*the **missing** mouse factor*

$$t(d,w) = a + b \log_2\left(\frac{d}{w} + 1\right)$$

***t** = time taken to complete the movement. **a**, **b** = empirical constants. **d** = distance from starting point to center of target. **w** = width of target measured along the axis of motion.*

mouse sensitivity

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Some twenty years ago, a typical computer monitor would measure 320 pixels across and 200 pixels vertically. A modern computer screen measuring 1600 x 1200 pixels give us 30 times as many pixels to play with. Our means of navigation among these 1 920 000 pixels is the same it was 20 years ago: the mouse. The sales argument for buying a 5-button, double-scroll-wheeled 2000 dots-per-inch optical mouse? It lets us work more efficiently. Marginally at least. Many people use such mice without setting a custom mouse sensitivity, or mouse-acceleration, on a dried-coke-on-wooden-desk surface.

Then there's the other camp of 'power users' and gamers, who have discovered what a correct mouse setting does to computer interaction – that perfect sensation of actually having one hand inside the screen, allowing you to manipulate any object on the fly, accessing any menu item in any drop down menu with just a twitch and a click. Having had that sensation, I can but conclude that obtaining the perfect mouse sensitivity is heavily neglected. There

other articles I've written: the **mnemonic** user interface

the **missing** mouse factor

what is fitts' law?

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is not one single application on any platform I know that will help you find your personal mouse setting. I'm looking for an application that would let you hit targets, registering if you over- (or under-)shoot the targets thus adjusting the mouse setting accordingly. Such an application would also take your personal mouse acceleration preference into account, and calculate and apply your very personal acceleration curve.

The fact that the world's most common operating system only has one setting for mouse pointer acceleration, on or off, also suggests that the whole issue of acceleration is neglected. Apple Inc. has since the '80s offered a seven-point mouse acceleration scale. It seems to me that most people keep this setting on seven, which in effect makes this an on/off scale as well.

Fitts' law

If you are not yet familiar with Fitts' law, click the 'click me' tag to the left.

You may wonder why such a sound and self-explanatory fact has a law dedicated to it (as did I the first time I heard the expression). The answer according to me lies in Fitts' law's mathematical appearance, which proves to have the interesting property of logarithmics:

*the **missing** mouse factor*

d and w

click me

$$t(d,w) = a + b \log_2(\frac{d}{w} + 1)$$

This means that if we double the distance $(2 \cdot d)$ to a target, the time, t, it takes a person to hit that target will surely increase, but it won't double.

Fittz' law has through rigorous testing proven to be a suitable approximation of a standard, non-accelerating mouse. The "mouse factor", a measure of the user's efficiency with the mouse, is part of the equation baked into the constant b.

No let us 'enhance pointer precision' (add acceleration) and theorize: Let $0 < s < 1$ denote our new 'accelerating mouse factor' function where 1 equals full efficiency and 0 means no efficiency. The efficiency of an accelerating mouse kicks in when the mouse is moved quickly, which normally is done when aiming for a distant target. This implies that s affects Fitts' law logarithmically as a continuous function of d. $s(d)$ is thus a smooth, constanty decreasing curve:

$$t(d,w) = a + b \log_2(d / w\, s(d) + 1)$$

The time [to hit a target] is minimized when the factor $s(d)$ in maximized, and as $s(d)$ approaches 0, t approaches infinity (which is the case of a disconnected mouse). What's important is that as far as time, $t(d,w)$, is concerned, the mouse factor behaves logarithmically.

An (unscientific) experiment of mine shows that with a mouse set to "perfect acceleration", I can hit any target on the screen in *roughly* the same time. This means that in an environment limited to the size of a standard computer screen, s is hardly depending on d at all.

Maximizing s is the key to perfect mouse sensitivity. Achieving an adequate s is done in the mouse control panel. Achieving a maximum s requires a very simple application, that to my knowledge does not yet exist.

*the **missing** mouse factor*

Conclusion

The mouse is a superior input device, and will be for many years to come. But as computer screens grow larger and larger, targets become increasingly harder to hit. Many interaction designers tend to take 'increasing the target size' as the solution of the problem – all according to Fittz' law. But Fittz' law only accounts for target size and distance – not mouse sensitivity. Increasing the target size as a means of making targets easier to hit defeats the sole purpose of larger screens.

According to me, adding acceleration to the mouse pointer is by far the biggest improvement in the history of mouse. But in order to take full advantage of this feature, we need that specialized application that will help us fine-tune the mouse to our personal requirements.

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What was bad about the article?

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Your mouse acceleration (enhanced pointer precision) is currently:

☐ **Enabled** ☐ **Disabled** ☐ **I don't care**

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