State of the Art

Fitts

Fitts’ law [1] describes the relationship between movement time, distance, and accuracy for people engaged in rapid aimed movements. It has been verified over a

wide range of conditions.2 Of interest to HCI researchers is that the law applies to pointing and dragging using a mouse, trackball, stylus, joystick, and touchscreen. Fitts’ law has been applied by HCI researchers in primarily two ways, as a predictive model, and as a means to derive the dependent measure throughput. [2]

Lateralidad

Using the dominant hand produces fast inaccurate responses; using the non-dominant hand produces slow accurate responses.  Small targets are hard; large targets are easy.  [3]

Género

This study suggests that in both China and the UK gender differences in computer ownership- might no longer exist for young adults at university. The present study confirms previous research that British males were more likely to have used a computer for the first time earlier than their female counterparts. This could be explained by the fact that most British students in the study used computers for the first time more than five years previously when a computer was perhaps characterised as more ÔmasculineÕ, than at the time of the study. [4]

The current study examined changes in computer experiences among incoming college students from 1989/1990 to 1997. As predicted, students in 1997 had more computer experience than earlier students, and gender di􏰇erences had diminished. However, in both years, males were more experienced than females with computer programming and games, and, in 1997, males were more likely to own a computer than females. Computer ownership as well as greater experience with programming and games may all enhance the technical sophistication of males with computers and account for the greater degree of competency and comfort with both the Internet and computers found among male students compared with female students in 1997 in the second part of the study. [7]

For the United Kingdom sample, there were no gender differences in computer anxiety but males held more positive attitudes than females. For the Hong Kong sample, there were no gender differences in computer attitudes but males reported greater computer anxiety [8]

The results comparing the genders on interaction difficulty. Men scored higher than women, although the difference was not strongly sifnificant. [9]

The results of this experiment confirm the expected gender effect, with male subjects performing significantly better than female subjects on a computer-based tracking task. The size of this gender effect was large: men outperformed women by 50 percent of the average amount of time on target. In line with this finding, proportion of male subjects who answered "Yes" to the questionnaire item, "I think that computers are easy to use" (72%) was also significantly higher than the proportion of female subjects who answered "Yes" (36%). [10]

Ojo

We know the eye can move faster than the hand [5]

Keystroke

The Keystroke-Level Model was developed to predict accurately task execution time for mouse-and-keyboard systems [6]

Cultura

Cultural characteristics of website users is a key factor to determining the user acceptance of a website, current design practice take little account of cultural issues during the design process. It is evident from the views presented in this paper that culture has a significant impact on how the user perceives a website. [11]

Fitts’ Law

Fitts published in 1954 his law that represents a model for human movement to predict the time that it takes for a user to move from an origin to a target. He created a function that measures speed and accurary in pointing tasks. This model could be used in the real world or in digital devices like using a computer mouse.

Scott MacKenzie [12] addapted the formula to be *MT= a + blog2(A / W + 1)* where MT represents the movement time, a and b are the empiric constants that are adjusted to the specific device used. A is the amplitude or distance from the initial point to the center of the target. W measures the width of the target and could also represent the accuracy of the pointing task as it sets the limits of the action. Fitts’s ID or index difficulty determines the movement difficulty and has units of bits [13]. The most used formula for ID is Shannon formulation proposed by MacKenzie [14] ID = log2(A / W + 1).

**Hick’s Law (redactar texto)**

***Hick's Law****(for William Edmund Hick) or the****Hick–Hyman Law****(for Ray Hyman), predicts the time it takes to make a decision in selecting among possible choices. The Hick-Hyman Law measures cognitive information capacity. Given n equally probable choices, the average reaction time T required to choose among them is approximately.*

*T = b.log2(n+1)*

*The reaction time curve is logarithmic because for quick search we divide choices into categories, skipping half of choices at each step instead of considering each choice one-by-one. To find a given  command in a randomly ordered menu, scanning each command  is essential, requiring linear time, so Hick's law does not apply here. But if list is ordered  we can search and select by subdividing strategy that works in logarithmic time.*

Laterality

15

Fifty-two right-handed students (26 men, 26 women) participated in this experiment, (face recognition)

Accuracy and RTs showed that men are more strongly lateralized than women, with right hemispheric dominance.

16

Two experiments were conducted with the same subjects, a simple visual detection task and a classical pointing task

left hand shorter RTs for both tasks, emphasizing the role which right hemisphere dominance for visuospatial attention plays in manual aiming asymmetries. Moreover, a direct comparison of the RTs obtained in both experiments showed that the specific cost of movement planning was lower when using the left hand, therefore also revealing right hemisphere dominance for movement planning

17

100 healthy male volunteers of age group 18-25yrs were participated

In right handed individual all reaction time parameters of right hand are significantly faster when compared to left hand values. Whereas there is no significant difference between right and left hand values in left handed subjects.

18

To examine these questions, 81 right- and 60 left-handers were administered the Waterloo Handedness Questionnaire (WHQ) and completed a computer-based pointing action,

In left-handers, there is no advantage for one hand in ipsilateral space, while in right-handers it is their non-preferred left hand that appears to perform better in ipsilateral space.

19

articipants were instructed to press a button as soon as a target was observed. The target stimulus was a left hand, a right hand, or a neutral control. Each hemisphere showed faster responses to contralateral hand stimuli as compared with ipsilateral hand stimuli, consistent with the ideomotor compati- bility hypothesis.

Age

20

The old were 10% slower than the Young old, who were 23% slower than the young. Choice, compared to simple, was 13% slower.

Young (mean age 20.0), Young-old (mean age 67.3) old (mean age 78.0)

We demonstrated that rapid voluntary stepping was affected by age,

21

***Strength and power declined beginning by age 40 in both women and men.***

22

***In this experiment older and younger adults were compared on their ability to position a cursor with an electromechan- ical mouse.***

However, the older adults did produce as much force in the no-accuracy task as the youn- ger adults did in the accuracy-constrained task. This means that the slower performance of the older adults in the accuracy-constrained task was not caused by their inability to produce enough force, rather that the older adults chose to produce slower movements.

23

Older typists were slower in tapping rate and in choice reaction time but were not slower in speed of typing, apparently because they were more sensitive to caracteres farther in advance of the currently typed character than Young typists.

Suggests a possible mechanism that may allow older typists to compensate for lower perceptual motor efficiency.

Older typists have adapted to their slower rates of processing by planning further ahead.

1

Fitts, Paul M. (June 1954). "The information capacity of the human motor system in controlling the amplitude of movement".*Journal of Experimental Psychology* **47** (6): 381–391.[doi](https://en.wikipedia.org/wiki/Digital_object_identifier):[10.1037/h0055392](https://dx.doi.org/10.1037%2Fh0055392). [PMID](https://en.wikipedia.org/wiki/PubMed_Identifier) [13174710](https://www.ncbi.nlm.nih.gov/pubmed/13174710).

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Towards a standard for pointing device evaluation, perspectives on 27 years of Fitts’ law research in HCI

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Abstract

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Available online 4 November 2004

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Fitts's Law Studies of Directional Mouse Movement

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Gender and cultural differences in Internet use: A study of China and the UK

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EVALUATION AND ANALYSIS OF EYE GAZE INTERACTION

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**Using the Keystroke-Level Model for Designing User Interface on Middle-Sized Touch Screens**

**Evgeniy Abdulin**

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Gender, Internet and computer attitudes and experiences

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A Cross-Cultural Comparison of Gender Differences in Computer Attitudes and Anxieties: The United Kingdom and Hong Kong

Mark Brosnan

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**An Exploratory Study of the Effects of Gender on Student Learning and Class Participation in an Internet-Based MBA Course**

[**   J.B. Arbaugh**](http://www.researchgate.net/profile/JB_Arbaugh)

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J. EDUCATIONAL COMPUTING RESEARCH, Vol. 14(2) 171-183, 1996

GENDER AND SOCIAL FACILITATION EFFECTS ON COMPUTER COMPETENCE AND A TTITUDES TOW ARD COMPUTERS

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**Cultural Issues and Their Relevance in Designing Usable Websites**

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I. Scott MacKenzie y William A. S. Buxton (1992). Extending Fitts' law to two-dimensional tasks. Procedimientos de la conferencia CHI 1992 de la [ACM](https://es.wikipedia.org/wiki/Association_for_Computing_Machinery) sobre Factores Humanos en Sistemas Informáticos, pp. 219-226.

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Using Fitts’ Law to Model Key Repeat Time in Text Entry Models William Soukoreff and Scott MacKenzie

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**Fitts' law as a research and design tool in human-computer interaction**

MaxKenzie

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Sex differences in face processing: Are women less lateralized and faster than men? Ornella Godard \*, Nicole Fiori

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Manual reaction time asymmetries in human subjects: the role of movement planning and attention

Sebastien Barthelemy, Philippe Boulinguez\*

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**Effect of handedness on visual, auditory and cutaneous reaction times in normal subjects**

**Sunita B. Kalyanshetti1\* and B.C. Vastrad2**

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Hemispatial Effects for Left- and Right-handers on a Pointing Task

Pamela J. Bryden1, Sara M. Scharoun1, Linda E. Rohr2 & Eric A. Roy3

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Lisa Aziz-Zadeh Æ Marco Iacoboni Æ Eran Zaidel Hemispheric sensitivity to body stimuli in simple reaction time

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Effects of Age, Step Direction, and Reaction Condition on the Ability to Step Quickly

Carl W. Luchies,1 Jeff Schiffman,1 Lorie G. Richards,2 Matthew R. Thompson,2 Doug Bazuin,3 and Alice J. DeYoung4

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Age-Associated Loss of Power and Strength in the Upper Extremities in Women and Men

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Age-Related Differences in Movement Control: Adjusting Submovement Structure To Optimize Performance

Neff Walker, David A. Philbin, and Arthur D. Fisk

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Effects of Age and Skill in Typing

Timothy A. Salthouse