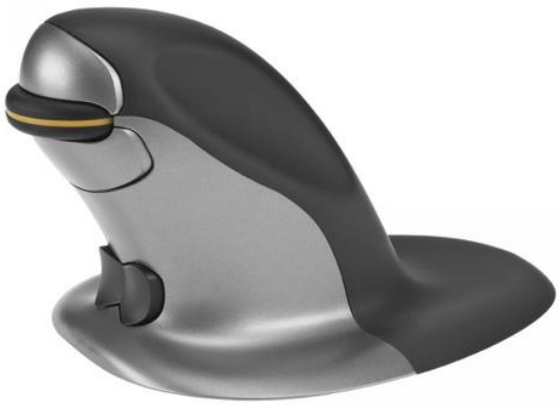
Risk Management
and Ergonomics, Inc.

The Penguin Vertical Mouse

A Usability Study Evaluating
Qualitative and Quantitative Functionality of Design



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Project Overview

A Usability Study (further referred to as the Study) regarding the quantitative and qualitative functionality of the Penguin Vertical mouse was conducted by VSI Risk Management & Ergonomics Inc. (VSI), a Human Factors Ergonomic Engineering firm located in Northern California. The study compared the Penguin vertical mouse to three other mouse designs; the Evoluent mouse, the 3-M Renaissance mouse, and the standard mouse.

The purpose of the study was to test for usability outcomes as they relate to

- Accuracy and Precision,
- Efficiency and Productivity,
- Goniometric Measurements to determine the most optimal wrist and finger postures due to the mouse design,
- Comfort
- User preference due to design and usability

The Use Study was conducted at two separate company sites with 11 participants located at each site. All participants were selected randomly and met the criteria of the study that included the following:

- Must be proficient with Microsoft (MS) Office programs such as Excel, Word, and Email
- Must spend at a minimum of 6 hours per day on the computer
- Must not have had any experience using any of the test mice prior to the study
- Must be agreeable to using all three of the test mice for each of the six day test periods
- Must be agreeable to stop using any of the test mice if discomfort develops and to notify the use study evaluator immediately
- Must not talk to other participants about personal experience with the test mice during the study

The Study ran for over a period of five weeks (including Holidays, weekends, etc.) with each participant using each one of the test mice for a period of six days.

To ensure that the parameters of the study were met, random, unscheduled visits were performed by the use study evaluator on non test days with all participants. This was done to ensure that the participants were actually using the test mice throughout the week to exclude the potential for bias in the study. Cross talk with other participants was also strongly discouraged during the study so as not to bias the qualitative results of participants due to other participant opinions.

Please Note: Data from 22 participants was used for the final analysis of this study from an original participant number of 26. This was due to 4 of the users not meeting the study parameters resulting with their data being excluded from the final analysis.

Please Note: Goniometric data was not used in comparison with the 3-M mouse due to many of the users not being able to complete the 6 week trial period of use.

I. Overview of Quantitative Data Collected

Accuracy and Precision
The following quantitative data was obtained from both groups for accuracy and precision by running both a timed Fitts Law test and a timed Microsoft (MS) Office Excel test.

Efficiency and Productivity
Efficiency and Productivity outcomes were completed by timed MS Office WORD tests.

Goniometric Measurements - Neutral Hand Posturing
Goniometric measurements of the dominant mousing hand were collected to determine if one of the four mouse designs were better or worse as it related to "neutral" upper extremity posturing with use. Goniometric measurements pertaining to specific hand postures observed while using the peripherals (standard mouse, Evoluent, Penguin, 3-M,) were measured at the onset of using each device and after using each device for five to six days.
Hand posture measurements were of particular interest to this study as neutral hand posturing contributes to pain free mousing. It also relates to the performance of "correct mousing technique", discouraging awkward and static postures of the wrist and fingers and contact stress against the median and ulnar nerves.

II. Overview of Qualitative Data Collected

Comfort
Qualitative data collected from the study included subject interviews of which mouse they felt was most comfortable to use throughout the work day and why.

User preference due to design and usability
Qualitative data collected from the study included subject interviews of which mouse they preferred to use due to its design and overall usability.

Methods & Study Outline

The study utilized a Single-Factor within Subjects design. Statistics were run using a one-tail Students T-test that compared outcomes between the standard mouse, Evoluent mouse, Penguin mouse and the 3-M Renaissance mouse.

Conclusion of ANOVA was utilized to determine statistical significance.

Dependent Variables
The dependent variables used in the study are:

- Accuracy and Precision
- Efficiency and Productivity
- Goniometric Measurements to determine the most optimal wrist and finger postures due to the mouse design
- Comfort
- User preference due to design and usability

Independent Variables
The independent variables used in the study are:

- Standard mouse
- Evoluent mouse
- 3-M Renaissance mouse
- Penguin mouse

Tools used for the Study
Surveys and/or data collections forms were created and data was collected with regards to:

1. Discomfort (VAS Scale, location of discomfort, comments),
2. Product Usability (1-10 scale)
3. Posture measurements and posture observations (contact stress, wrist extension, and deviation, finger flexion/extension)
    a. Measurement Methods:
        i. Goniometric measurements for wrist and hand angles
        ii. Visual observations for finger postures
        iii. Visual observations for idle static loading
        iv. Visual observation and estimated time exposures for contact stress

Summary of Use Study Procedures

Each of the 22 participants were asked to perform a series of three timed tests with their right, dominant mousing hand; a WORD test, an EXCEL test, and then a Fitts Law test.

Participants were first asked to perform these three timed tests using their standard mouse and data was collected for a baseline.
Participants were then asked to perform these three timed tests using the first of three test mice. Two individual WORD and two individual EXCEL tests with the same number of character's were provided so that the participant would not gain familiarity with the verbiage and mousing commands of the test.
Participants were then asked to use the test mouse for a period of six days.
After a period of six days, the timed test series was rerun on the test mouse and data was collected.
After the data was collected from the first test mouse, the second test mouse was introduced. The alternate series of timed tests were run and the data was collected.
Users were asked to use the second test mouse for a period of six days. At the end of the second trial period of six days, the three timed tests were re-administered and the data was collected. This procedure was repeated for all three of the test mice.

Goniometric measurements of ulnar deviation, wrist extension and palmar abduction were taken with all participants with all four of the mice; standard mouse, Evoluent mouse, 3-M Renaissance mouse and the Penguin mouse.

Baseline/Beginning of Week 1:
Initial data collection with standard mouse use

- Initial qualitative comments are collected from each subject as they pertain to the use of the subjects' standard mouse
- Goniometric measurements of the various hand postures assumed while using the standard mouse are collected from each subject by a Certified Hand Therapist
- Initial discomfort rating are collected from each subject as they pertain to the use of the subjects' standard mouse
- Initial productivity surveys are collected from each subject as they pertain to the use of the subjects' standard mouse use
- Fitts Law test is run with use of the subjects' standard mouse to obtain the true statistical mean for each subject
- EXCEL test is run with use of the subjects' standard mouse to obtain the true statistical mean for each subject
- WORD test is run with use of the subjects' standard mouse to obtain the true statistical mean for each subject

Baseline/Beginning of Week 1:
Initial Data Collection with the first test mouse

- Initial qualitative comments are collected from each subject as they pertain to the look of the first test mouse
- Initial qualitative comments are collected from each subject as they pertain to the use of the first test mouse
- Initial observation of using the first test mouse are collected
- Paper instruction (included with the packaging) on proper hand posture use for the first test mouse is provided for subjects that did not understand the basic use of the mouse
- Goniometric measurements of the various hand postures assumed while using the first test mouse are collected from each subject
- Fitts Law test is run with use of the subjects' first test mouse to obtain the true statistical mean for each subject
- EXCEL test is run with use of the subjects' first test mouse to obtain the true statistical mean for each subject
- WORD test is run with use of the subjects' first test mouse to obtain the true statistical mean for each subject

End of Week 1:

- Researchers perform a personal check in with regards to comfort and productivity surveys
- Researchers perform a personal check in for observations of how the subjects are using the first test mouse
- Researchers perform a personal check in with regards to reactions and/or comments as they pertain to use of the first test mouse

Beginning of Week 2:
Final data is collected with the first test mouse and initial data is collected with the second test mouse

- Final qualitative comments are collected from each subject as they pertain to the look and use of the first test mouse
- Second test mouse is introduced
- Initial qualitative comments are collected from each subject as they pertain to the look of the second test mouse
- Initial qualitative comments are collected from each subject as they pertain to the use of the second test mouse
- Initial observation of using the second test mouse are collected
- Paper instruction (included with the packaging) on proper hand posture use for the second test mouse are provided
- Goniometric measurements of the various hand postures assumed while using the second test mouse are collected from each subject.
- Fitts Law test is run with use of the subjects' second test mouse to obtain the true statistical mean for each subject
- EXCEL test is run with use of the subjects' second test mouse to obtain the true statistical mean for each subject
- WORD test is run with use of the subjects' second test mouse to obtain the true statistical mean for each subject

End of Week 2:
- Researchers perform a personal check in with regards to comfort and productivity surveys
- Researchers perform a personal check in for observations of how the subjects are using the second test mouse
- Researchers perform a personal check in with regards to reactions and/or comments as they pertain to use of the second test mouse,

Beginning of Week 3:
Final data is collected with the second test mouse and Initial Data is collected with the third test mouse

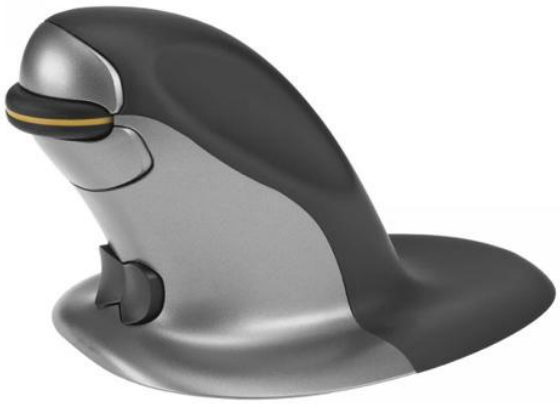
- Final qualitative comments are collected from each subject as they pertain to the look and use of the second test mouse
- Third test mouse is introduced
- Initial qualitative comments are collected from each subject as they pertain to the look of the third test mouse
- Initial qualitative comments are collected from each subject as they pertain to the use of the third test mouse
- Initial observation of using the third test mouse are collected

- Paper instruction (included with the packaging) on proper posture use for the third test mouse are provided
- Goniometric measurements of the various hand postures assumed while using the third test mouse are collected from each subject
- Fitts Law test is run with use of the subjects' third test mouse to obtain the true statistical mean for each subject
- EXCEL test is run with use of the subjects' third test mouse to obtain the true statistical mean for each subject
- WORD test is run with use of the subjects' third test mouse to obtain the true statistical mean for each subject

End of Week 3:

- Researchers perform a personal check in with regards to comfort and productivity surveys
- Researchers perform a personal check in for observations of how the subjects are using the third test mouse
- Researchers perform a personal check in with regards to reactions and/or comments as they pertain to use of the third test mouse

Summary of Qualitative Results



I. **Qualitative Results -** Comfort

Out of 22 users, 20 related that the Penguin was the most comfortable to use compared to the Evoluent, 3-M Renaissance and standard mouse options. This results with a 90% satisfaction rate for perceived comfort with the Penguin mouse.

II. **Qualitative Results** - User preference due to design and usability.

Discussion:

Penguin
Out of 22 users, 18 related that the Penguin had superior design and usability. They believed this to be due to the Penguins innate design which many described as an "upright version of a horizontal mouse display." Left and right click buttons were readily accessible in conjunction with the scroll wheel feature. DPI settings were also easily programmable compared to the other two test mice. Users also enjoyed that it was a "plug and play" mouse and that no software was not needed to program the buttons compared to the Evoluent mouse.

All users appreciated the lit up "P" feature display on the Penguin that notified them of the charging status of the Penguin.

All users were impressed with the "sleep mode" of the Penguin when not in use to save battery power.

All users enjoyed the cordless feature of the Penguin and that the dongle was easily stored within the body of the mouse for storage and travel purposes.

All users related that they could work an entire day, sometimes for more than eight hours, without ever experiencing discomfort with their dominant mousing hand when using the Penguin.

Please Note: Prior discomfort had been reported at the dominant mousing hand with standard mouse use by 12 of the 22 users. Discomfort at the dominant mousing hand decreased after one weeks use with the Penguin mouse with two users. One user reported a Visual Analog Scale for Pain Measurement (VAS) of 8/10 that decreased in one week to a VAS rating of 4/10. The other user reported a VAS rating of 6/10 that decreased to a VAS rating of 3/10.

All 22 participants used the Penguin mouse for the duration of the six days.

Two of the users described experiencing discomfort in the bicep muscles at the onset of use but that it dissipated after two days. This evaluator attributes this muscle soreness to the users engaging large muscle regions that had not been used prior with the standard mouse.

Three users mentioned having "charging problems" with the Penguin

Four of the users described the Penguin base as taking up too much real estate on their worksurface and preferred the 3-M Renaissance base. However, these same users preferred the functionality design of the Penguin compared to the 3-M Renaissance mouse.

Evoluent Mouse
Most users continued to use incorrect hand posturing with the Evoluent mouse placing their wrist into excessive extension and planting on the ulnar border even after training on correct hand posture use was provided at the onset of the study.

20 out of the 22 users did not enjoy having to download software to program the Evoluent mouse.

Two of the users initially thought it was "cool" that they could download software to program the buttons on the Evoluent mouse however all users found the software download to be inefficient as many of the buttons that initially looked like they were available for programming weren't.

Eight of the 22 users did not want to continue using the Evoluent mouse for the duration of one week but did so after checking in with the use study evaluator after expressing their concerns.

Six users complained of discomfort at their mousing hand developing after only one days use with the Evoluent mouse.

"It felt like a rock in my hand"
" I felt like I was ironing my shirt"

3-M Renaissance Mouse

Many users could not figure out how to use the 3-M Renaissance scroll wheel function even after several days of use. 18 of the users discontinued use of the 3-M Renaissance mouse after two to three days due to what they described as poor design and inability to use the scroll button function.

19 of the users disliked the toggle style of the left/right mouse click functions and could not get used to using it.

14 of the 22 users found that the 3-M Renaissance base was more comfortable to use than the Penguin base however still preferred the Penguin innate functionality of design over the 3-M Renaissance mouse.

Overall Results for Preference

- 17 of the users chose to keep the Penguin mouse at the end of the study: 77.3%.
- 2 of the users chose to keep Evoluent mouse at the end of the study: 9.1%
- 2 of the users chose to keep the 3-M Renaissance mouse at the end of the study: 9.1%
- 1 of the users chose to stay with the standard mouse: 4.5%

Further Discussion:

The two users who chose to keep the 3-M Renaissance mouse were between the ages of 25 and 27 and were active video gamers expressing that the 3-M Renaissance mouse resembled the joystick feel that they were accustomed to.

Two of the three users that chose the Evoluent mouse did so due to liking the programmable button option.

One of the users chose to keep the Evoluent mouse due to having difficulty maintaining a charge with the Penguin mouse during her test week and therefore felt that the Penguin mouse may not be dependable.

The user who chose to stay with the standard mouse design was over 60 years of age and did not like any of the vertical mice designs.

Summary of Quantitative Results

The following data has been shown to warrant statistical significance as it relates to the usability of the Penguin vertical mouse.

I Quantitative Test Results: Fitts Law Tests – accuracy and precision

Results:

- Statistical significance that the mouse is faster than the Evoluent, 3-M Renaissance, and Penguin mice initially and finally.
- Statistical significance that the Penguin is faster than the 3-M Renaissance initially and at final testing.
- No statistical significant difference with regards to accuracy and precision was determined between the Penguin and Evoluent mouse.

II Quantitative Test Results: EXCEL **t**ests – accuracy and precision and efficiency and productivity.

- Statistical significance that the Penguin is more efficient and therefore more productive than the standard mouse initially and at final testing.
- Statistical significance that the Penguin demonstrates greater accuracy and precision coupled with efficiency and productivity than the Evoluent and 3-M Renaissance mice at final testing.
-

III. **Quantitative Results:** WORD test – efficiency and productivity

- Statistical significance that the Penguin is more efficient and therefore more productive than the standard mouse initially and at final testing.
- Statistical significance that the Penguin is more efficient and therefore more productive than the Evoluent and 3-M Renaissance mice at final testing.

IV. Quantitative Results: *Goniometric Measurements - Neutral Hand Posturing*

Wrist Extension:

- Standard Mouse compared to Evoluent Mouse- No statistical significance (the same).
- Standard Mouse compared to the Penguin Mouse – Yes- statistical significance that the standard mouse demonstrates greater wrist extension with use than the Penguin mouse.
- Evoluent Mouse compared to the Penguin Mouse - Yes- statistical significance that the Evoluent mouse demonstrates greater wrist extension with use than the Penguin mouse.

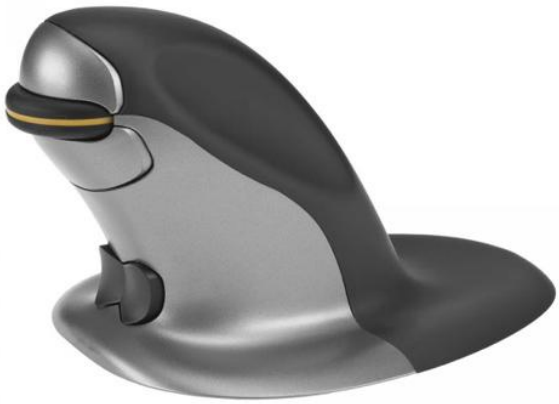
Ulnar Deviation:

- Standard Mouse compared to Evoluent Mouse – Yes - statistical significance that the standard mouse demonstrates a greater degree of ulnar deviated wrist postures with use than use with the Evoluent mouse.
- Standard Mouse compared to the Penguin Mouse – Yes - statistical significance that the standard mouse demonstrates a greater degree of ulnar deviated wrist postures with use than use with the Penguin mouse.
- Evoluent Mouse compared to the Penguin Mouse – No statistical significance that the Evoluent mouse demonstrates greater ulnar deviated wrist postures than the Penguin mouse with use.

Palmar Abduction: Please Note for the following summary - a greater degree of palmar abduction is desirable. A smaller degree of palmar abduction reflects gripping and/or squeezing of the mouse and therefore, is undesirable as that it could cause strain issues with the thumb.

- Standard Mouse compared to Evoluent Mouse – Yes - statistical significance that the standard mouse demonstrates a lesser degree of palmar abduction than the Evoluent mouse with use.
- Standard Mouse compared to Penguin Mouse – Yes - statistical significance that the standard mouse demonstrates a lesser degree of palmar abduction than the Penguin mouse with use.
- Evoluent mouse compared to the Penguin Mouse – No statistical significance that the Evoluent mouse demonstrates a greater or lesser degree of palmar abduction than the Penguin mouse.

Summary Tables of Statistical Values for Quantitative Results using Fitts Law, Microsoft Office EXCEL and Microsoft Office WORD



Fitts Law Quantitative Results

Fitts' law is a model of human movement primarily used in human–computer interaction and ergonomics that predicts the time required to rapidly move to a target area. This application is used both with point-and-click and drag-and-drop actions and is often used with usability studies to model the act of *pointing*, either by physically touching an object with a hand or finger as with a touch pad or screen or by pointing to an object on a computer monitor using a pointing device such as a mouse. Since the advent of graphical user interfaces, Fitts' law has been applied to tasks where the user must position a mouse cursor over an on-screen target, such as a button or other widget.

Fitts Law in its original and strictest form;

- Describes untrained movements, (not movements that are executed after months or years of practice)
- Applies only to movement in a single dimension and not to movement in two dimensions (though it is successfully extended to two dimensions in the Accot-Zhai steering law);

This study utilized Fitt's Law to collect data on accuracy and precision when using the standard mouse, the Evoluent mouse, the 3-M Renaissance mouse and the Penguin mouse. This data was then organized for statistical comparison using a single tail T-test paired two samples for Means between independent variables to determine if one device was in fact more accurate or precise.

Quantitative Results – Fitts Law Accuracy and Precision

Summary of Statistical Values	Statistical Values
Standard Mouse vs. Evoluent Initial Statistically significant that the mouse is more accurate and precise than the Evoluent upon initial use.	t Stat Value = -6.776513577 (absolute value) t Critical Value = 1.724718243 **Mean** Mouse Evoluent 830.3809524 994.952381
Standard Mouse vs. Evoluent Final Statistically significant that the mouse is more accurate and precise than the Evoluent after six days of use.	t Stat Value = -3.7733974 (absolute value) t Critical Value = 1.724718243 **Mean** Mouse Evoluent 830.380952 933.3333333
Standard Mouse vs. Penguin Initial Statistically significant that the mouse is more accurate and precise than the Penguin upon initial use.	t Stat Value = -4.890014548 (absolute value) t Critical Value = 1.724718243 **Mean** Mouse Penguin 830.3809524 992.952381
Standard Mouse vs. Penguin Final Statistically significant that the mouse is more accurate and precise than the Penguin after six days of use.	t Stat Value = -2.818932371 (absolute value) t Critical Value = 1.724718243 **Mean** Mouse Penguin 830.3809524 905.5714286
Standard Mouse vs. 3-M Renaissance Initial Statistically significant that the mouse is more accurate and precise than the 3-M Renaissance mouse upon initial use.	t Stat Value = -4.49412327 (absolute value) t Critical Value = 1.770933396 **Mean** Mouse 3-M 830.0714286 1019
Standard Mouse vs. 3-M Renaissance Final Statistically significant that the mouse is more accurate and precise than the 3-M Renaissance mouse after six days of use.	t Stat Value = -3.698782567 (absolute value) t Critical Value = 1.770933396 **Mean** Mouse 3-M 830.0714286 948.3571429
Evoluent vs. Penguin Final No statistical significance that the Evoluent is more accurate and precise than the Penguin and vice versa after six days of use.	t Stat Value = 0.722504082 (absolute value) t Critical Value = 1.724718243 **Mean** Evoluent Penguin 933.3333333 905.5714286
3-M Renaissance vs. Penguin Final Statistically significant that the Penguin is more accurate and precise than the 3-M Renaissance mouse after six days of use.	t Stat Value = 2.079260481 (absolute value) t Critical Value = 1.770933396 **Mean** 3-M Penguin 948.3571429 891.2857143

Using a Microsoft Office WORD Test for Quantitative Results

A test derived from a Microsoft Office WORD program was provided to each participant at the initial onset of use with each of the tested peripherals to test for productivity, and efficiency of design. After six days of use, the WORD test was re-administered to collect comparison data for statistical analysis. There are two versions of the WORD test, each with the same number of characters and mousing instructions. Each participant was encouraged to use the mouse as much as possible when executing the written instructions of the test. Both versions of the test were used every other week to reduce the potential for motor memory.

The WORD tests are depicted below:

Open a WORD document and type the following paragraph

I am an unbelievable person who is capable of all kinds of remarkable things! I try and stay focused and think of myself as a good person who likes people, the outdoors and pets. I love good food, music and good wine. Life is good for the most part and I am happy to be a part of it.

Instructions:

1. Bold the second sentence
2. Underline the fourth sentence
3. Below the paragraph, insert a table with three columns and four rows
4. Shade all the cells Yellow

WORD Test II

Open a WORD document and type the following paragraph

Eating Mexican food can be an enjoyable experience especially with margaritas and good guacamole. Eating Indian food can also be fun if you like the taste of curry. However, it is most likely going to be a vegetarian dish. All foods can be fun to eat with the right company.

Instructions:

1. Bold the first sentence
2. Italicize the third sentence
3. Below the paragraph
4. Insert a table with three columns and four rows
5. Shade all the cells green

Quantitative Results – WORD Test for Productivity

Standard Mouse vs. Evoluent Initial NO statistical difference that the mouse is more productive than the Evoluent or vice versa.	t Stat Value = 0.876542208 (absolute value) t Critical Value = 1.724718243 **Mean** Mouse Evoluent 2.236190476 2.14381
Standard Mouse vs. Evoluent Final Statistically significant that the Evoluent is more productive than the standard mouse after six days of use.	t Stat Value = 2.418007294 (absolute value) t Critical Value = 1.724718243 **Mean** Mouse Evoluent 2.236190476 1.865714
Standard Mouse vs. Penguin Initial Statistically significant that the Penguin is more productive than the standard mouse with initial use.	t Stat Value = 3.888730164 (absolute value) t Critical Value = 1.724718243 **Mean** Mouse Penguin 2.236190476 1.523333333
Standard Mouse vs. Penguin Final Statistically significant that the Penguin is more productive than the standard mouse after six days of use.	t Stat Value = 4.438922096 (absolute value) t Critical Value = 1.724718243 **Mean** Mouse Penguin 2.236190476 1.346666667
Standard Mouse vs. 3-M Renaissance Initial NO statistical difference that the mouse is more productive than the 3-M Renaissance or vice versa.	t Stat Value = -0.008 (absolute value) t Critical Value = 1.770933 **Mean** Mouse 3-M 2.118571 2.12142857
Standard Mouse vs. 3-M Renaissance Final Statistically significant that the 3-M Renaissance is more productive than the standard mouse after six days of use.	t Stat Value = 2.098272149 (absolute value) t Critical Value = 1.770933396 **Mean** Mouse 3-M 2.118571429 1.580714286
Evoluent vs. Penguin Final Statistically significant that the Penguin is more productive than the Evoluent after six days of use.	t Stat Value = 2.835761231 (absolute value) t Critical Value = 1.724718243 **Mean** Evoluent Penguin 1.865714286 1.346666667
3-M Renaissance vs. Penguin Final Statistically significant that the Penguin is more productive than the 3-M Renaissance mouse after six days of use.	t Stat Value = 2.225639884 (absolute value) t Critical Value = 1.770933396 **Mean** 3-M Penguin 1.580714286 1.275

Using a Microsoft Office EXCEL Test for Quantitative Results

A test derived from a Microsoft Office EXCEL program was provided to each participant at the initial onset of use with each of the tested peripherals to test for productivity, efficiency, precision, and accuracy with design. After six days of use, the EXCEL test was re-administered to collect comparison data for statistical analysis. There are two versions of the EXCEL test, each with the same number of characters and mousing instructions. Each participant was encouraged to use the mouse as much as possible when executing the written instructions of the test. Both versions of the test were used every other week to reduce the potential for motor memory.

The EXCEL tests used are shown below.

EXCEL TEST #1

Open a blank EXCEL document and create the table below

	January	February	March	April	May	TOTALS
joyce	3	6	3	8	2	22
terri	9	4	2	4	3	22
loran	1	5	4	8	5	23
sherry	2	5	4	2	9	22

EXCEL TEST #2

Open a blank EXCEL document and create the table below

	Monday	Tuesday	Wednesday	Thursday	Friday	TOTALS
melissa	5	4	3	8	2	22
jeanne	2	6	2	4	3	17
amy	3	3	4	8	5	23
kristine	1	5	6	0	9	21
	11	18	15	20	19	

Quantitative Results – EXCEL

Combined Test for Accuracy & Precision & Productivity & Efficiency

Standard Mouse vs. Evoluent Initial NO statistical difference that the mouse is more accurate/precise than the Evoluent or vice versa with EXCEL.	t Stat Value = -0.209092604 (absolute value) t Critical Value = 1.724718243 **Mean** Mouse Evoluent 2.302857143 2.355238095
Standard Mouse vs. Evoluent Final Statistically significant that the Evoluent is more accurate/precise than the standard mouse after six days of use with EXCEL.	t Stat Value = 2.752841241 (absolute value) t Critical Value = 1.724718243 **Mean** Mouse Evoluent 2.302857143 1.788571429
Standard Mouse vs. Penguin Initial Statistically significant that the Penguin is more accurate/precise than the standard mouse with initial use with EXCEL.	t Stat Value = 4.568957 (absolute value) t Critical Value = 1.724718 **Mean** Mouse Penguin 2.302857 1.50047619
Standard Mouse vs. Penguin Final Statistically significant that the Penguin is more accurate/precise than the standard mouse after six days of use with EXCEL.	t Stat Value = 5.974069406 (absolute value) t Critical Value = 1.724718243 **Mean** Mouse Penguin 2.302857143 1.311904762
Standard Mouse vs. 3-M Renaissance Initial NO statistical difference that the mouse is more accurate/precise than the 3-M Renaissance or vice versa with EXCEL.	t Stat Value = 0.729900982 (absolute value) t Critical Value = 1.770933396 **Mean** Mouse 3-M 2.434285714 2.249285714
Standard Mouse vs. 3-M Renaissance Final Statistically significant that the 3-M Renaissance is more accurate/precise than the standard mouse after six days of use with EXCEL.	t Stat Value = 4.083195 (absolute value) t Critical Value = 1.770933 **Mean** Mouse 3-M 2.434286 1.666428571
Evoluent vs. Penguin Final Statistically significant that the Penguin is more accurate/precise than the Evoluent after six days of use with EXCEL.	t Stat Value = 3.365924025 (absolute value) t Critical Value = 1.724718243 **Mean** Evoluent Penguin 1.788571429 1.31190476
3-M Renaissance vs. Penguin Final Statistically significant that the Penguin is more accurate/precise than the 3-M Renaissance mouse after six days of use with EXCEL.	t Stat Value = 3.013867731 (absolute value) t Critical Value = 1.770933396 **Mean** 3-M Penguin 1.666428571 1.215714286

Combined Raw Data

Analysis of the Data Using Fitts Law

TEST I T-Test Paired two sample for Means

Initial Standard Mouse vs. Evoluent Mouse:

t-Test: Paired Two Sample for Means

	Variable 1	*Variable 2*
Mean	830.3809524	994.952381
Variance	10890.44762	12410.54762
Observations	21	21
Pearson Correlation	0.469453777	
Hypothesized Mean Difference	0	
df	20	
t Stat	-6.776513577	
P(T<=t) one-tail	6.84361E-07	
t Critical one-tail	1.724718243	
P(T<=t) two-tail	1.36872E-06	
t Critical two-tail	2.085963447	

mouse statistically better

In the above statistical result, you will denote that the "T-Stat" is greater than the "T Critical" for a one-tail result. This data reflects that the numbers are truly different and did not occur by chance.

Based on a p value of .05, this data reflects that there is statistical significance and that the results did not occur by chance.

This is a negative result for the Evoluent mouse indicating that the standard mouse is faster than the Evoluent mouse upon initial use.

Analysis of the Data Using Fitts Law

TEST II T-Test Paired two sample for Means

Final Standard Mouse vs. Evoluent Mouse (after six days of use)

t-Test: Paired Two Sample for Means

	Variable 1	*Variable 2*
Mean	830.380952	933.3333333
Variance	10890.4476	11375.23333
Observations	21	21
Pearson Correlation	0.29798353	
Hypothesized Mean Difference	0	
df	20	
t Stat	-3.7733974	
P(T<=t) one-tail	0.0005972	
t Critical one-tail	1.72471824	
P(T<=t) two-tail	0.00119439	
t Critical two-tail	2.08596345	

mouse statistically better

In the above statistical result, you will denote that the "T-Stat" is greater than the "T Critical" for a one-tail result. This data reflects that the numbers are truly different and did not occur by chance.

Based on a p value of .05, this data reflects that there is statistical significance and that the results did not occur by chance.

This is a negative result for the Evoluent mouse indicating that the standard mouse is faster than the Evoluent mouse even after six days of use.

Analysis of the Data Using Fitts Law

Test III T-Test Paired two sample for Means

Initial Standard Mouse vs. Penguin Mouse:

t-Test: Paired Two Sample for Means

	Variable 1	*Variable 2*
Mean	830.3809524	992.952381
Variance	10890.44762	30117.74762
Observations	21	21
Pearson Correlation	0.491355504	
Hypothesized Mean Difference	0	
df	20	
	-	
t Stat	4.890014548	
P(T<=t) one-tail	4.42704E-05	
t Critical one-tail	1.724718243	
P(T<=t) two-tail	8.85409E-05	
t Critical two-tail	2.085963447	

mouse statistically better

In the above statistical result, you will denote that the "T-Stat" is greater than the "T Critical" for a one-tail result. This data reflects that the numbers are truly different and did not occur by chance.

Based on a p value of .05, this data reflects that there is statistical significance and that the results did not occur by chance.

This is a negative result for the Penguin mouse indicating that the standard mouse is faster than the Penguin mouse upon initial use.

Analysis of the Data Using Fitts Law

Test IV T-Test Paired two sample for Means

Final Standard Mouse vs. Penguin Mouse:

t-Test: Paired Two Sample for Means

	Variable 1	*Variable 2*
Mean	830.3809524	905.5714286
Variance	10890.44762	19042.35714
Observations	21	21
Pearson Correlation	0.520528729	
Hypothesized Mean Difference	0	
df	20	
t Stat	-2.818932371	
P(T<=t) one-tail	0.005301647	
t Critical one-tail	1.724718243	
P(T<=t) two-tail	0.010603294	
t Critical two-tail	2.085963447	

mouse statistically better

In the above statistical result, you will denote that the "T-Stat" is greater than the "T Critical" for a one-tail result. This data reflects that the numbers are truly different and did not occur by chance.

Based on a p value of .05, this data reflects that there is statistical significance and that the results did not occur by chance.

This is a negative result for the Penguin mouse indicating that the standard mouse is faster than the Penguin mouse even after six days of use.

Analysis of the Data Using Fitts Law

Test V T-Test Paired two sample for Means

Initial Standard Mouse vs. 3-M Renaissance Mouse:

t-Test: Paired Two Sample for Means

	Variable 1	*Variable 2*
Mean	830.0714286	1019
Variance	12200.84066	21200.76923
Observations	14	14
Pearson Correlation	0.269216565	
Hypothesized Mean Difference	0	
df	13	
t Stat	-4.49412327	
P(T<=t) one-tail	0.000301875	
t Critical one-tail	1.770933396	
P(T<=t) two-tail	0.00060375	
t Critical two-tail	2.160368656	

mouse statistically better

In the above statistical result, you will denote that the "T-Stat" is greater than the "T Critical" for a one-tail result. This data reflects that the numbers are truly different and did not occur by chance.

Based on a p value of .05, this data reflects that there is statistical significance and that the results did not occur by chance.

This is a negative result for the 3-M Renaissance mouse indicating that the standard mouse is faster than the 3-M Renaissance mouse upon initial use.

Analysis of the Data Using Fitts Law

Test VI T-Test Paired two sample for Means

Final Standard Mouse vs. 3-M Renaissance Mouse:

t-Test: Paired Two Sample for Means

	Variable 1	*Variable 2*
Mean	830.0714286	948.3571429
Variance	12200.84066	10353.78571
Observations	14	14
Pearson Correlation	0.366427158	
Hypothesized Mean Difference	0	
df	13	
t Stat	-3.698782567	
P(T<=t) one-tail	0.001338125	
t Critical one-tail	1.770933396	
P(T<=t) two-tail	0.002676249	
t Critical two-tail	2.160368656	

mouse statistically better

In the above statistical result, you will denote that the "T-Stat" is greater than the "T Critical" for a one-tail result. This data reflects that the numbers are truly different and did not occur by chance.

Based on a p value of .05, this data reflects that there is statistical significance and that the results did not occur by chance.

This is a negative result for the 3-M Renaissance mouse indicating that the standard mouse is faster than the 3-M Renaissance mouse even after six days of use.

Analysis of the Data Using Fitts Law

Test VII T-Test Paired two sample for Means

Final Evoluent Mouse and Penguin Mouse:

	Variable 1	*Variable 2*
Mean	933.3333333	905.5714286
Variance	11375.23333	19042.35714
Observations	21	21
Pearson Correlation	-0.019969127	
Hypothesized Mean Difference	0	
df	20	
t Stat	0.722504082	
P(T<=t) one-tail	0.239174351	
t Critical one-tail	1.724718243	
P(T<=t) two-tail	0.478348702	
t Critical two-tail	2.085963447	

no statistical difference

In the above statistical result, you will denote that the "T-Stat" is less than the "T Critical" for a one-tail result. This data reflects that there is no statistical significance that one mouse is more accurate or precise than the other.

Test VIII T-Test Paired two sample for Means

Final Penguin Mouse and 3-M Renaissance Mouse:

	Variable 1	*Variable 2*
Mean	948.3571429	891.2857143
Variance	10353.78571	23331.14286
Observations	14	14
Pearson Correlation	0.744334806	
Hypothesized Mean Difference	0	
df	13	
t Stat	2.079260481	
P(T<=t) one-tail	0.028975337	
t Critical one-tail	1.770933396	
P(T<=t) two-tail	0.057950674	
t Critical two-tail	2.160368656	

penguin statistically better than 3m

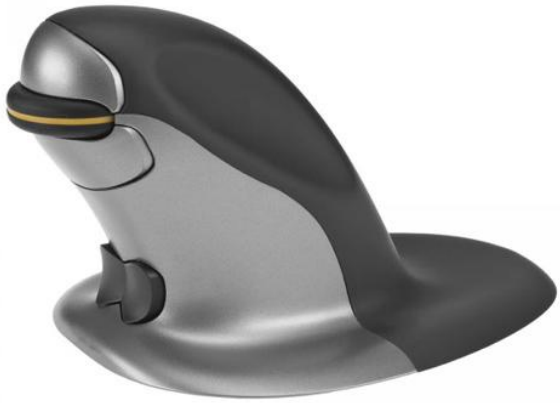
In the above statistical result, you will denote that the "T-Stat" is greater than the "T Critical" for a one-tail result. This data reflects that the numbers are truly different and did not occur by chance.

Based on a p value of .05, this data reflects that there is statistical significance and that the results did not occur by chance.

This is a positive result for the Penguin mouse and a negative result for the 3-M Renaissance mouse indicating that the Penguin mouse is more accurate and precise than the 3-M Renaissance mouse after six days of use

Analysis of the Data

Using WORD for Productivity



Analysis of the Data Using WORD for Productivity

Test I T-Test Paired two sample for Means

Initial Standard Mouse vs. Evoluent Mouse

	Variable 1	*Variable 2*
Mean	2.236190476	2.14381
Variance	0.682844762	0.361695
Observations	21	21
Pearson Correlation	0.816223187	
Hypothesized Mean Difference	0	
df	20	
t Stat	0.876542208	
P(T<=t) one-tail	0.195571214	
t Critical one-tail	1.724718243	
P(T<=t) two-tail	0.391142427	
t Critical two-tail	2.085963447	

no statistical difference

In the above statistical result, you will denote that the "T-Stat" is less than the "T Critical" for a one-tail result. This data reflects that the numbers are not truly different and the result could have occurred by chance therefore having no statistical significance.

Based on a p value of .05, this data reflects that there is **no** statistical significance and that the results could have occurred by chance.

This result shows that there is no statistical significance that the mouse is more productive than the Evoluent mouse or vice versa when using WORD.

Analysis of the Data Using WORD for Productivity

TEST II T-Test paired two samples for Means

Initial Standard Mouse vs. Penguin Mouse:

	Variable 1	*Variable 2*
Mean	2.236190476	1.523333333
Variance	0.682844762	0.471583333
Observations	21	21
Pearson Correlation	0.395394865	
Hypothesized Mean Difference	0	
df	20	
t Stat	3.888730164	
P(T<=t) one-tail	0.000456241	
t Critical one-tail	1.724718243	
P(T<=t) two-tail	0.000912482	
t Critical two-tail	2.085963447	

penguin statistically better

In the above statistical result, you will denote that the "T-Stat" is greater than the "T Critical" for a one-tail result. This data reflects that the numbers are truly different and did not occur by chance.

Based on a p value of .05, this data reflects that there is statistical significance and that the results did not occur by chance.

This is a positive result for the Penguin mouse indicating that the Penguin mouse is more productive with use than using the standard mouse upon initial use.

Analysis of the Data Using WORD for Productivity

TEST III T-Test paired two samples for Means

Initial Standard Mouse vs. 3-M Renaissance Mouse:

	Variable 1	*Variable 2*
Mean	2.118571	2.12142857
Variance	0.395705	2.36355165
Observations	14	14
Pearson Correlation	0.502181	
Hypothesized Mean Difference	0	
df	13	
t Stat	-0.008	
P(T<=t) one-tail	0.496871	
t Critical one-tail	1.770933	
P(T<=t) two-tail	0.993742	
t Critical two-tail	2.160369	

no statistical difference

In the above statistical result, you will denote that the "T-Stat" is less than the "T Critical" for a one-tail result. This data reflects that the numbers are not truly different and the result could have occurred by chance therefore having no statistical significance.

Based on a p value of .05, this data reflects that there is **no** statistical significance and that the results could have occurred by chance.

This result shows that there is no statistical significance that the mouse is more productive than the 3-M Renaissance mouse or vice versa when using WORD.

Analysis of the Data Using WORD for Productivity

TEST IV T-Test paired two samples for Means

Final Standard Mouse vs. Evoluent Mouse:

	Variable 1	*Variable 2*
Mean	2.236190476	1.865714
Variance	0.682844762	0.397496
Observations	21	21
Pearson Correlation	0.563704342	
Hypothesized Mean Difference	0	
df	20	
t Stat	2.418007294	
P(T<=t) one-tail	0.012635585	
t Critical one-tail	1.724718243	
P(T<=t) two-tail	0.025271171	
t Critical two-tail	2.085963447	

Evoluent statistically better

In the above statistical result, you will denote that the "T-Stat" is greater than the "T Critical" for a one-tail result. This data reflects that the numbers are truly different and did not occur by chance.

Based on a p value of .05, this data reflects that there is statistical significance and that the results did not occur by chance.

This is a positive result for the Evoluent mouse indicating that the Evoluent mouse is as or more productive after six days of use than the standard mouse.

Analysis of the Data Using WORD for Productivity

TEST V T-Test paired two samples for Means

Final Standard Mouse vs. Penguin Mouse:

	Variable 1	*Variable 2*
Mean	2.236190476	1.346666667
Variance	0.682844762	0.661983333
Observations	21	21
Pearson Correlation	0.37297978	
Hypothesized Mean Difference	0	
df	20	
t Stat	4.438922096	
P(T<=t) one-tail	0.000126122	
t Critical one-tail	1.724718243	
P(T<=t) two-tail	0.000252243	
t Critical two-tail	2.085963447	

penguin statistically better

In the above statistical result, you will denote that the "T-Stat" is greater than the "T Critical" for a one-tail result. This data reflects that the numbers are truly different and did not occur by chance.

Based on a p value of .05, this data reflects that there is statistical significance and that the results did not occur by chance.

This is a positive result for the Penguin mouse indicating that the Penguin mouse is as or more productive after six days of use than the standard mouse.

**Please denote that the Penguin also achieved a positive result when compared to the standard mouse upon initial use.

Analysis of the Data Using WORD for Productivity

TEST VI T-Test paired two samples for Means

Final Standard Mouse vs. 3-M Renaissance Mouse:

	Variable 1	*Variable 2*
Mean	2.118571429	1.580714286
Variance	0.395705495	1.010314835
Observations	14	14
Pearson Correlation	0.384418076	
Hypothesized Mean Difference	0	
df	13	
t Stat	2.098272149	
P(T<=t) one-tail	0.027993945	
t Critical one-tail	1.770933396	
P(T<=t) two-tail	0.055987891	
t Critical two-tail	2.160368656	

no statistical difference

In the above statistical result, you will denote that the "T-Stat" is less than the "T Critical" for a one-tail result. This data reflects that the numbers are not truly different and the result could have occurred by chance therefore having no statistical significance.

Based on a p value of .05, this data reflects that there is **no** statistical significance and that the results could have occurred by chance.

This result shows that there is no statistical significance that the mouse is more productive than the 3-M Renaissance mouse or vice versa when using WORD after six days of use.

Analysis of the Data Using WORD for Productivity

TEST VII T-Test paired two samples for Means

Final Evoluent Mouse vs. Penguin Mouse:

	Variable 1	*Variable 2*
Mean	1.865714286	1.346666667
Variance	0.397495714	0.661983333
Observations	21	21
Pearson Correlation	0.346932388	
Hypothesized Mean Difference	0	
df	20	
t Stat	2.835761231	
P(T<=t) one-tail	0.005107464	
t Critical one-tail	1.724718243	
P(T<=t) two-tail	0.010214928	
t Critical two-tail	2.085963447	

penguin statistically better than Evoluent

In the above statistical result, you will denote that the "T-Stat" is greater than the "T Critical" for a one-tail result. This data reflects that the numbers are truly different and did not occur by chance.

Based on a p value of .05, this data reflects that there is statistical significance and that the results did not occur by chance.

This is a positive result for the Penguin mouse indicating that the Penguin mouse shows a higher rate of productivity with the user after six days of use than the Evoluent mouse after six days of use.

Analysis of the Data Using WORD for Productivity

TEST VIII T-Test paired two samples for Means

Final 3-M Renaissance Mouse vs. Penguin Mouse:

	Variable 1	*Variable 2*
Mean	1.580714286	1.275
Variance	1.010314835	0.74845769
Observations	14	14
Pearson Correlation	0.85938881	
Hypothesized Mean Difference	0	
df	13	
t Stat	2.225639884	
P(T<=t) one-tail	0.022177913	
t Critical one-tail	1.770933396	
P(T<=t) two-tail	0.044355826	
t Critical two-tail	2.160368656	

penguin statistically better than 3m

In the above statistical result, you will denote that the "T-Stat" is greater than the "T Critical" for a one-tail result. This data reflects that the numbers are truly different and did not occur by chance.

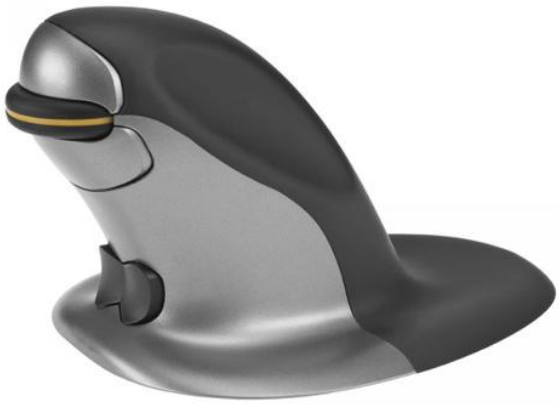
Based on a p value of .05, this data reflects that there is statistical significance and that the results did not occur by chance.

This is a positive result for the Penguin mouse indicating that the Penguin mouse shows a higher rate of productivity with the user after six days of use than the 3-M Renaissance mouse after six days of use.

Analysis of the Data

Using EXCEL for

Accuracy & Precision, Productivity & Efficiency



Analysis of the Data Using EXCEL for Accuracy/Precision and Productivity

TEST I T-Test Paired two sample for Means

Initial Standard Mouse vs. Evoluent Mouse:

	Variable 1	*Variable 2*
Mean	2.302857143	2.355238095
Variance	1.633651429	3.95478619
Observations	21	21
Pearson Correlation	0.840058279	
Hypothesized Mean Difference	0	
df	20	
	-	
t Stat	0.209092604	
P(T<=t) one-tail	0.418245464	
t Critical one-tail	1.724718243	
P(T<=t) two-tail	0.836490928	
t Critical two-tail	2.085963447	

no statistical difference

In the above statistical result, you will denote that the "T-Stat" is less than the "T Critical" for a one-tail result.

Based on a p value of .05, this data reflects that there is NO statistical difference that the mouse is more accurate/precise than the Evoluent or vice versa with EXCEL with initial use.

Analysis of the Data Using EXCEL for Accuracy/Precision and Productivity

Test II T-Test Paired two sample for Means

Standard Mouse vs. Penguin Initial Use

	Variable 1	*Variable 2*
Mean	2.302857	1.50047619
Variance	1.633651	0.604544762
Observations	21	21
Pearson Correlation	0.800239	
Hypothesized Mean Difference	0	
df	20	
t Stat	4.568957	
P(T<=t) one-tail	9.32E-05	
t Critical one-tail	1.724718	
P(T<=t) two-tail	0.000186	
t Critical two-tail	2.085963	

penguin statistically better

In the above statistical result, you will denote that the "T-Stat" is greater than the "T Critical" for a one-tail result.

This result is statistically significant that the Penguin is more accurate/precise than the standard mouse with initial use with EXCEL.

Analysis of the Data Using EXCEL for Accuracy/Precision and Productivity

Test III T-Test Paired two sample for Means

Standard Mouse vs. 3-M Renaissance initial Use

	Variable 1	*Variable 2*
Mean	2.434285714	2.249285714
Variance	1.717272527	2.093637912
Observations	14	14
Pearson Correlation	0.76775177	
Hypothesized Mean Difference	0	
df	13	
t Stat	0.729900982	
P(T<=t) one-tail	0.23919885	
t Critical one-tail	1.770933396	
P(T<=t) two-tail	0.4783977	
t Critical two-tail	2.160368656	

no statistical difference

In the above statistical result, you will denote that the "T-Stat" is less than the "T Critical" for a one-tail result.

Based on a p value of .05, this data reflects that there is NO statistical difference that the mouse is more accurate/precise than the 3-M Renaissance or vice versa with EXCEL with initial use.

Analysis of the Data Using EXCEL for Accuracy/Precision and Productivity

Test IV T-Test Paired two sample for Means

Standard Mouse vs. Evoluent Final

	Variable 1	*Variable 2*
Mean	2.302857143	1.788571429
Variance	1.633651429	0.945992857
Observations	21	21
Pearson Correlation	0.74275356	
Hypothesized Mean Difference	0	
df	20	
t Stat	2.752841241	
P(T<=t) one-tail	0.006134696	
t Critical one-tail	1.724718243	
P(T<=t) two-tail	0.012269392	
t Critical two-tail	2.085963447	

Evoluent statistically better

In the above statistical result, you will denote that the "T-Stat" is greater than the "T Critical" for a one-tail result.

This result is statistically significant that the Evoluent is more accurate/precise than the standard mouse with final use with EXCEL.

Analysis of the Data Using EXCEL for Accuracy/Precision and Productivity

Test V T-Test Paired two sample for Means

Standard Mouse vs. Penguin Final

	Variable 1	*Variable 2*
Mean	2.302857143	1.311904762
Variance	1.633651429	0.76211619
Observations	21	21
Pearson Correlation	0.81463618	
Hypothesized Mean Difference	0	
df	20	
t Stat	5.974069406	
P(T<=t) one-tail	3.83411E-06	
t Critical one-tail	1.724718243	
P(T<=t) two-tail	7.66822E-06	
t Critical two-tail	2.085963447	

penguin statistically better

In the above statistical result, you will denote that the "T-Stat" is greater than the "T Critical" for a one-tail result.

This result is statistically significant that the Penguin is more accurate/precise than the standard mouse after six days of use with EXCEL.

Analysis of the Data Using EXCEL for Accuracy/Precision and Productivity

Test VI T-Test Paired two sample for Means

Standard Mouse vs. 3-M Renaissance Final Use

	Variable 1	*Variable 2*
Mean	2.434286	1.666428571
Variance	1.717273	1.059332418
Observations	14	14
Pearson Correlation	0.845778	
Hypothesized Mean Difference	0	
df	13	
t Stat	4.083195	
P(T<=t) one-tail	0.000647	
t Critical one-tail	1.770933	
P(T<=t) two-tail	0.001293	
t Critical two-tail	2.160369	

3m statistically better

In the above statistical result, you will denote that the "T-Stat" is greater than the "T Critical" for a one-tail result.

This result is statistically significant that the 3-M Renaissance mouse is more accurate/precise than the standard mouse after six days of use with EXCEL.

Analysis of the Data Using EXCEL for Accuracy/Precision and Productivity

Test VI T-Test Paired two sample for Means

Evoluent vs. Penguin Final Use

	Variable 1	*Variable 2*
Mean	1.788571429	1.31190476
Variance	0.945992857	0.76211619
Observations	21	21
Pearson Correlation	0.757842722	
Hypothesized Mean Difference	0	
df	20	
t Stat	3.365924025	
P(T<=t) one-tail	0.001536728	
t Critical one-tail	1.724718243	
P(T<=t) two-tail	0.003073456	
t Critical two-tail	2.085963447	

penguin statistically better than Evoluent

In the above statistical result, you will denote that the "T-Stat" is greater than the "T Critical" for a one-tail result.

This result is statistically significant that the Penguin is more accurate/precise than the Evoluent after six days of use with EXCEL.

Analysis of the Data Using EXCEL for Accuracy/Precision and Productivity

Test VII T-Test Paired two sample for Means

3-M Renaissance vs. Penguin Final

	Variable 1	*Variable 2*
Mean	1.666428571	1.215714286
Variance	1.059332418	0.819318681
Observations	14	14
Pearson Correlation	0.840223539	
Hypothesized Mean Difference	0	
df	13	
t Stat	3.013867731	
P(T<=t) one-tail	0.004984714	
t Critical one-tail	1.770933396	
P(T<=t) two-tail	0.009969429	
t Critical two-tail	2.160368656	

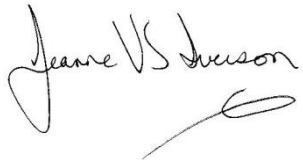
penguin statistically better than 3m

In the above statistical result, you will denote that the "T-Stat" is greater than the "T Critical" for a one-tail result.

This result is statistically significant that the Penguin is more accurate/precise than the 3-M Renaissance after six days of use with EXCEL.

Signatures of Professional Consultants

This Use Study was developed and written for Posturite Inc. by:



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