DXT Mouse

Mouse Myths

Only use the shoulder to move the mouse.
The shoulder region is the most common area of discomfort affecting computer users in yet many contemporary mouse designs encourage or force the use of the shoulder joint and its accompanying muscles to move the mouse. (Chasen C, 2009).

The large muscle groups that operate the shoulder are designed for power and large ranges of movement.

The shoulder muscles are not designed for fine motor control such as is required when moving a mouse cursor. The prime function of the shoulder is to position the hand in space and act as a stabilizer for fine motor control.

DXT Mouse uses a pinch grip.
Pinch grip is dominated by static muscle activity as defined by Long et al (1970).

The DXT Mouse uses precision grip using dynamic muscle activity not static muscle activity.

In 1956, Napier defined power grip and precision grip as the basic resistive grips in loaded hand activities.

Precision grip was manipulation of an object between the thumb and the finger tips, not against the palm.

In 1970 Long et al referred to three forms of grip and indicated that a differentiating factor between both power and pinch grips and precision grips is muscle activity – power and pinch grips are dominated by static muscle activity whereas the precision grip is dominated by dynamic muscle activity.

The DXT mouse utilises precision grip for the majority of mousing activities. A pinch form of grip may be used during dragging and dropping activities but the peak force reached during these tasks of around 2.51 Newtons is well below the action limit of 10 Newtons as described by the American Conference of Industrial Hygienists.

Computer mice that are controlled from the shoulder can provide precision control to the cursor.
The shape and size of computer input devices should take advantage of the fine motor control of the hand for their operation rather than relying solely on the shoulder.

The small muscles and joints in the fingers have greater information processing abilities for movement and sensation than other body parts. The larger muscle groups that operate the elbow and shoulder are adapted for power and a large range of movement. The smaller muscle groups that operate the fingers and thumb have greater agility than the larger muscle groups of the upper limb.

The small muscle groups and joints in the fingers are densely represented in the human motor and sensory cortex and have higher information processing abilities than other body parts.

A total of about one third of the motor cortex is dedicated to the control of the fine movement of the hand.

A further third of the cortex controls the rest of the arm, the whole of the leg and half of the body.

The final third controls the face, tongue and voice control.

The DXT mouse takes advantage of these resources within the human brains.

The work of Zhai (Zhai, Milgram, Buxton, 1996) has shown that effectively designed pointing devices that rely on all parts of the human upper limb working in synergy, with each limb segment performing the functions it does best, can indeed outperform devices that inappropriately depend on a particular limb segment for their entire operation.

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The stylus-type input devices in which the thumb and index finger work in unison are thus most likely to yield high performance.

Whole handed mice provide support and prevent injury by blocking movement of the fingers, hand and wrist.
Most ergonomic mice fix the hand and wrist in one position, preventing the natural movement of the hand and wrist.

By fixing the hand and wrist, movement then is forced to occur within the shoulder.

The shoulder is not designed for fine movements such as cursor control.

The most common upper limb disorders in computer users are those that affect the shoulder.
(Chasen C, 2009).

The DXT allows a balanced distribution of natural movement throughout the fingers, hand, wrist and forearm.

The mouse should not be lifted to reposition the cursor because of the forces that the activity generates.
The forces generated when lifting the DXT Mouse are minimal and far less than those peak action limit forces as indicated by the American Conference of Industrial Hygienists .

The DXT Mouse is easily lifted, which enables the user to efficiently and effectively move the cursor over large distances with a series of “little scoots” on a very small piece of real estate.

- Chasen, C (2009) Safety Managers Guide to Office Ergonomics Wiley.
- Long C; Conrad P. W; Hall E. A.; Furler S. L. (1970) Intrinsic-Extrinsic Muscle Control of the Hand in Power Grip and Precision Handling AN ELECTROMYOGRAPHIC STUDY, J Bone Joint Surg Am, ul 01;52(5):853-867.
- Napier, JR., The prehensile movements of the human hand, J. Bone Joint Surg., 38B: p. 902-913, 1956.
- Ullman, J et al (2003). A new Approach to the Mouse Arm Syndrome. International Journal of Occupational Safety and Ergonomics; 9, 4 : 463-477.
- Zhai S, Milgram P, Buxton W. (1996) The Influence of Muscle Groups on Performance of Multiple Degree-of-Freedom Input - CHI 1996 http://www.sigchi.org/chi96/proceedings/papers/Zhai/sz_txt.htm
- San Francisco Veterans Affairs Medical Center, San Francisco, California 94121, Shergill AK, Asundi KR, Barr A, Shah JN, Ryan JC, McQuaid KR, Rempel D (2009) Pinch force and forearm-muscle load during routine colonoscopy: a pilot study Gastrointest Endosc. Jan;69(1):142-6.