

Alternative Access to Communication Aids

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This paper will endeavour to bring together the issues and facts about alternative access for use with communication aids. Although it is not the intent of this paper to discuss other forms of technology such as computers and environmental controls, some of the same principles will apply. For more information on alternative access to computers, see the end of this chapter.

Switch Access Issues

For many individuals with a severe communication impairment and severe physical limitations, indirect access methods, such as scanning may be the only way to access technology. Indirect selection via scanning requires the user to activate a switch or number of switches connected to the communication aid. The device must be able to accept a switch and have some type of scanning array available to the user, see *Appendix 1*. There are many issues that need to be considered for the use of a scanning system:

- **user's motor skills and positioning**
- **switch activation site**
- **positioning and mounting of switch**
- **size of switch**
- **switch feedback**
- **user's control.**

It is important to note again the importance of a full assessment by a multidisciplinary team before embarking on a switch access programme. Input from physiotherapists and bioengineers, as well as from speech and language therapists and occupational therapists, may be important as the switch user must be positioned correctly in order to exert maximum control over their switch.

Motor Skills and User Positioning

Most potential users will change their position daily and for different activities. In order to utilise an indirect access method, the user must be in a comfortable position in which they also feel secure. In addition, usually the user will need to be in a position which allows for an adequate view of the equipment, eye contact with other people and awareness of the surrounding environment. The multidisciplinary team will need to evaluate the appropriate position and seating system for the user to maximise their full motor capabilities. This may include specific positioning aids such as splints, arm rests, head and/or foot rests etc.

Switch Activation Site

When identifying a switch activation site, it is important to choose a site which the user can access efficiently using a reliable motor movement. Different areas of the body should be assessed looking first at accessing with the hand or finger as this seems to be the most 'socially acceptable' site for switches. If this site is not accessible then other switch sites such as the head, shoulder, elbow, feet, legs and knees should be investigated. In addition, the tongue, cheek and chin can be used as switch sites and there are now specific switches manufactured just for this purpose. Once a reliable switch site is identified, the switch will need to be positioned and mounted.

Positioning and Mounting of Switch

Once a suitable switch and activation site have been identified the best method of mounting the switch requires to be established. Avoid complicated mounting systems, if at all possible, so that it is easy for a variety of people to be able to mount the switch. First look for mounting sites on the user's existing equipment. Often a piece of *Velcro* can be stuck down to this equipment with the opposite side stuck to the switch. Wheelchair trays, either on top for use with a hand or underneath for use with a knee are suitable sites. Headrests can be used for head switches and the inside of armrests can be used with a switch strapped to the thigh. If there is no suitable site on the user's existing equipment then a specialised mounting system needs to be used. These systems often take the form of multi-jointed arms which can be screwed onto a chair or table and then bent into the correct position for the user.

Size of Switch

It is best to try and find the smallest size of switch that the user can access so as not to interfere with other pieces of equipment the user may depend on at different times of the day. However, a large switch may be

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required to allow for a big enough surface area for the user to access the switch.

Switch Feedback

It is important to identify what type of feedback from the switch the user may require. Is touching the switch surface and/or seeing its effect enough, or does the user require audible feedback, such as a click or a beep? It should be noted here that auditory and visual feedback may also be available through the communication aid to which the switch will be connected. Tactile feedback may also be helpful for the user as s/he may be able to feel some resistance when the switch is pressed. There are other switch features which are important to take into account. They are summarised in Table 1.

User's Control of Switch

Once the placement of the switch has been identified, the user's control of the switch for scanning purposes will need to be addressed. Initially the user may use the switch for 'cause and effect' training and practice. Activities which encourage activating a switch to make something happen should be introduced. Once this has been mastered, the user may be able to cope with activities that involve timing. The following three components have been identified as essential to consider when introducing switch timing activities:

- the user must be able to wait for the right moment
- the user must be able to activate the switch, noting the type of switch and the length of time it takes to activate the switch
- the user must be able to release the switch accurately and efficiently

The speed with which an individual can activate the switch using a scanning array will need to be adjusted as the user becomes more familiar and adept at using the switch.

Each of these factors can be addressed using switch operated appliances or battery operated devices connected to a switch. It is important to identify what the user will be most motivated by, for example, music playing on a tape recorder, a toy moving or barking, or a light going on and off.

When discussing indirect selection, it is important to have an idea of the different types of switches available to an individual user. Switches come in many varieties and can be customised to suit each individual. Switches may come in single, double, four way or multiple configurations.

For a list of switches and a description of those now available commercially please see *Appendix 2*.



Table 1. Switch Features

Contact type	Switches may be activated by different types of contact such as up / down touch, side to side touch, push or pull, tilting, pressure, squeezing, swiping, suck / blow etc.
Contact / non contact	Some switches operate on non-contact methods such as infra-red detection, heat, eye movements, breaking a light beam. These tend to be more complex and delicate to use and may be expensive.
Sensitivity	Some switches are designed for light pressure while others for heavy duty use such as a foot switch. Some switches offer an adjustment for varying sensitivity adjustment.
Robustness	Switches should be robust in their outward construction and internal wiring. Most users will be transporting their switches daily and any switch should be hard wearing.
Length of travel	Some switches require a tiny press while others have to be pressed down a long way to operate.
Activation type	Switches can be set up in different ways and each user will need the right type of setting for them. Some switches are normally OFF and only activate when pressed. Some are normally ON and only activate when pressure is removed. There are also switches that operate momentarily, or stay on as long as the switch is activated, while others can be 'timed' to stay on for a set period however long the switch activation. In addition, some switches may stay on until a second switch activation switches them off again (latched).

Customising Switches: If it is not possible to find a commercially available switch and/or mounting system for an individual user then it is possible to have something specially made by a Bioengineering Department or Rehabilitation Engineer. This may be costly and time consuming so commercially available products should always be considered first. These commercial products may then be adapted to suit an individual user rather than starting to design a completely new input device. Due regard should always be given to health and safety regulations.

Alternative Access to Computers

Computers and other technological devices can be adapted to suit an individual user’s needs by altering keyboards and/or input devices.

Different types of keyboards are available that either allow for keys that are larger and/or more widely spaced, or mini keyboards for individuals with good fine motor control, but limited range of movement. Ergonomic keyboards may be useful for head / mouthstick, single or two handed operation where a standard QWERTY keyboard layout may be difficult to access. Standard keyboards can also be adapted by the use of keyguards and/or wrist rests. In addition, some software utilities allow you to change the configuration and/or response of the keyboard to suit an individual’s needs.

Other alternative input devices that are available include touch screens, mice, trackerballs, joysticks, head pointers and mouse pens. Voice input as an alternative to a keyboard is also now available.

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APPENDIX 1

A Selection of Dedicated Communication Aids and their Indirect Access Methods

Dedicated Communication Aids and their Indirect Access Methods

	Single switch	2 switch	Joystick	Head pointer	Icon prediction
AlphaTalker	✓	✓	X	✓	✓
BIGmack	✓	X	X	X	X
Canon Communicator	✓	X	X	X	X
ChatBox	✓	✓	X	X	✓
DeltaTalker	✓	✓	✓	✓	✓
DigiVox	✓	✓	X	X	✓
DynaVox 2	✓	✓	✓	X	X
Lightwriter	✓	✓	X	X	X
Macaw	✓	✓ ¹	✓	✓	✓
MessageMate 20 / 40	✓	✓	X	X	X
MessageMate 8	✓ ²	✓	X	X	X
Orac	✓	✓	✓	✓	✓
Portacom	✓	✓	X	X	X
SpeakEasy	✓ ²	✓	X	X	X
Spokesman	✓ ²	✓	X	X	X
Talking Buddy	✓	X	X	X	X
Ultimate 8	✓	X	X	X	X
Vanguard	✓	✓	✓	✓	✓

¹Up to 5 switches can be used.

²One switch per message

APPENDIX 2

Switch Selection

Provided a person can make a consistent voluntary movement with any part of their body it should be possible to find a suitable switch for them to use: – movement of hand, foot, head, eyeblink, suck, puff etc. or even sound can be used.

It is important that the person is positioned correctly so that they can exert maximum control over the switch. The switch may need to be mounted. Some people find an auditory or a tactile feedback helpful. Some users will only be able to access a single switch, some two or more.

Different pieces of equipment require different connectors from the switches. If the right switch has the wrong connector it is often possible to use a switch adaptor – i.e. 1/4” to 1/8” or 1/8” to 1/4”. To connect a switch or switches into a computer – PC, BBC, MAC etc. – a special interface box is required (different for each type of computer). Some manufacturers like Possum make switches with connectors specifically for their own equipment.

A Selection of Switches Currently Available

Lever Switch – a light action microswitch mounted in a small box which is pivoted at one end and can be operated by hand, chin, head, headpointer etc. Tactile and auditory feedback. Come in different sizes. £37 – £66. Available from *QED, TFH, Liberator*.

Latching Switch – once pressed stays ‘on’ or ‘off’ until pressed again. Operated by hand, head etc requires a little pressure. Tactile and auditory feedback. £37. Available from *QED*.

See-saw Switch – box pivots at mid-point to give a different switch output at each end. Operated by hand, chin, headpointer etc. Tactile and auditory feedback. £34 – £80. Available from *QED, Liberator, Don Johnston*.

Click Switch – a small, low cost mechanical switch with 5 different pressure settings and two screw holes for optional mounting. Operated by finger, chin, headpointer etc. Tactile and auditory feedback. £15 approx. Available from *Toby Churchill*.

Specs Switch – brightly coloured (red, blue, green, yellow, pink, purple or black) switch 1 3/8” diameter, 1/2” high. Sensitive to 1oz pressure. Comes with standard flange mount, space-saving flush mount and strap mounting plate (strap included). Tactile and auditory feedback £40. Available from *Ablenet*.

Jellybean Switch – brightly coloured (red, blue, green, yellow, pink, purple or black) switch 2 1/2” diameter, 1” high. Sensitive to less than 2oz of pressure but robust. Tactile and auditory feedback. Holders for 2 or 4 ‘beans’ available. Switch £39; holder for 2 beans, £30; holder for 4 beans £40. Available from *Ablenet*.

Big Red Switch – also comes in yellow, green and blue, 5” diameter, less than 1 1/2” high; sensitive to less than 3oz of pressure, made of shatterproof plastic. Tactile and auditory feedback. £39. Available from *Ablenet*.

Buddy Button – brightly coloured (red, green, purple, pink, yellow or blue) switch, 2 3/8” diameter, 1/2” high. Sensitive yet robust. Tactile and auditory feedback. This is a *Tash* switch. £39. Available from *CAC*.

Large Button Switch – single, double or 4-way. Requires light pressure but very robust. Tactile and auditory feedback. Operated by finger, fist, foot etc. £34 – £61. Available from *QED, TFH*.

String Switch – loop of string attached to a switch box. Requires very little movement and minimal strength. Tactile and auditory feedback. £30. Available from *Ablenet*.

Wolfson Touch Switch – a metal plate, which can be of any size, is connected to a small box of electronics . The switch will remain on as long as it is being touched by any part of the body. On the box there is a LED indicator to show the status of the switch and a sensitivity adjustment screw. £82. Available from *QED*.

Pal Pad – robust, low-profile switch available in various colours. £32. Available from *QED, CAC*.

Touch Pad – different sizes, can easily be activated by slight touch from any part of the body. From £20. Available from *CAC, TFH*.

Foot Switch – robust to take activation with a foot, wood or metal covered with non slip rubber. Tactile and auditory feedback. £15 – £19. Available from *Toby Churchill, QED, TFH*.

- Contact Switch** – just contact the switch with any part of the body, including the tongue, and it will operate, needs power (mains or battery). From £49. Available from *Toby Churchill, CAC*.
- Wedge Plate Switch.** Very sensitive touch plate requiring no physical pressure. Can be touched by any part of the body but most often hand £77.50. Available from *TFH*.
- Wooden Block Switch** – large, durable wooden switch which has a light positive action. Tactile and auditory feedback. £25 approx. Available from *QED*.
- Wobble Switch** – a robust switch which has a flexible spring extending from one end. Spring moved or bent in any direction will operate the switch. Used with hand, chin etc. Tactile and auditory feedback. £80 approx. Available from *QED, CAC, Liberator*.
- Grasp Switch** – hand held switch which is activated by squeezing. Some have a 1” diameter rubber hand grip, others are made of metal which flexes when squeezed. Tactile feedback. £23 – £85. Available from *QED, CAC, Toby Churchill*.
- Thumb Switch** – a hand held switch which is activated by depressing the raised button on the end with the thumb. Tactile and auditory feedback. £22 – £55. Available from *QED, TFH*.
- Joysticks** – various models can be operated by hand, chin etc. Can have self centring action and gates to limit movement. Can operate up to 5 switches, used with hand, chin etc. £58 – £230. Available from *QED, Liberator*.
- Pillow Switch** – smooth foam surface for cheek or chin contact. Can pin or velcro to pillow or clothing. Tactile and auditory feedback. £70. Available from *CAC*.
- Pressure Switch** – a pressure pad/ball is connected to an air pressure switch which can be adjusted for sensitivity. Used with hand, elbow, chin etc. Tactile feedback, £82 – £153. Available from *QED, Liberator*.
- Pressure Mat** – activated by air pressure . User can stand on it or roll onto it, different sizes. Tactile feedback £20. Available from *QED, TFH*.
- Suck-Blow Switch** – operates either one or two switches using suck and/or puff. £82 – £150. Available from *Toby Churchill, QED, TFH*.
- Eye-Blink Switch** – safe infra-red system which detects eyelid closure. Mounted on spectacle frames which will fit over normal glasses. Auditory and visual feedback. £276. Available from *Toby Churchill*.
- Mercury Switch** – a small movement triggers the switch, often mounted on a wrist or head band. £22 – £30. Available from *QED, TFH*.
- Sound Operated Switch** – speech or sound operates the switch £92+. Available from *QED, TFH*.
- Necklace & Bead Switch(es)** – Necklace (different lengths available) fits round neck. Bead(s) fit onto necklaces, beads come in varying sizes between 3” and 1 1/4” and different colours for coding. Originally designed for use with electric wheelchairs. Suitable for people with good head control but poor coordination in the rest of their body. Need to specify type of jack plug plus length of cable. Tactile and auditory feedback. Necklace £16, each bead £20. Available from *Dudley Controls*.

Suppliers

- Cambridge Adaptive Communication (CAC)**, The Mount, Toft, Cambridge CB3 7RL. (Tel. 01223 264244, Fax 01223 264254).
- Don Johnston Special Needs**, 18 Clarendon Court, Calver Road, Winwick Quay, Warrington WA2 8QP. (Tel. 01925 241642, Fax 01925 241745).
- Dudley Controls Ltd.**, 10 Peverel Drive, Granby, Milton Keynes MK1 1NL. (Tel. 01908 640777, Fax 01908 374218).
- Liberator / Ablenet**, Whitegates, Swinstead, Lincolnshire, NG33 4PA. (Tel. 01475 550391, Fax 01475 550357).
- Quest Enabling Designs (QED)**, Ability House, 242 Gosport Road, Fareham, Hants. PO16 0SS. (Tel. 01329 828444, Fax 01329 828800).
- TFH Ltd.**, 76 Barracks Road, Sandy Lane Industrial Estate, Stourport-on-Severn, Worcs. DY13 9QB. (Tel. 01299 827820, Fax 01299 827035).
- Toby Churchill Ltd.**, 20 Panton Street, Cambridge CB2 1HP. (Tel. 01223 576117, Fax 01223 576118).