Power Wheelchair
Non-Joystick Driving Methods
Decision Making Tree

Each client functional category includes a list of diagnoses. These are diagnoses where this functional level is sometimes seen. Functional levels vary greatly within a diagnosis and these functional skills may also be seen in clients with other diagnoses.

Specific Driving Methods are also labeled Proportional or Digital. Proportional typically provides 360 degrees of directional control as well as speed control by moving further from a starting point. Digital control uses switches, discreet directional control, and does not typically provide speed control via how the switch is activated.

This document is not intended to replace competent evaluation.

Client cannot use any type of joystick (see Joystick Decision Making Tree)
　　　　Joystick control requires grading of the force and distance of movement. The client must also have adequate movement and motor control to use a joystick.

Client has fair upper extremity control (CP, TBI, MS, MD)
- Individual mechanical switches on a tray surface (digital)
  　Typically 4 switches, Forward, Left, Right and Reverse or *Reset.
  　Choose the switch size and force that matches the client's abilities.
  　The client must be able to move their hands horizontally and vertically to move up and over the switch surface.

  　If the client does not have controlled vertical movements (more difficult for clients with increased tone):

- Proximity array under tray surface (digital)
  　Typically 4 switches, Forward, Left, Right and Reverse or *Reset
  　Place switches at a distance apart and in a pattern that matches the client's abilities.
  　Provide a tactile cue on the tray surface so the client knows where the activation area is located, even when looking forward to drive (i.e. Velcro).
  　Adjustment of activation area: activation distance is a "bubble" around the switch (on certain proximity switch brands). If the activation area is too large, the switches may activate one another or be activated by the top of the client's thighs.
  　Proximity switches are capacitive switches and are activated by items which are conductive. The switch can be activated by certain items on the tray within the activation area, including beverages or a cat. The switches will not be activated by other items, such as a book. The switches must be protected from moisture.

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Client has good fine motor (finger/hand) control, but limited activation travel and force (ALS, SMA, MD)

- Touch Pad (proportional), i.e. Switch It Touch Drive 2

    The client must have adequate movement of a finger or thumb to move within a 360 circle for full available directional control.

    The farther the finger or thumb moves from center, the faster the wheelchair moves.

    A client with this control may be able to use a mini proportional joystick.

    Note – a larger Touch Pad (HMC) is no longer available in the USA. This would be used by a client with fair upper extremity control.

- VIC Touchless finger joystick (proportional) is no longer available in the USA.

- Fiberoptic switches (digital)

    Typically 4 switches; Forward, Left, Right and Reverse or *Reset.

    Place switches at a distance apart and in a pattern that matches the client's abilities

    Tactile cue: the client should ideally be able to feel the tip of the fiberoptic switch or mount to determine location, but this is not necessary.

    Adjustment of activation distance: activation distance is a straight line from the end of the switch. Match this to the client's available movement, which is typically quite small.

    Switch placement: fiberoptics can be placed at the angle required by the client. These can be placed facing directly upwards or parallel to the floor, allowing the fingers to be moved while curled over the edge of a handpad or tray in a flexed position.

    Switch mounting: cables are fragile and need to be well-protected. Switches can be mounted in a tray, handpad or armtrough, or in a hollow gooseneck mount.

    UE support: to provide postural support and facilitate a very small movement, support of the forearm, wrist and hand is required.

Client has good head control, but little extremity control (high level SCI, ALS, CP, MS)

- Gyroset Vigo (proportional)

    A headset translates head movements into movement of the power wheelchair. Sensor is placed on head pad. Wireless Bluetooth. Angles and sensitivity programmable. Emergency stop functions. Headset activated or deactivated by tapping sensor on head pad. Must be calibrated before each use. Stop by assuming neutral position or deactivating headset.

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- Magitek (proportional)

    A sensor typically mounted at the top of the head on a headset. Movement of the head is translated into movement of the power wheelchair.

    Precautions: client must be able to consistently bring head to upright to stop movement of power wheelchair. Programming required to allow power seating control through left and right directional control only.

-Proportional Head Control (RIM) (proportional)

    A posterior head pad is attached to a joystick behind the head. Moving the head rearward moves the power wheelchair Forward.

    Precautions: client must sustain pressure against back pad to sustain Forward movement. This can lead to increased tone in some clients or require excessive muscle strength for others. Increased tone can impact the client's ability to stop. Difficult to use with tilt or recline as posterior head pad moves. A Reverse strategy is required.

-Head Array (digital)

    Despite not providing proportional control, head arrays may provide better driving control for some clients in this category. Further information below.

Client has fair head control, but little extremity control (CP, TBI, high level SCI)

-Head Array (digital) (also refer to Head Array Comparison Chart)

    Typically, 3 to 5 proximity switches in a tripad head rest. The pad behind the head is for Forward directional control. Various style head supports can be used.

    A Reverse strategy is required. This may be accomplished through an external switch to toggle F/R, a quick hit on the rear pad, a *Reset switch, or Standby. Options vary by base electronics.

    -Permobil Total Control head array allows a combination of mechanical and proximity switches. This has 2 proximities in the rear pad to better capture diagonals.

    -Switch It Dual Pro has 3 options: 1. Proximities only 2. Mechanical only, increased force on switch increases speed 3. Proximities and Mechanical – proximities respond immediately and mechanicals allow increased speed with increased force. Speed for each switch/direction can be changed on the rear of the head array. Precaution – increased force can lead to increased tone and difficulty stopping, as well as increased fatigue.

    -ASL Atom offers a user switch which plugs into the head array. Pressing the user switch turns off the head array (double beep), allowing the client to rest on the head pads without driving, changing modes, or powering off the chair. If the user switch is held down for a longer amount of time (long beep), a directional command from the head

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array can now send a wireless switch signal to an AT device (no interfacing component or cable required). Can turn on auditory feedback when a directional switch is activated.

-ASL Fusion combines mechanical force switches and proximity switches in each pad. Increased force results in increased speed. Can assign pad functions, choose proportional or digital control for each pad, turn on auditory feedback, and wirelessly connect to AAC device, Tecla, or ATOM Mouse Emulator.

-Stealth Products i-Drive head array allows mechanical and proximity switches to be combined. Each switch is assigned using i-Drive programming, which also provides other programming options. Works with a variety of head support options.

Client has good oral motor control, but little head or extremity control (high level SCI)
-Sip 'n Puff (digital)
Requires good intra-oral pressure control, which requires good lip closure and a competent soft palate.
Latch is used to sustain Forward movement without sustaining a hard puff. Typically turned on by a second Hard Puff and turned off with a Hard Sip. Consider a fiberoptic "kill switch" if the client will use latch.
4 pressure control: Hard Puff (forward), soft puff (right), hard sip (reverse), soft sip (left). Various strategies for changing speed which vary by base electronics.
2 pressure control (Q-Logic): 2 puffs (forward), 1 puff (right), 2 sips (reverse), 1 sip (left).
Stage control (i-Drive): Stage 1 only controls Forward and Reverse and is not latched. A softer puff moves the chair forward slowly (i.e. creeping up to a table). Stage 2 (entered via a Hard Puff) provides 4 pressure control with Latch option.

Client has partial oral motor control and partial head control (MS, TBI, SCI, CP)
-Sip n Puff Head Array combo (digital)
Any puff is Forward, any sip is Reverse, head array controls Left and Right. This may be appropriate for a client who cannot discriminate between hard and soft pneumatic commands, but has some head movement.

Client has adequate motor control at 4 specific body sites (CP, TBI, ALS, SMA, MD)
-4 mechanical and/or electrical switches for Forward, Left, Right and Reverse or *Reset (digital). An optimal switch placement is where the client has small, isolated, repeatable and sustained ability to activate and release a switch. Switches vary in size and force requirements.
Stealth Products i-Drive and Switch It Cool Cube interfaces allow any mechanical and electrical switches to be combined.

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Client has adequate motor control at 3 specific body sites (CP, TBI, ALS, SMA)

-3 mechanical and/or electrical switches for Forward, Left and Right (digital).

Reverse or *Reset can be added later or consider Standby, as needed.

Stealth Products i-Drive and Switch It Cool Cube interfaces allow any mechanical and electrical switches to be combined.

Client has adequate motor control at 2 specific body sites (CP, TBI, ALS, SMA)

-2 mechanical and/or electrical switches used to emulate 4 directions (digital).

-Q-Logic 2 switch control:

Switch #1: 2 switch activations, second sustained (Forward), 1 sustained switch activation (Left), double click (*Reset)

Switch #2: 2 switch activations, second sustained (Reverse), 1 sustained switch activation (right)

-Stealth Products i-Drive Link:

Sustained activation of both switches simultaneously (Forward)

Sustained activation of Switch #1 (Left)

Sustained activation of Switch #2 (Right)

Double click of Switch #1 (*Reset)

-ASL 2 switch Fiberoptic array (can only be used with fiberoptic switches):

Sustained activation of both switches simultaneously (Forward)

Sustained activation of Switch #1 (Left)

Sustained activation of Switch #2 (Right)

-ASL Single Switch Scanner with Dual Switch Step Scan

Switch #1: each activation moves through driving direction choices (Forward, Left, Right and Reverse)

Switch #2: sustained activation moves the power wheelchair in the selected direction

Client has adequate motor control at 1 specific body site (CP, TBI, ALS, SMA)

-Single Switch Scanning (digital)

Using an external scanner (ASL UNO) or the base electronics display.

Options vary by base electronics.

First switch activation starts the scan and a second sustained activation moves the power wheelchair in the highlighted direction.

Directions and *Reset are scanned.

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Client has good eye gaze control, but little volitional movement (SCI, ALS)
        -Tolt Technologies Ability Drive
        Eye movements are translated into movement of the power wheelchair. Driver looks at
        direction they wish to drive to. Screen shows 4 quadrants, camera view.

*Reset redefines what the Forward, Left and Right directional switches control by changing the mode of operation of the wheelchair, providing control of Reverse, Speeds, power seating, IR transmission, Mouse emulation, and Interfaced external AT devices.

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