daggers found in settlement contexts are usually fragmentary and smaller than those from hoards and burials (Sarauw 2008). Holberg's investigations in Norway confirmed that daggers found on

settlements usually show signs of damage and reworking (Holberg 1998, 16). In those instances in which several daggers occur together in burials, it is often possible to distinguish a 'dagger hierarchy'; that is, one or a limited number of large, unused daggers combined with a greater number of daggers showing poor workmanship, reworking, or inferior raw material (Holberg 1998, 13; Sarauw 2008; Weiler 1994, 76).

Those who have studied flint daggers have noted that they show a wide range of knapping quality. I conducted a study of a random selection of *c.* 540 flint daggers of all types from the collections at the Historical Museum in Lund. I recorded knapping quality on a scale from 'poor' to 'excellent'. Some daggers are exceptionally well-made and symmetrical, while others are poorly made and show large numbers of knapping errors (Olausson 2000, fig. 6). Sophus Müller suggested in 1902 that even the finest daggers were intended for use and not made only for the sake of beauty. He pointed to reworked daggers where it was possible to see, from what is left of the original, that they were once first-class objects (Müller 1902, 166).

The majority of the daggers encountered are made from a high quality, glassy flint of Senonian age. Sarauw's investigation of the fragmentary daggers and dagger debitage from the site of Bejsebakken in Jutland showed that most of the daggers were made from a Senonian flint which resembles the kind mined at Skovbakken,

Fig. 5. Senonian flint outcropping at Stevns Klint, Denmark (after Högberg & Olausson 2008).

750 meters from Bejsebakken. However, one broken dagger was made of Danian flint with bryozoans and he states that flintknappers at Bejsebakken were not very demanding in their choice of raw material for making smaller daggers (Sarauw 2008). Similarly, Earle commented that many of the 'household daggers' found during the Thy investigations were made of field flint of low quality (Earle 1997, 165). When he conducted his extensive inventory, Apel discovered rare examples of daggers made of raw materials other than Senonian flint including Danian flint, Kristianstad flint, and even quartzite (Apel 2001, 32).

It seems clear from the appearance of the daggers that they bear some relationship to metal forms. Vandkilde suggests that the type I dagger is modeled on the tanged flat copper daggers of Beaker type (Vandkilde 2005, 15), and many archaeologists have noted the close similarities between the type IVD flint dagger and the triangular bronze dagger from the Unetice Culture (Apel 2001, 251; Callahan personal communication; Stensköld 2004, 66). Most of the flint dagger types are considered imitations rather than copies, however. Daggers were made under the influence of metal forms, but in a distinctly Scandinavian – or should we say 'lithicized' – style (Müller 1902, 132; Stensköld 2004, 92; Vandkilde 2005, 17).

How do daggers measure up as a basis for a prestige goods system?

The manufacture and use of metal increases in scope and complexity during the Late Neolithic, and by the onset of LNII, metallurgy had become an 'integrated part of social life', according to Vandkilde (2005, 11). This must surely have meant a radical shift in the underpinnings of a society which had until that time built its way of life upon objects made of native raw materials such as flint, wood, bone and plant fibers. Unlike these materials, copper and tin could not be obtained locally. Alliances and networks were now open to renegotiation. Networks for obtaining the new raw material, and the know-how for working it, had to be established.

Fig. 6. A replication of a type Ic dagger, made by modern knapper Greg Nunn. The dagger is 32.5 cm long. Photograph courtesy of Greg Nunn.

Flint technology, as epitomized in the daggers, was under threat from this new technology. The ideal prestige good is one where it is easy to restrict access to one or more of the parameters I noted previously. How do daggers measure up?

Control of raw material. As noted above, we know that most of the daggers have been made from Senonian flint, which is glassy and easily worked. This type of flint is readily available on the beaches of Denmark and southern Sweden (Fig. 5; Högberg & Olausson 2008). As discussed previously, daggers made from erratic flints found in surface moraines are also frequent, both at settlements and in burials. Therefore, I suggest that it was not possible for any individual or group to gain control over the raw material for making the majority of daggers (cf. Sarauw 2008). However, localities with nodules of sufficient size and of sufficient quality to serve as raw material for the longest, most elaborate daggers are fewer and these may have been subject to control, as Apel (2001) suggests. The evidence for Late Neolithic flint mines at localities in northern Jutland (e.g. Becker 1959; 1980) may be evidence for this kind of exploitation and control.

Control of knowledge. I maintain that all adult members of Late Neolithic society possessed both the necessary knowledge (recipe for action) and the necessary know-how to make a serviceable flint dagger. My arguments for this position are firstly the large numbers of daggers and secondly that so many of them exhibit poor knapping. I maintain that dagger-making was part of the informal community of Late Neolithic practice. Members of society learned to knap as children (cf. Sarauw 2008), since the ability to do so would have been a necessary survival skill.

The elaboration of certain forms (Fig. 6) indicates that a parallel production system for making extraordinary daggers existed at the same time, however. Joan Gero has noted that social information in things is amplified in the manufacturing sequence by manipulating the number of manufacturing steps that comprise each stage. Incrementing the number of production steps represents inflation in the costs of transmitting social information (Gero 1989, 94). Dagger production technology would seem to be a good example of this process. For instance, several of the subtypes defined by Lomborg (1973) are elaborations on the main typological theme. These subtypes require more production stages and greater knapping finesse (e.g., Type IC; Stafford 2003, 1548). Contemporary knapper Errett Callahan has spent many years trying to replicate flint daggers. He and Jan Apel are attempting, through experimentation and the study of archaeological preforms and finished and unfinished pieces, to rediscover the knowledge necessary for making a type IV flint dagger. They have found, for example, that the so-called stitching on the handles of the best type IV daggers such as those

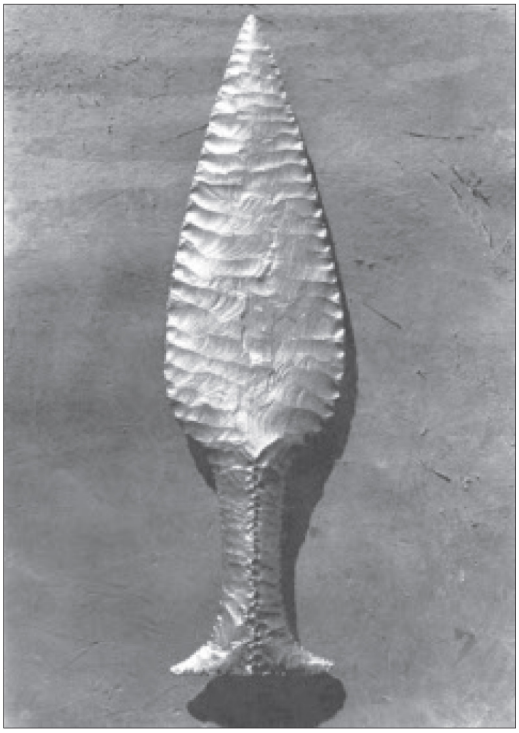

Fig. 7. Full-sized replica of the Hindsgavl dagger from Denmark, 29.3 cm long. Made by knapper Errett Callahan. Potograph courtesy of Errett Callahan.

from Hindsgavl (Fig. 7) or Skatelöv is formed according to specific norms and using specific tools. Stitching on ordinary type IV daggers is done using coarser techniques. In Callahan's descriptions of the type IV system, it is evident that this knowledge is precise, complex and highly standardized (Barrowclough 2004; Callahan personal communication). We can thus envision that the elaborate types were developed in an attempt to restrict access to knowledge or to know-how.

Control of individuals with know-how. Greater morphological complexity requires greater know-how, at least where flintknapping is concerned. Size is also an issue here: knappers agree that excessively longer knapped objects are much more difficult to make than shorter ones (Pelegrin 1990; Stout 2002). The aim of Callahan and Apel's work is to make available the knowledge – the recipe for action – necessary for making a type IV dagger. However, those who lack the physical skills to translate this into the appropriate actions will still fail to make anything resembling an elaborate dagger. It seems to me that this is a key ingredient here, since there is no short-cut to accruing know-how; it simply must take time. Callahan has about 50 years of knapping experience and he has been replicating daggers for more than 25 years (Callahan, personal communication).

Granted, as a modern knapper he has not had the advantages of knapping since childhood or hands-on instruction. Nevertheless, achieving the highest levels of proficiency requires time; time which cannot be used in getting food on the table. Stafford, another modern knapper, has suggested that the technical proficiency needed to execute the pressure-flaking stage on a type IC dagger took years to master (Stafford 2003, 1548).

Jan Apel maintains that acquiring the know-how necessary for making the elaborate type IC and type IV daggers requires an apprenticeship system, i.e., a specific type of learning environment. He suggests that certain families set up apprentice systems, thus maintaining control over both the knowledge and the know-how needed for making the elaborate daggers. Perhaps these families were allied with or were themselves members of an enterprising elite who tried to translate these skills, through the medium of elaborate daggers, into symbolic capital (Apel 2001).

Contemporary with the making of elaborate daggers we have the manufacture of ordinary daggers. Here the community of practice was informal and access was open, I believe. Thus, whereas everyone in the society could have had access to the knowledge of how to make a dagger, not everyone could gain the know-how which was necessary to make the most elaborate daggers. In the latter case the community of practice was formal and restricted.

Control of the gifted or talented individual and his or her dagger production. Are full knowledge and long apprenticeship for accruing know-how sufficient to enable any individual to make an elaborate type IV dagger? I do not believe so. The best daggers were only made by the most gifted individuals who also had access to recipes for action (knowledge) and long practice (know-how), as well as motivation and training. The elite who wished to exploit this system would look for a means to ensure that the community of practice for making the elaborate daggers was formal and restricted and attempt to gain control over the community. Furthermore, the elite would wish to find means to ensure that gifted individuals under his/her control were recognized and allowed access to the community. Given the open nature of the community of practice for making most daggers, I think that both of these steps would have been difficult.

Conclusion: endings and beginnings

As a basis for a prestige goods system, daggers were only partially successful. Dagger-making was carried out in two types of communities of practice. Flint-knapping know-how was necessary for survival and the knowledge and the know-

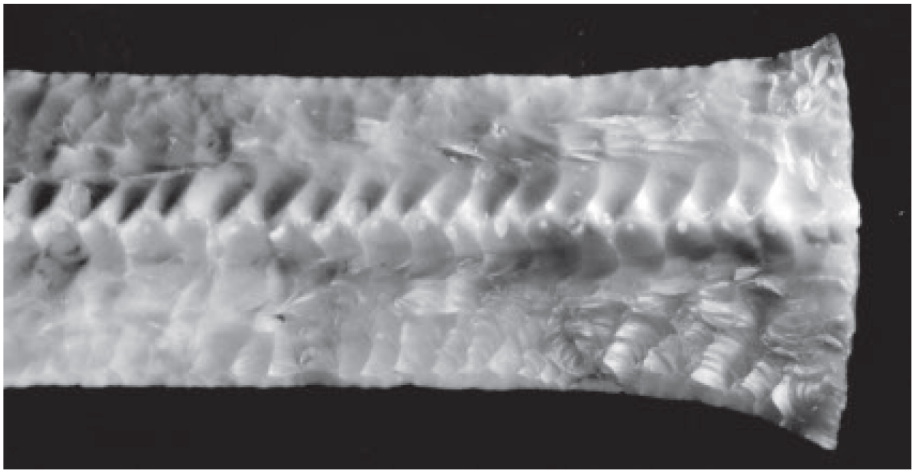

Fig. 8. Stitching on the handle of an experimentally made type IV dagger. Photograph by the author.

how needed for making everyday daggers belonged to an open and informal community of practice. Some of the more elaborate daggers are evidence of attempts to control know-how, perhaps in order to restrict access to a community of practice. We see these sorts of elaborations on daggers of type IC and type IV. Trying to restrict access meant 'upping the ante' on knowledge and/or on know-how by making the dagger more and more elaborate so that the community of practice for making them could be restricted. But there were only limited means of increasing the complexity of making daggers. The only options were to increase the manufacturing stages or to create details on them which only the individuals with the most knowledge, the most know-how, and/or the most expertise could reproduce (Fig. 8). But if elaborate dagger forms became too complicated, for instance if too few knappers were able to make them, then it became impossible to make enough to satisfy social demands.

Copper/bronze technology proved much more suitable as a social medium for prestige goods. In this case it was fairly simple to limit access to the parameters of raw material, knowledge, and know-how, and the community of practice could be easily restricted and brought under the control of an aspiring elite. It is easy to understand why social complexity accelerated once the system got underway.

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Notes

1 Since authors have not made a distinction between axes and adzes in their descriptions, I will follow the terminology used by the author. From a technological point of view and based on the documentation, I judge that axe blades and adze blades are comparable.

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