GUIDE TO MAKING TOOL HANDLES:
Learning about hafting in lithic technology

**Aim of exercise:** To explore tool morphology and use through different hafting styles.

**MATERIALS**

- 1 U slotted wooden arrow shaft (shaft #1)
- 1 L slotted wooden arrow shaft (shaft #2)
- 1 Adze wooden shaft (shaft #3)
- 1 Axe wooden shaft (shaft #4)
- 1 Wooden spear shaft (shaft #5)
- 1 Wooden scraper shaft (shaft #6)
- 1 Role of twine
- 1-3 pair of scissors (to cut the twine)
- 2-3 projectile point replicas
- 1 axe/adze replica
- 1 spear point replica
- 1 scraper

**INTRODUCTION**

Hafting of stone tools:
*Before conducting the exercise, discuss with the students the following aspects of hafting in lithic technology.*

Many of the stone tools found within the archaeological record would have been hafted. Organic materials including wood, bone, and antler was often used to hold the stone tool heads creating an extended handle which is called a shaft. Hafting a tool within a shaft can provide better handling and leverage when using a tool. In lithic studies, hafted tools are part of what is called a composite toolkit and is an important aspect of stone technology. A composite tool is a tool that is made out of more than one part and can help in identifying and understanding cultural groups, time periods, tool use, and tool morphology.

**Discussion Points/Questions:**
- Think about the tools you use today.
  - Are there any tools that are hafted?
  - What types of materials are used to make the hafts?
  - How does hafting help you use the tools?

In many modern societies who have continued using stone technologies, the shaft is the most valued part of the tool and is often passed down through generations. The stone head is often viewed as the more expendable part and is constantly being replaced when broken.

**Discussion Points/Questions:**
• Think about different types of hafted tools.
  o How many hafted tool types can you name?
  o Why do you think the shaft is more valuable than the stone tool?
  o How would the difference in value placed upon the shaft and the stone head be reflected within the archaeological record?

There are many different ways to attach a stone tool to a shaft, binding it in place so that it does not move when in use. Often times in the archaeological record we do not find the shaft with the stone tool. Because of this, we cannot directly observe the techniques used to bind the stone to the shaft. To overcome this we conduct experiments on replica tools or look to living societies using stone technologies to help us understand different types of binding agents and techniques used in the hafting process. Such binding agents include using gum or sap from trees as well as animal sinew to create glues that act as an adhesive to create a strong hold. Twine is also used, wrapping the tool and the shaft together.

Discussion Points/Questions:
• Think about the importance of binding agents and the properties needed for them to work.
  o Can you think of any other types of binding agents that may have been used by past peoples?
  o What type of binding agents do we have now that could work?
  o Why do you think the shaft and binding agents are not found within the archaeological record?

HAFTING EXERCISE

This exercise is designed to allow the students hands on experience with the stone tool molds and the different hafts to help them understand concepts of tool use and morphology. It is broken up into three section based on tool technologies (section 1: projectile points; section 2: Axe/Adze; section 3; spear; section 4: scraper). Students can work in groups or on their own. See “making hafts” in the next subsection for examples of how to haft the lithic tools.

Have the students explore the different hafting types provided within the teaching kit. Provided in the kit are 6 different shafts for four different tool types (projectile point; adze/axe; spear; scraper). Have the students try attaching the different stone tool heads to their corresponding shafts using twine as the binding element. Tell the students to observe the different aspects of each technology and then, using those observations and their experience in hafting the stone tools, ask them to answer the following questions in each section.
**Projectile points:**
Presented are two different types of shafts (#1 and #2) (Figure 1 and 2) and several projectile points (molds) (Figure 3). Have the students try and haft the points within the different shafts using the twine to attach projectile points to the shafts.

![Figure 1. L shaped shaft for arrow.](image1)

![Figure 2. U shaped shaft for arrow.](image2)

![Figure 3. Projectile point.](image3)

Have the students think about/answer the following questions:
1. What are the benefits/strengths of each hafting style and why? Where are the weaknesses and why?
2. Are there other types of binding agents you could use that would make the hafting stronger?
3. Can you think/design other ways of hafting these arrows?
Axe vs. Adze:
Presented is one stone tool head (adze/axe head)(figure 4) and two possible shaft types (Adze is shaft #3 (figure 6) and Axe shaft is #4 (figure 5). Based on how this tool is hafted it will either be used as an adze or an axe.

1. What is the difference between the hafting of an adze and the hafting of the axe?
2. How would the difference in hafting type affect the tool’s use?
3. What type of material would be processed by each and why?
Spear:
Presented is one stone tool head (spear point) (figure 8) and one possible shaft (#5) (figure 7). Have the students evaluate the size of both components (spear head and shaft) of this tool and how this reflects its use.

Figure 7. Spear shaft.

Figure 8. Spear projectile point.

1. What is the weakest part of the tool and why?
2. How would this tool be launched? Can you think of more than one way?
3. What type of animals would be hunted using this tool?
4. Could the stone tool head be hafted differently? How would this change its use?
**Scraper:**
Presented is one stone tool head (scraper)(figure 10) and one possible shaft (#6)(figure 9). Have the students look at the position of the tool in the shaft and the steepness of the stone tool head’s used edge (around 90*) and think about how this reflects the tool’s use.

1. What motion is this tool being used in?
2. How would the steepness of the used edge effect the tool’s use?
3. What type of material would this tool be used to process?
GUIDE TO HAFTING: Making hafts

INTRODUCTION

All of the hafts contain two parts: 1) wooden shaft, and 2) twine to attach stone tool mold to haft. The guide is separated into various subsections based on tool types (arrows, spear, scraper, axe/adze). Each subsection includes detailed step by step instructions with an optional first step, which shows how to make the shaft yourself. Note: Always wear protective eye (lab glasses) and hand wear (leather gloves) when using woodworking tools.

ARROW SHAFTS

There are two different types of arrow shafts needed for this exercise: 1) L-shaped shaft (Figure), and 2) U-shaped haft. Both hafts are made out of the same materials with the only difference being the shape of the slot where the stone tools are inserted.

EQUIPMENT NEEDED:

- Doweling rods: Need 2 (one for each haft type) with circumference of 10mm. The rods can be purchased at any hardwood store or craft store for $1.00-$3.00 (CDA).
- Whittling knife: To make the slot where the tool will be inserted.
- Sandpaper: To sand the wood down after shaping.

STEP BY STEP INSTRUCTIONS: L-shaped Haft

Step 1 (optional) - Wearing protective hand and eye wear, use the whittling knife to shape one end of the haft into an L-shape about 1 in. long. When done use sand paper to smooth the wood to prevent splintering of the wood.

Step 2 - Obtain projectile point lithic, L-shaped shaft (#2) and twine.

Step 3 - Place end of the projectile lithic into the L part of the shaft. Take the twine and begin wrapping the lithic onto the shaft.
Step 4 - To make the projectile point more secure in the shaft, wrap the twine in a criss-cross pattern along the body of the lithic.

Step 5 - Keep wrapping the tool into the shaft until it is tight and secured.

Step 6 - Once the lithic is tight, tie off the end of the twine and you are done!

STEP BY STEP INSTRUCTIONS: U-shaped Haft

Step 1 (optional) - Wearing protective hand and eye wear, use the whittling knife to shape one end of the haft into an U-shape that is 1 in. long. When done use sand paper to smooth the wood to prevent splintering of the wood.

Step 2 - Obtain projectile point lithic, U–shaped shaft (#1) and twine.
**Step 3** - Place end of the projectile lithic into the U part of the shaft. Take the twine and begin wrapping the lithic onto the shaft.

**Step 4** - To make the projectile point more secure in the shaft, wrap the twine in a criss-cross pattern along the body of the lithic.

**Step 5** - Once the lithic is tight, tie off the end of the twine and you are done!
SPEAR SHAFT

There is one shaft needed for this exercises. The shaft is made out of a wooden stick (Figure) of which can be obtained from any tree or from any hardwood store for $3.00-4.00 (CDA).

EQUIPMENT NEEDED:

- Wooden stick: from any tree or store with circumference of 15mm
- Whittling knife: To strip bark off stick and to shape slot where tool will be inserted.
- Small jig saw: To make initial slot in stick
- Sandpaper: To sand the wood down after shaping.

STEP BY STEP INSTRUCTIONS:

Step 1 (optional) - Wearing protective hand and eye wear, use the whittling knife to strip the bark off the branch. Once the bark is stripped, use the clamps to vertically secure the branch to table. Once the branch is secured, use the jig saw to cut an inch long cut down into one end of the shaft. Having made a 1in cut with saw, use whittling knife to make slot wider (about 10mm wide). Once the slot is made, use the sandpaper to smooth the shaft to prevent splintering of the wood.

Step 2 - Obtain projectile point lithic, U –shaped spear shaft (#5) and twine.

Step 3 - Place end of the projectile point into the U part of the shaft. Take the twine and begin wrapping the lithic onto the shaft.
Step 4 - Once the lithic is tight, tie off the end of the twine and you are done!
SCAPER SHAFT

There is one shaft needed for this exercise. The shaft is made out of a wooden stick of which can be obtained from any tree or from any hardwood store for $3.00-4.00 (CDA).

EQUIPMENT NEEDED:

- Wooden stick: from any tree or store with circumference of 25mm.
- Whittling knife: To strip bark off stick and to shape slot where tool will be inserted.
- Small jig saw: To make initial slot in stick
- Sandpaper: To sand the wood down after shaping.

STEP BY STEP INSTRUCTIONS:

Step 1 (optional) - Wearing protective hand and eye wear, use the whittling knife to strip the bark off the branch. Once the bark is stripped, use the clamps to vertically secure the branch to table. Once the branch is secured, use the jig saw to cut a 5mm long slot about 5mm from one edge of the tools end. Remove shaft from vertical position. Placing the shaft lengthwise on table, use the clamps to secure the shaft to the table. Using the saw again, cut into the body of the shaft to meet up with the vertical cut mark taking away about 20mm of the shafts end to create an L like shape. Once the slot is made, use the sandpaper to smooth the shaft to prevent splintering of the wood.

Step 2 - Obtain lithic scraper, scraper shaft (#6) and twine.

Step 3 - Before putting scraper in haft, wrap twine around end following indentations.
**Step 4** - Place scraper head against the L-slot at the end of the shaft.

**Step 5** - Holding the scraper in place, wrap the twine around the head in a criss-cross pattern.
Step 6 - Once the scraper head is firmly in place, tie up the twine ends and that is it!
**AXE/ADZE SHAFT**

There are two different types of arrow shafts needed for this exercises: 1) Axe shaft, and 2) Adze shaft. The wood for the Axe shaft can be obtained from any tree branch. The Adze shaft is obtained by cutting a tree at the juncture where two branches meet. This creates an L shaped branch needed to create the shaft.

**EQUIPMENT NEEDED:**

- Wooden stick: two sticks from any type of tree. One stick is straight branch with a circumference of 30mm (for the Axe) and the second is the juncture where two branches meet with a circumference of 35mm (for the Adze).
- Whittling knife: To strip bark off stick and to shape slot where tool will be inserted.
- Small jig saw: To make initial slot in sticks
- Sandpaper: To sand the wood down after shaping.

**STEP BY STEP INSTRUCTIONS: Axe Shaft**

**Step 1** (optional) - Wearing protective hand and eye wear, use the whittling knife to strip the bark off the branch. Once the bark is stripped, use the clamps to vertically secure the branch to table. Once the branch is secured, use the jig saw to cut an inch long cut down into one end of the shaft. Having made a 150mm cut with saw, use whittling knife to make slot wider (about 70mm wide). Once the slot is made, use the sandpaper to smooth the shaft to prevent splintering of the wood.

**Step 2** - Obtain lithic axe/adze head, axe haft (#4) and twine.
**Step 3** - Insert axe head into slot in haft.

**Step 4** - Wrap twine around haft and head in a criss-cross pattern.
**Step 5** - Tie off end of twine and you are done!

**STEP BY STEP INSTRUCTIONS: Axe Shaft**

**Step 1** (optional) - Wearing protective hand and eye wear, use the whittling knife to strip the bark off the branch. Once the bark is stripped, use the clamps to vertically secure the branch to table. Once the branch is secured, use the jig saw to cut a 140mm long slot about 10mm from one edge of the tools end. Remove shaft from vertical position. Placing the shaft lengthwise on table, use the clamps to secure the shaft to the table. Using the saw again, cut into the body of the shaft to meet up with the vertical cut mark taking away about 40mm of the shafts end to create an L like shape. Once the slot is made, use the sandpaper to smooth the shaft to prevent splintering of the wood.

**Step 2** - Obtain lithic axe/adze head, adze haft (#3) and twine.
Step 3 - Insert adze head into slot in haft.

Step 4 - Wrap twine around haft and head.
**Step 5** - Wrap twine in criss-cross pattern around both head of haft and the longer part of the shaft.

![Image of a hafted tool with twine wrapped around it.]

**Step 6** - Tie off twine and you are done!

![Image of a hafted tool with twine tied off.]

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