A Custom-Made Head Pointer for Children

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Severely physically disabled adults and children may be able to use a head pointer to access an augmentative communication system or to participate in activities. This paper describes how to make and fit a thermoplastic head pointer and how to train a child to use it.

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This article describes a custom-made head pointer made from thermoplastic material. At the time of this writing, the device had been used for 3 years and had led to referrals for custom-made head pointers from school occupational therapists and local evaluation centers.

Head pointers are used by nonspeaking disabled people to communicate and to access toys, computers, electric wheelchairs, and other devices (see Figure 1). Because head pointers are unfamiliar to most parents and teachers, occupational therapists are often called on to recommend them, fit them, and train children in their use.

The advantages of the custom-made head pointer include a custom fit regardless of head size or shape and immediate availability. This is especially useful for pediatric patients. Most commercial models, like the Adjustable Head Pointer ($69.50), come in only one size. They may be too large and bulky for children. The Tiny Tot head pointer ($125) comes in pediatric sizes, but funding through insurance or alternative sources is usually required for this relatively expensive head pointer, and this delays fitting. Fabrication of the custom-made head pointer described in this article requires an hour of the therapist's time plus materials; it is comparable in price to the low- to mid-priced commercial models (i.e., approximately $70).

Literature Review

Augmentative communication, which is a rapidly developing specialty in rehabilitation, focuses on providing communication systems for nonspeaking persons (Attermeier, 1987). Such systems may be as simple as a picture board or as complex as a computer with an electronic voice. Evaluation for an augmentative communication system requires a team effort (Attermeier). The occupational therapist's role includes identifying the mode of indication, that is, the user's most functional motor response with which to access a communication system.

The pointing response is the preferred access mode for communication because it allows direct selection of choices and is fast and efficient (Musselwhite & St. Lewis, 1982; Stowers, Altheide, & Shea, 1987). In contrast, scanning systems require the user to wait while various choices are manually or electronically indicated and to press a switch when the scanner gets to his or her choice.

The head pointer is a desirable alternative mode of response because it provides a pointing response with touch contact that can be used to access many toys and keyboards without modification. For the

1 Available from the Preston Corporation, Preston 1988 Spring Catalogue, 60 Page Road, Clifton, NJ 07012.
2 Available from Zygo Industries, Zygo 1988 Catalogue, PO Box 1008, Portland, OR 97207-1008.
Figure 1. Young adult using electronic communication device with head pointer.

Child, touching is concrete and easily understood. Other pointing methods, including eye gaze and light beam pointers, require specialized equipment and adaptations for positioning materials.

Harris and Vanderheiden (1980) emphasized the need for early intervention with young physically disabled children so that the children can develop basic interaction skills that are prerequisites to using an augmentative communication system. The incentive to communicate evolves as the young child develops preferences for activities and begins to understand the cause and effect relationship between his or her behavior and that of others (Shane, 1986). Harris and Vanderheiden stated, "As with the vocal nonhandicapped infant/child, early interaction and communication would initially center around basic needs, control, exploration, and play activities" (p. 241). A head pointer can provide a way for the child to touch objects and thus to participate actively in play.

Attermeier (1987) emphasized the need for early intervention to help nonspeaking physically disabled children develop maximum head control and a reliable signal response that could be used for making basic choices. The head pointer can motivate a child to use and thus to improve his or her existing head control.

In summary, head pointers have a role in developing the prerequisites for augmentative communication, which include the establishment of preferences, the understanding of cause and effect, and the ability to use a consistent signal for choice indication. For some nonspeaking disabled persons, the head pointer can provide the most efficient means of communication.

Materials and Equipment
A head pointer can be fabricated with the following materials:

- low-temperature thermoplastic material
- 12-in. D-ring touch fastener strap
- 1-in. tricot loop strapping
- pressure-sensitive hook fastener
- rivets, small and large
- 3/8-in. heavy-duty elastic
- metal rod holder (must be fabricated at a local machine shop)
- 3/8-in. aluminum rod

The head pointer consists of a headband and strap, a horizontal crosspiece that prevents the headband from slipping down over the eyes, and a front piece to secure the metal rod holder, which holds the head stick in place.

The headband and strap are made from a 1-in. wide thermoplastic strip with ends angled down at 45°. This strip is cut to fit the head circumference minus 2–3 in. The strip is heated and molded around the head just above the eyebrows (see Figure 2). The strip is angled downward so that the strap will be positioned to catch under the occiput (see Figure 3). The premade touch fastener strap is cut at the D-ring. The D-ring end is attached to the headband with heavy-duty elastic, and the remainder of the strap is attached to the opposite side with the length adjusted to allow overlap of the touch fastener closure.

With the headband strapped in place, measurement for the crosspiece is taken just anterior to each ear and across the head. A 1-in. thermoplastic strip is cut to length, molded across the head just anterior to the ears, and riveted onto the headband (see Figure 4).

The front piece is measured from midforehead to the crosspiece. The metal rod holder (see Figure 5) is riveted to the strip anterior to the intersection with the crosspiece and then the strip is riveted in place (see Figure 6). Tricot loop strapping is used to line the headband and is attached with thin strips of pressure-sensitive hook fastener. If necessary, a chin strap made of tricot loop strapping can be attached to the headband with a pressure-sensitive hook fastener. The aluminum rod is cut to length and rough edges are filed. A removable pencil eraser can be used on the tip of the rod to prevent the point from slipping during contact.

Using the Head Pointer
The functional use of a head pointer depends on (a) the fit of the apparatus, (b) the physical ability of the user, and (c) the motivation of the user.

Fit
The fit of the head pointer is very important. If the pointer slips on the head, pointing will lack accuracy.
and the pointer may slip off if pressure is applied. An initial evaluation of fit should be done without a chin strap because this strap is often unnecessary for light-pressure touching. The head pointer should not slip on the forehead when manipulated with gentle pressure.

After an initial fitting, the child should be seated optimally and provided with a work surface (see Figure 7). Arm restraints may be needed to prevent the child's hands from interfering with materials, but gentle hand holding is advised for the initial evaluation.

The length of the head stick is determined by the user's degree of head and trunk control. The stick should be long enough for the user to touch the work surface without excessive neck flexion. The angle of the pointer should allow the user visual monitoring with the eyes in a neutral position and should not require upward gaze. Pointing accuracy and range of indication can be evaluated with grids (e.g., ¼-in. squares, 1-in. squares).

If the child has never used a head pointer or has minimal head control, he or she may have difficulty planning or controlling head movements. This may be evidenced by a tendency to press the pointer into the table surface and thus off the forehead. The child with limited head control may have difficulty controlling neck flexion and will bang the pointer onto the table surface. When these problems are observed, the pointer should be shortened. Activities presented initially require only side-to-side head movement without neck flexion. Later, materials can be positioned on an easel so that flexion control can be graded to a horizontal surface. Angling the head stick will reduce the amount of neck flexion required for pointing on the table surface, but the angle will make it more difficult to apply pressure, which is an important consideration for the keyboard user.

Physical Ability of the User

To use a head pointer optimally, head and trunk control are required. Trunk control to lean forward or
sideways increases range, for example, to reach all areas on the wheelchair lap tray. A child with only head movement capabilities can use a head pointer, but the area within reach (range of indication) is then limited to the arc of head movement. In such a case, materials angled toward vertical will increase range. The angle for maximum range is determined by adjusting an easel so that the tip of the head pointer is in contact with the surface through the arc of neck extension to flexion. A computer keyboard can be positioned on an easel to increase the user’s functional range to reach more keys.

Accuracy can also be increased by using adaptations such as a plastic guard with holes to guide pointing. Guards are available for computers and typewriters or can be made from acrylic plastic for use with picture and word boards.

Motivation of the User

The initial focus of intervention is to motivate the child to accept and use the head pointer in play. The fit of the head pointer is important, but a determination of exact accuracy and range of indication is not essential.

To help the young child adjust to the feel of the head pointer, parents can have the child wear a hat or headband prior to the head pointer fitting. After the fitting, the pointer can be introduced in short sessions (5 to 20 minutes) with high-interest activities. These activities should not require accuracy and should be discontinued if they frustrate the child.

Training

Training is begun with a short head stick so that the child will not be tempted to push the stick against the table surface and inadvertently push it off his or her head. Activities requiring side-to-side head control, such as choosing between two toys, are emphasized first. Activities such as popping a bubble held out on a bubble wand or knocking over a tall stack of blocks give the young child a sense of accomplishment as he or she develops motor planning skills with the head pointer.

Play activities should be designed so that the child is an active participant. For example, when playing with dolls, the child can select clothing or food while the therapist manipulates the objects. In a simple cooking activity, the child might find the spoon or help stir with the head pointer.

Accuracy of response can be stimulated by asking the child to touch smaller objects, for example, to show body parts on a doll or to touch details in a picture. Sticky putty, touch fastener, or a magnet can be attached to the end of the pointer so that the child can pick up objects. The child might fish for fish (cut from tricot loop strapping) with a pointer that has touch fastener on its tip. This would encourage the child to develop accuracy (Williams, 1988).

Touch pressure, which is needed for switch activation or keyboard activities, can be stimulated initially by having the child poke clay or dough with the head stick. Drawing with a marker taped to the head stick also requires light pressure on a flat surface.

Figure 6. Molded front piece with rod holder attached.

Figure 7. Child choosing stickers with head pointer.
more specific training, a variety of electronic toys with keyboards and buttons to push are available in local toy stores.

Conclusion
The fit of a head pointer and the physical ability of the user determine functional ability with this device. The custom-made head pointer described in this paper is a useful alternative to commercial devices because it is individually molded for optimum fit. This device is particularly useful for children and for persons of any age with unusual head shapes. The custom-made head pointer is also easily obtainable in the occupational therapy clinic without the time delays necessitated by outside orders. The head pointer can provide an increased variety of activity options for the severely disabled child as well as a potential motor response mode for augmentative communication.

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References