Dataverse Usability Evaluation: Final Report

Eric Gibbs, MLIS Simmons College
Lin Lin, MLIS Simmons College
Elizabeth Quigley, MLIS Simmons College

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Rong Tang, Associate Professor & Director, Simmons GSLIS Usability Lab
Simmons GSLIS Usability Lab

Introduction

Initial meetings with the Dataverse team revealed that user testing conducted by an outside team would help reveal the ways in which the site's user experience could be improved in upcoming versions of the system. The scope of the features the team had in mind for evaluation was too large for one scenario, so two scenarios were created and broken into tasks for individuals searching the site, known as data users, and those uploading data to the site, called data creators. The Dataverse team identified functions of the site that they were interested in gathering user data on and the usability team devised a natural flow of tasks that would enable the team to see how users interacted with those functions on the current website.

Each scenario contained around ten separate tasks for participants to complete, and were created so that they would follow a logical progression that users might take when interacting with Dataverse. The scenarios began with simple actions to get users accustomed to the site's interface and grew more complex as the users grew familiar with basic functions of the system and could move into other areas.

These scenarios were accompanied by pre and post test surveys. The pre-test survey dealt primarily with demographic information and questions based on participants' past experiences with Dataverse, while the post-test survey aimed to gather information on how users felt about the site based on their experience during testing. The one common aspect of both surveys was a question to gauge user comfort with using Dataverse and compare the reported levels before and after testing. Otherwise, the pre-test survey consisted primarily of focused queries on users' past behavior with Dataverse and the post-test gave users a chance to voice their thoughts on using the system in a more open-ended manner.

Once these instruments for evaluation were created and refined, work on the procedure for data collection began. The usability team was accustomed to, and had past success, using Morae Recorder and Observer software to record user testing for future analysis. Because it was determined that Harvard students formed the ideal participant group for the study, the usability team decided to conduct the tests on Harvard's campus in the Knafel Building. Two MacBook Air computers equipped with Morae software were employed as an easily portable way to capture the test sessions for later use. Data collected via Morae's recording function consisted of taped responses from the surveys, video of the participant's screen as they moved through the tasks, video of the participant's face as they react to the tasks, the number of mouse clicks per scenario task, time spent on each task, and also whether or not participants had difficulty with or failed to complete the specified actions.

In addition to the user testing surveys and scenarios, a set of interview questions was developed as an early way to learn about Dataverse and its usability. The questions were meant to be guidelines for open-ended interviews with experienced Dataverse users as a way to gather anecdotal data on the application which would augment the more quantitative findings from the user testing.

Review of the Literature Relevant to Dataverse

Open-access repositories usability

Usability of open source software and applications is currently a hot topic. Many evaluations and discussions on the usability of open source content management systems have been done that are accessible online via blogs and forums. Compared to open source content management system usability studies and commercial discovery systems usability studies, there has been a lack of user experience studies of open access repositories. Kramer (2011), a Research Data Management Librarian of Cornell Institute for Social and Economic Research (CISER), presented how metadata was displayed and presented in ICPSR and CISER Data Archive. Interestingly, the presentation was collected and is stored in Cornell University's DSpace. There is one study on DSpace-based institutional repository usability conducted by a librarian, who is also a student from Universitat de Lleida. She studied this topic for her Master's dissertation and she posted a summary on the DSpace Wiki. Fifteen participants including students and staff were recruited to perform five tasks. Her study (Graça, 2012) suggests DSpace should have a bigger search box, enhance search results, improve help page and user guide, use less jargon, and replace department-type of document structure with subjects/ areas of knowledge structure. These suggestions may apply to the IQSS Dataverse Network as well.

Although there are very few published studies about usability issues of open source data management systems, there are developers and social science working groups paying attention to usability issues. DuraSpace wiki has been collecting use cases over time which can be used to facilitate user interface design and evaluate user experience. One blog post mentioned: User Interface (http://duraspace.org/dspace-futures), Thu, 01/10/2013 - 10:35am

> A common perception is that the DSpace user interface (UI) is still difficult to customize. In addition, some feel that the UI looks dated, and that a more modern-looking interface would improve usability and would appeal more to researchers and other new users. Some related observations:
> • The awkwardness of the UI tools don't permit agile development
> • Branding and minor customizations should be easier to accomplish
> • Accommodating use cases for special collections, audio, and visual materials requires easy-to-use tools and user interfaces. DSpace should be more competitive in its support for new UI development
> • DSpace needs improved administrative tools to take the burden off of developers and to provide functions for managing things like multimedia streaming and downloading.

User-centered design

User-centered design (UCD) is a design methodology and process that focuses on the user needs, goals, and preferences. Although the idea of UCD is to place users in the center of the design decisions, it does not mean designers should ignore the business goals (Williams, 2009). UCD is about profiling users and their behaviors in a given context. The process usually involves user input. There are also other design philosophies such as activity-centered design and goal-directed design. It is difficult to determine whether one method is better than another. User experience designers need to be flexible and open to all kinds of methods when designing systems and applications.

Activity-centered design

In an early study of user interface design titled The Case Against User Interface Consistency, Grudin (1989) emphasized that developing the appropriate design required analysis of the users' tasks and an understanding of human behavior (p. 1166). Grudin explained in the article that interface consistency is a largely unworkable reliable concept using several convincing examples. He also suggests to designers that they should focus less on general interface properties and pay more attention to the users' tasks and work context, physical constraints, and psychology.

Affordance and function

Sometimes systems behave contrary to user expectations. According to Russell-Rose and Tate (2012) in their work entitled Designing the Search Experience, mismatches between affordance and function cause usability issues (p. 99):

> One of the fundamental concepts in human-computer interactions (HCI) is the notion of affordance: the idea that an object's design should suggest the interactions that its function supports. A push plate on a door affords pushing; a handle affords pulling. How many times have you walked up to a door and found it behave contrary to your expectations? Invariably, this event is caused by a mismatch between affordance and function.

Improving the searching experience

Russell-Rose and Tate (2012) discussed frameworks and models of search design, and users' information seeking behavior in their book *Designing the Search Experience*. One of the changes in searching experiences is that search engines and many discovery tools are becoming smarter. They suggest users terms and phrases while users type. They recognize misspelled words and correct them automatically. They suggest alternative terms for a query in the form of a "did you mean…" message. As these techniques have become a convention of searching experience design, designers should integrate them into the systems with the traditional advanced search and browsing to enhance the search experience. Another change is that the idea of search design has been leaning towards learnability and building progressive learning experience. One of these examples is a news-reading application using overlay to provide a tutorial for new users. Designers need to keep up with the new trends in the field.

Faceted searching

Kules, Capra, Banta, & Sierra (2009) in their study of faceted search interface examined the usefulness of facets in exploratory search. They did an eye tracking experiment on the faceted search feature in library catalogs and found out that users spent about 50 percent of their time looking at the facets and only about 8.2% of their time looking at the queries. This result suggests that facets play an important role in the exploratory search process.

Findings

Pre-test and post-test survey

In all, twenty-one user testing sessions and two interviews were conducted as part of this evaluation. The interviews were conducted on April 3rd and 10th and user testing spanned from April 29th to May 20th. Two of the user testing sessions were pilot sessions primarily used for equipment and scenario calibration, and they have not be factored into the evaluation results. The data collected from the remaining nineteen sessions and interviews forms the basis of the analysis of Dataverse's usability and recommendations on how it can improve.

Participants for testing consisted of a combination of students, current Harvard employees, and former Harvard employees. Task scenarios alternated between one (tasks for data users) and two (tasks for data creators) so that each participant completed the opposite scenario of the previous one. In all, ten individuals completed scenario one and nine completed scenario two, with everyone taking the same pre and post test survey.

The pre-test survey revealed that the majority of test participants were inexperienced Dataverse users. Twelve out of the nineteen participants reported that they had never used the system before and five stated that they had only used it once. Due to the overwhelming majority of new Dataverse users in the testing and lack of data on experienced users, this report will focus on the site's usability for those unfamiliar with the application.

The post-test survey contained a question asking users to report their comfort level during the completion of the task scenarios assigned to them. The question used a seven point Likert scale that ranged from very comfortable (a value of seven) to very uncomfortable (a value of one). The mean reported post-test score was 4.2 out of seven, a value which is closest to "neutral" on the scale devised for this evaluation. This indicates that users generally did not state that they felt great discomfort during the testing, but Dataverse's user-friendliness can certainly be improved.

Despite not being overwhelmingly pleased with Dataverse, users stated that they felt the application was useful. Thirteen out of the nineteen participants stated that they would use Dataverse if they were looking for a way to access scholarly data and thirteen said that they would recommend the site to friends or colleagues looking to do the same. This data speaks to the fact that though users feel the site is not optimally usable at the moment, they still see it as a viable resource for research. One interview participant quoted a recent White House memo stating that federally funded research will need to be made more available to the public in digital form, and that Dataverse is a prime way to make this happen (U.S. Office of Science and Technology Policy, 2013). This is all the more reason to work toward improving the site for future users who see Dataverse as a go-to resource but are unable to fully utilize its features.

Tasks

Findings from the two scenarios come from participants' comments and also observations the usability team made during the testing sessions. Time on task was not evaluated for this usability report due to keyboard issues with the MacBook Air participants used for the testing. Additionally, participants' time on task ranged anywhere from thirty seconds to

twenty five minutes. The analysis of time on task would be skewed and would not provide accurate user experience results for the Dataverse team.

Scenario One

Scenario One involved data users, users who are not creating data but are searching for data, and did not include creating a Dataverse account. Tasks involving the basic and advanced search, downloading specific files from studies, and locating the report a problem icon were included in this scenario.

Search

Basic and advanced search caused frustration for the participants. Participants had difficulty completing searches when they misspelled a word in the search string and no results appeared. They commented that even if they misspelled a word, which happened often due to the computer keys sticking, they wished Dataverse would recommend studies similar to their misspelled query. Moving from basic search to advanced search, users commented on how they wished their previous search query came with them as they weren't sure if they needed to retype the keywords from the basic search into the advanced search fields. One participant stated this about the transition from basic to advanced search: "I'm going to click on advanced search. Oh this makes my head hurt! I wish it had kept my search terms." The frustration displayed in this quote was echoed by the majority of our participants. Participants not only wished their search query transitioned to the advanced search but also stated they were confused if they were completely restarting their search or if they were doing an advanced search of their basic search. Due to this lack of confidence in their searching, participants would go back to their basic search and use the "within these results" box to filter their results.

Participants not only hoped for their search queries to tag along with the transition from basic to advanced search, but they also identified a need to have explanations of the cataloging information fields. One participant noted they weren't sure the difference between description and keyword or what the other fields meant; the terms were too technical and specific to Dataverse for a new user according to participants' comments. To find explanations of the fields, participants went to the user guide, most frequently through the icon, not by using the link in the advanced search. Though they would find the user guide, it was discovered that the fields were not listed in the same order in the user guides as in the drop down menu and the explanation for 'description' was missing.

Having the basic search bar appear on the advanced search page caused confusion for participants when they went to submit their search query. Multiple participants chose the blue search button in the basic search bar rather than scrolling down the page to find the blue search button meant for advanced searches. Participants found the presence of two search options on one page distracting.

Browsing dataverses

After searching for studies, participants were asked to go back to Dataverse's homepage and find the dataverses for the National Archives and Records Administration and MIT. The desired path to finding these two specific dataverses was for participants to click on "view more" then use the automatic filtering box to narrow down the list. Most often participants attempted to click on the subheadings "browse dataverses by filter by organization" or "browse dataverses by filter by type", these subheadings are not clickable links so participants would have to determine another path. If a participant didn't notice the filters underneath the subheadings, occasionally they would turn to the basic search box and perform a search for the dataverse.

Identifying specific studies & data files

Participants were asked to find a specific study, identify several files, determine how to download the files, and how to cite a data file for a research paper. Participants had an easier time searching for the study as they already knew the title and had prior experience with Dataverse's search. However, once they were in the study and looking at the Data & Analysis tab frustrations appeared. Participants stated that the font size was too small and it was hard to distinguish between different files. The file chosen by the usability team was located on the first page but participants mentioned if they had to load more files, it would have been worse and not enjoyable further loading file names.

After finding the requested file, participants were then asked to download a subset of variables. The desire to be able to sort the variables within the columns was mentioned as well as being able to search the variables to find the ones asked for in the task. Participants mentioned the "create zip file" button should say "download" instead as that is what they were looking for after choosing variables. Participants were asked to download an entire file section after downloading a subset of variables, one participant said, "Well that is confusing because if everything is all checked, then hitting download one place should download all of them." The participant refers to the action of having to scroll to the top of the page to click the "download selected files" button rather than being able to click on the "download as..." drop down menu within the file section. Additionally, the view data citation option on the Data & Analysis page was hard for participants to notice when asked to look for a way to cite the data file.

Participants suggested using different fonts for the sections within the Data & Analysis tab as having a homogeneous structure for the page makes it difficult to distinguish between file sections and individual files.

Scenario Two

Scenario Two involved data creators, users who are not searching for data but are creating data, and did include creating a Dataverse account. Creating an account and dataverse, uploading files, releasing studies and dataverses, collections, and permissions were included in this scenario.

Creating an account & dataverse

Participants were prompted to create a dataverse upon beginning Scenario Two. In order to create a dataverse, participants had to create an account first and could click on one of two places on the homepage to get to this point. If a participant chose the create dataverse box on the homepage, they were directed to a page with four yellow boxes describing the steps to creating a dataverse. Multiple participants expected clicking on the create an account box would link them directly to the create account page when it actually isn't a link at all and just a graphic. When participants were creating accounts and dataverses several issues appeared, a main one being if there was an error in the form, i.e.-mistyping passwords, the classification for the dataverse would not stay checked. Participants wouldn't realize this was the error and get frustrated that they kept getting error messages when they believed they had completed everything correctly.

Creating studies & uploading files

Multiple tasks in Scenario Two dealt with creating a study and then uploading files for that study. Participants noted the asterisks on the create study form as being difficult to differentiate and suggested using different symbols to distinguish between required and recommended fields. Also, the instructions at the top of the page blended into the rest of the content with participants scrolling up and down trying to locate them. After creating a study, the participants uploaded files to the study. Participants noted they felt uncomfortable leaving the category field blank as well as not being used to seeing "save" as the button for uploading something and they would prefer to see a button that says "upload".

Settings & permissions

When completing tasks that involved restricting access to files and releasing both the study and the dataverse, participants had several issues. During the restricting access task one participant stated, "It says you can still restrict access with it listed as public but I don't like having the word public associated with something that should be restricted." Additionally, there were multiple sections related to restricting file access so participants couldn't determine which one did a general restriction and therefore was the correct one to use for the task. When participants were asked to release a study or their dataverse, they frequently weren't confident that they had actually released it. One participant stated it would be nice if there was a confirmation pop up that appeared asking if they really wanted to release a study or dataverse.

Collections

Participants were asked to create both a static and a dynamic collection within their dataverse. For this task, participants would go to the user guide hoping to find more information on how to complete this task. However, participants would either not be able to find it in the user guide or still wouldn't be able to figure out the proper path to collections after reading the user guide. Additionally, issues with the hierarchy of Dataverse appeared during this task as participants weren't sure what collections were used for or how they fit into their dataverse. Participants had a difficult time locating the collection tab within their account and expressed a

desire to have a link to the page in the box with other links located in the upper right hand corner. Once a participant was able to create a static collection they had an easier time creating a dynamic collection as they had already found the collection tab. For the static collection, participants didn't notice the list of their studies on the bottom of the page and frequently had to be prompted by the moderator to look there.

In addition to having difficulty completing this task, participants said the terminology used for it was way too technical. Using the terms "parent" and "child" as well as "static" and "dynamic" caused them confusion with multiple participants stating they had no idea what those meant or what they were supposed to be doing with them.

Both Scenarios

Homepage

One of the primary user difficulties in both scenarios was the lack of clarity about how to return to Dataverse's homepage. Users often attempted to click on the IQSS logo in the upper left hand corner and the "Powered by the Dataverse Network" link on the right side of the page when prompted to return to the home screen rather than the correct "Dataverse Network Homepage" link.

User guides

Throughout both test scenarios participants went to the user guide for help with Dataverse, and they had mixed results in their experiences. While many people reported that the information in the guide was in the best format it could be and its content was helpful, others found the resource problematic. There were cases in which the guide's content did not match how the Dataverse site is structured. These instances include the Permissions section of the guide, which states that users can release dataverses from that area, and the search fields definition page, which did not have all of the current advanced search fields on it.

In addition to the guide content not always matching what is on the Dataverse site, sometimes the path to access certain features was unclear to users. The collections section of the guide is one example of this case. While the user guide does a good job of explaining how to create collections once you get to the root, there are no instructions about how to get to the root collection from the homepage.

Another source of user frustration with the guide was the fact that it pops up in a different tab when users open it. This caused confusion about how participants could get back to Dataverse once they found the information they were looking for and they often needed prompts from the moderator to find their way back to the right tab.

Icons

Both scenarios had tasks that tested the four icons found on Dataverse: search, user guide, settings, and report a problem. Users said the search and user guide icons were easy to interpret because they were very similar to universally used icons for those pages. However, the

report a problem icon was not very intuitive according to them, several participants stated it looked more like a cartoon bubble or a chat icon. When participants thought it was a chat icon, they decided not to click on it because they weren't interested in beginning a chat with a Dataverse administrator. The moderator had to prompt them to click on it anyway and then they were surprised to see it was actually a link to a form. Participants stated a desire to have plain text rather than icons as "it would be more straightforward than the icons."

Hierarchy of Dataverse

Users completing the scenarios had difficulty visualizing and explaining how Dataverse's hierarchy is currently constructed. Many of them were confused about how collections fit into the scheme of Dataverses, studies, and files. Another area that users struggled with was knowing where to access settings for dataverses, studies, and collections. Collection settings are not easily accessible currently and require several clicks to access. Users also had some difficulty completing the scenario two task that required them to release their dataverse.

Accounts

The usability team discovered differences between user accounts and what they believe to be an administrator account, the Usability account created prior to testing for the team. Administrator accounts show additional icons upon login that are not found on the homepage of Dataverse when a user signs into their account. As previously stated, the settings cog appeared with the line of icons after going through multiple web pages. For administrator accounts, the settings cog appears and is persistent no matter which pages you move to within your account. Another icon, labeled as LOCKSS Manifesto, also appears upon login with an administrator account with the other icons but never appears within a user account.

Recommendations

Recommendations based off the findings culled from both usability methods have been divided into two tiers. Tier 1 contains recommendations the usability team deems most important and Tier 2 contains recommendations the Dataverse team should review and begin to consider after Tier 1 has been implemented.

Tier 1

Easily findable homepage link

It is common website practice to include the homepage link as an icon in the top left corner of the page, so users' attraction to the IQSS image is understandable. For this reason, it is of great importance that Dataverse's homepage incorporates a recognizable homepage link prominently displayed in the upper left hand corner of the page. The current icons/links (IQSS, Harvard Library, and Dataverse Network) on the top of the page do not have to be eliminated, but the footer of the page would be a more appropriate placement than their current location.

Visualizing dataverse hierarchy

In order to help alleviate hierarchy-visualization issues, a visual representation of the different levels of Dataverse would be a helpful feature to add. This way, content uploaders would be able to see where they are in the site and how they can access the different levels of their content. A more streamlined settings menu should accompany the visual hierarchy and allow users to access the settings for their dataverses, collections, studies, and files in one location. This menu would work best as a persistent feature once individuals are logged in to the system, as users were confused when the settings icon would appear and disappear on different pages when they attempted to edit different areas within their dataverse.

Saved search history for users with accounts

The ability to save search history once users are logged in to their accounts would make Dataverse much more convenient for users. Many users mentioned that they often use Google Scholar to search for research data, so it makes sense for Dataverse to adopt some of its functions when possible. One of the convenient features that Google Scholar offers is that it uses an auto-complete feature in the search bar so that individuals who aren't sure of what they might have searched for in the past can start typing and see what matches come up. A similar feature in Dataverse's basic and advanced search would be useful for users looking to search terms they have used in the past without having to type them in completely.

Search improvement

Many of the difficulties from scenario one occurred in the tasks that involved using the basic and advanced search functions. There was an especially great amount of confusion when attempting to choose relevant fields in the advanced search menu. Users were unsure of the terminology of the different areas they can select in the advanced search, and they were generally unsuccessful in finding a place where the terms were explained. It would be easier for users to see field descriptions when they hover over the items in the field drop-down menus. This way individuals do not even need to leave the page for clarification. Another way to make field descriptions easier to access would be to add a clearly visible link to the section of the user guide that contains information on searching. While there is currently such a link on the advanced search page, participants did not notice it when scanning for help. If it can be made more clear that users can click directly to the search section of the guide, they should have less of a problem understanding what different search options mean.

Another problematic part of the advanced search feature during testing was the order of the fields within the drop-down option menu. Users attempting to find the keyword search option had a hard time locating it because it was in the bottom of the menu, rather than the top where they were expecting to see it. The different advanced search options were not logically arranged from a user's perspective, so they had some issues locating a specific one within the menu. If future versions of the advanced search menu order the fields in a more obvious way, whether

alphabetically or by most common usage, there should be less confusion in locating a particular option.

Once users had chosen their terms and fields in the advanced search page, they were unsure of how the basic search bar and advanced options interacted with one another. Several users simply hit the enter key and found that only searched what was in the basic search box, while others entered information in both the basic and advanced areas and expected to have all the information searched for. The ambiguity in the advanced search page can be resolved by explaining the relationship between the two types of searching permitted on the page. One example of this is the Boston Public Library's advanced search page. It is structured like Dataverse's advanced search page with the basic search box on top and the other fields below, but it explicitly states, via a text box between the two areas, that users can search one or the other and not both. A similar feature on Dataverse's advanced search page would make its structure more obvious to users.

Users also struggled when attempting to search for specific variables to create subsets within a given study file. Many studies in Dataverse have a great deal of variables, and users often struggled when attempting to locate specific variable names that they were interested in finding. This difficulty can be minimized by inserting a variable search feature in the subsetting and analysis page. There is such a feature currently on the advanced search page, and moving it into subsetting and analysis would give users a straightforward way to look up variables within a given study file.

Update user guide

Based on the test findings, the usability team recommends updating the user guide to make sure the content matches Dataverse features. Novice users especially need detailed instructions on getting around the website, and even experienced users attempting to perform new tasks would benefit from step-by-step site walkthroughs. For example, the instructions on creating a collection should begin with how to find the "Collections" tab in settings. Additionally, having the user guide tab remain in the same tab as Dataverse, or making it more clear that clicking on the guide will make it appear in a new window, will lower the amount of future issues when a user attempts to navigate back to the Dataverse website after opening the user guide.

Collection labelling

The tasks in scenario two relating to collections were frequently confusing for users, and part of the problem is the terminology the system uses when creating them. The collection creation tab refers to collections as sub-collections, and users sometimes thought that they were in the wrong area because of this label. More consistent reference to collections throughout the site, whether this is as collections or sub-collections, will be more clear for users.

Back button compatibility

One constant throughout the user testing was that participants relied on the browser's back button when they were unsure of how to return to the area they were just at. This is

common user behavior in any system and Dataverse should strive to make itself more capable of functioning when users choose to use the back button.

Currently there is an issue where users returning to study pages are unable to click on the tab they were just on. During the test sessions this was most evident when users clicked on the analysis and subsetting tab of a particular study and then used the back button to go the study page, where they found that they could not click on the data and analysis tab again. The reason for this problem was explained to users during the testing so as not to derail the proceedings, but solitary users would likely think the site was broken and not know how to resolve the issue. Fixing this issue will quickly restore study-navigation functionality to the Dataverse site.

There is also back button-related difficulty in the search feature. When users attempt to use the back button to correct a spelling mistake or modify an unsuccessful search their results are not repopulated, meaning that they have to enter the information all over again. This was an oft-stated complaint that users had when performing tasks relating to searching the site. If search field information can be saved when users go back after a search it will eliminate a great deal of frustration when attempting to utilize the site's searching capabilities.

Persistent settings icon

The tasks relating to collection management in scenario two revealed some inconsistencies in the Dataverse site's navigation. The settings icon, where all of the collection functions can be accessed, requires several steps to locate once users with basic dataverse accounts are logged in. This layout caused a great deal of difficulty for users trying to create collections and release their dataverses. Having the settings icon remain with the other persistent icons on the upper right side of the page would make it easier for users to access the important functions contained within the settings page.

Tier 2

Simplify homepage

The current Dataverse homepage consists of a create account and log in area, a search box at the top of the page, and two columns divided into dataverses and studies. Participants found the homepage to be very busy and difficult to navigate around. As previously mentioned, there was confusion under the dataverses heading as to what was a clickable link and what was not. The usability team recommends moving towards a simplified homepage for the next version of Dataverse. We suggest making the search box bigger, collapsing the dataverse and studies columns, and making the create account and log in section more prominent. By collapsing the two columns under the search box, users will still have the option to open them to see what has recently been released and browse dataverses. Additionally by making the account area more prominent, first time users will gravitate towards creating accounts.

Delete comments tab

On the page for an individual study there are four tabs across the top of the page that provide further information on the study for users. One of these tabs, the comments tab, is recommended to be deleted. The usability team noticed a lack of comments on multiple studies they encountered during testing therefore showing it is not a feature users interact with frequently. The comments tab is taking up space on a study's page as well as acting as another area for new users to click on when trying to find the section of the study they are looking for and hindering the completion of their desired task.

Persona creation

In usability a persona is an idea of who you think your user is. Personas are created by looking at data of who is accessing your site and talking to your users. These are fully fleshed out and can include things such as age, a fake name, hobbies, work environment, etc. Defining a persona can really help understand what your users are using your website for by asking them and help to design an iteration of your website that will best suit them.

The Dataverse team currently classifies users as either data creators or data users. Data creators and data users are most likely researchers and probably faculty members according to members of the Dataverse team. Creating personas for these two distinct users will provide an understanding of who is using the Dataverse website and how they are using it therefore allowing the Dataverse team to create iterations of the website that are extremely user friendly.

Accessibility

During user testing, several participants commented on the font size being too small as well as the red and green asterisks denoting required or recommended fields on forms to be hard to either see or differentiate. The usability team recommends the Dataverse team work towards making the Dataverse website fit accessibility guidelines to avoid issues, like the two identified, in future versions of the website. According to Harvard's University Disability Services (accessibility.harvard.edu) the W3C's Web Accessibility Initiative guidelines (World Wide Web Consortium, n.d.) should be followed for Harvard websites.

New account creation step-by-step guide

When a new user decides to create an account or dataverse there are two options for them, one is to click on create account in the right hand corner or click on an orange box that says create dataverse. These two clicks link to two different pages that are inconsistent with each other. For example, when a new user clicks on the create dataverse box they are directed to a page with four yellow boxes and a small link under the last box that leads to the create account page. The "create account" box on the create dataverse page should be turned into a clickable link that directs to the create account page as well. Also both pages have a gray timeline, however, the create account page has completed steps turn to blue whereas the create dataverse timeline never changes. The usability team recommends updating both the create account and create dataverse pages so they are consistent with each other.

In addition to making these two pages similar, the usability team recommends creating a step by step guide for new users to follow when they log in to their account for the first time after creating it. This guide would show them where to go to create a dataverse, add a study, files, collections, etc as well as how to find permissions and settings for either Dataverses, studies, or collections.

Streamline permissions and restricted access pages

Currently, there are two permissions pages located within a user's account profile; one permissions page for dataverses and one for studies. To help minimize confusion for users, the usability team recommends condensing these two permission pages into one general permissions page that includes permissions options for both dataverses and studies. By having one permission page, users will no longer have to jump around the website attempting to determine which permission page is which.

Fix collections so studies are more noticeable

To find the collection tab to either create or edit a collection, a user has to make their way back to their dataverse and click on the settings cog. This path is confusing if a user is within one of their studies or somewhere else within their dataverse account and the settings cog is not present. By having a link to creating a collection appear in the box in the upper right hand corner that holds other links, it would reduce user confusion and frustrations.

Increase widget profile

The data citation widget located on the edit study page is hard to see and wasn't noticed by any of the participants during this round of user testing. This is a helpful function that lends itself towards being a feature that makes a user's experience creating or editing a citation for their study easier but it is not prevalent enough on the page as it is now. The colors used for the widget don't grab a user's eye and the way it currently is structured makes it appear to be coding language. We recommend making each piece of metadata be on a separate line, with sample text, and to get rid of the angle brackets surrounding each descriptor.

"Click here to add a study or collection" prompt with embedded links in a new user's account

When a user is logged in their account and clicks on their dataverse to edit it or add studies for the first time, the page is mostly blank with only the following statement, "there are no studies in this dataverse". The usability team recommends changing this to say "click here to add a study or collection" with an embedded link that directs the user to the appropriate webpage. The change in wording makes it more progress based rather than stopping users at that point in the dataverse and study creation process.

Next Steps

In addition to the recommendations outlined in the previous sections, the evaluation team has identified several future steps Dataverse can take to become more user friendly. An in-depth analysis of the user testing sessions would go a long way in fleshing out the findings presented in this report. This would involve: counting user errors on different tasks, determining where and when participants needed additional help in completing task prompts, calculating which tasks took the longest and shortest amount of time to accomplish, and gathering other quantitative data from the sessions. Doing this work would allow the usability team to get maximum value from the data collected in testing.

Another future step Dataverse can take is reviewing the analytic data collected on its website to get a comprehensive picture of its users. Analytics will be instrumental in determining what browsers users commonly access Dataverse with, how many users visit the site, how many new users are creating accounts, how long individuals are staying on pages, and other useful metrics. Once this data is examined the Dataverse team will have a more complete understanding of who is using the site and how to focus its future development.

Analytic data is a good starting point in determining user behavior, but it would be even more meaningful to ask Dataverse users directly about their interaction with the site. The user testing collected demographic data from twenty-one participants, but this is not a large enough sample to construct an accurate Dataverse user persona, especially for experienced users. A widely distributed survey which asks users about their behavior with the system would give the Dataverse team a better understanding of the people behind the analytic statistics. The survey results would create a more conclusive portrait of common user behavior than the small user testing example was able to.

The new faceted search that will be a part of the site's next iteration would benefit from an investigation that looks at sites that have a similar search interface and also user feedback. Part of the investigation will include looking into the practices in place in EBSCO, DSpace, and other websites that utilize faceted search interfaces and determining what should be adopted from similar sites and what can be improved in Dataverse's version. Similarly, getting user feedback from focus groups and card sorts on what they would like to see from the new search would give the Dataverse team valuable feedback for creating the most effective search interface possible.

Several users familiar with Dataverse stated that they commonly use Google Scholar or HOLLIS to locate studies with data sets contained in Dataverse. It would make sense for commonly utilized sites to also include a way to access the raw data contained in Dataverse as well as the published studies it corresponds to. Linking Dataverse studies to their finished products in search engines would make users more likely to access the material found in the site and make it an even more powerful research tool than it currently is.

The Dataverse team should also consider doing another round of user testing with users who maintain large dataverses. Since these users might not be located in Boston, remote user testing is recommended in order to gain data about how these users interact with Dataverse.

Conclusion

The recommendations and findings of the usability evaluation of Dataverse outline solutions to some of the major hurdles that users have identified during testing. While these

steps will not make the site completely user-friendly, they will go a long way toward it. The only way to ensure that Dataverse becomes and remains usable is to evaluate the site on an iterative basis and realize that, while a flawless user experience is not attainable, the best way to get close is through periodic evaluation of the site from a user's perspective.

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Dataverse Usability Evaluation: Quantitative Analysis

Elizabeth Quigley, MLIS Simmons College

Presented on: June 27, 2013

Supported by:

Eric Gibbs, MLIS Simmons College

Lin Lin, MLIS Simmons College

Rong Tang, Associate Professor & Director, Simmons GSLIS Usability Lab

Simmons GSLIS Usability Lab

Introduction

The quantitative analysis of Dataverse user testing sessions was completed following the qualitative analysis to further support the usability team's recommendations. The quantitative analysis evaluates the effectiveness and efficiency of Dataverse through numbers rather than solely using quotes and stories from users. Tasks for both scenarios were tagged to determine time on task, mouse clicks per task, and if they were completed by the participant. This quantitative analysis report will go through both scenario one and scenario two task by task.

Morae Manager software was used to complete this quantitative analysis. Each user testing session was watched to add task start and end times as well as add markers (participant prompted, error, and user needs help) and each task was determined as completed with ease, completed with difficulty, or failed to complete. After all nineteen sessions were viewed, the graph feature of Morae Manager created many graphs that can be found at the end of this report. The following boxes define markers and their levels as well as how tasks were determined to be either completed or failed.

Marker	Level	Definition
Participant Prompted	Minor	Participant was asked a question
Participant Prompted	Medium	Participant was prompted to check another page
Participant Prompted	Severe	Participant was prompted to the correct page
User Needs Help	Minor	Moderator clarifies something on page for user
User Needs Help	Medium	Moderator informs user if they are on right page or not
User Needs Help	Severe	Moderator completed task or moved task forward
Error	Minor	N/A*
Error	Medium	N/A*
Error	Severe	User couldn't complete task

*omitted as all errors were rated as severe

Task Completion Level	Definition
Completed with Ease	Completed task with no signs of frustration, minor or medium participant prompting, no errors or user needs help
Completed with Difficulty	Navigated away from page, clicked on page that would not complete task, was able to complete task but took a long time, was able to complete task with prompts or errors, was able to complete task even with navigating away from correct page then coming back
Failed to Complete	Could not complete task, task was completed by moderator, severe errors and severe user needs help markers fall in this category

Average marker and task score uses a scale of 0 (minor) to 2 (severe). If a task has a rating of 0 this means all users completed the task with ease. The closer to 2 an average task

score falls, the more difficult the task was to complete. In usability research, a score of 70% completion of a task by users is the standard metric to determine if a feature is functional or not. For the purpose of this usability report, any task that isn't 100% completed with ease by users is a feature that needs to be reviewed to determine how to make it more user friendly in future iterations of Dataverse.

Scenario One

Scenario one focuses on data users, users who are not creating data but are searching for data, and did not include creating a Dataverse account. Tasks involving the basic and advanced search, downloading specific files from studies, and locating the report a problem icon were included in this scenario. All tasks include average number of mouse clicks, time on task, participant success rate, and average task score. If markers were added for a task, then average marker score, marker distribution, and marker types will also be listed. The average time for scenario one was 43:26 minutes and the average number of mouse clicks was 182.76 clicks.

Out of the fourteen tasks for scenario one, six tasks had participants who failed to complete the task. These tasks are 2, 3a, 3b, 4a, 6b, and 9. Task 2 further supports the recommendations for a saved search history for users with accounts and search improvement. Tasks 3a and 3b support the recommendations for a saved search history for users with accounts, search improvement, and updating the user guide. Task 4a supports the recommendation for a homepage link that is easy to identify. Task 6b supports the recommendation for improving back button compatibility between Dataverse and browsers. Multiple participants mentioned they would very infrequently look for the individual data citation on Dataverse so this task isn't necessarily representative of the way users interact with Dataverse. However, this does test the effectiveness of the organization of the studies tab in Dataverse as it required a participant to "search" around the web page to find a particular piece of information. Task 9 only had one participant fail to complete it, however, users needing help and participant prompting were necessary for completion of task. Though there is not a specific recommendation from the qualitative analysis that directly relates to this task, being able to locate a report an error icon or link is necessary.

All quantitative metrics for scenario one tasks:

Task 1-You are just starting your research process and are specifically interested in finding information on elections in which Bill Clinton has run. Use the "basic search" box to start looking for information on this topic.

Average mouse clicks: 4.60

Average time on task: 2:35 minutes

Participant Success Rate: 90% of participants completed with ease, 10% completed with difficulty

Average task score: 0.10

Task 2-You want to narrow the results from your first search down to a more reasonable number. Use the search tools provided by Dataverse to search for studies containing information on voting behavior within the results you've found so far.

Average mouse clicks: 19.10

Average time on task: 4:38 minutes

Average marker score: 0.75

Participant Success Rate: 40% of participants completed with ease, 20% completed with difficulty, 40% failed to complete

Average task score: 1.00

Marker Distribution: 16.67% minor, 83.3% Medium

Marker Types: 33.33% user needs help, 66.67% participant prompted

Task 3a-You want to narrow down your results again so that you can focus on studies that contain information on Massachusetts. Perform an advanced search using the keywords you've used to search so far while limiting your results to those specifically relating to Massachusetts.

Average mouse clicks: 37.30

Average time on task: 7:57 minutes

Average marker score: 1.00

Participant Success: 60% completed with difficulty, 40% failed to complete

Average task score: 1.40

Marker Distribution: 36.36% minor, 18.18% minor, 45.45% severe

Marker Types: 18.18% user needs help, 54.55% participant prompted, 27.27% error

Task 3b-Now that you have limited your results to studies that only focus on Massachusetts, you are interested in other studies that consist of survey data (Kind of Data) from the same distributor that cover voting behavior (and are not limited to Massachusetts). Perform an advanced search to locate these studies.

Average mouse clicks: 34.56

Average time on task: 6:31 minutes

Average marker score: 1.10

Participant Success: 22.22% completed with ease, 33.33% completed with difficulty, 44.44% failed to complete

Average task score: 1.22

Marker Distribution: 30% minor, 40% medium, 30% severe

Marker Types: 20% user needs help, 60% participant prompted, 20% error

Task 4a-You are interested in finding research done by the government organization ***The National Archives and Record Administration****. Locate their Dataverse from the IQSS Dataverse Network homepage.*
Average mouse clicks: 14.30

Average time on task: 3:09 minutes

Average marker score: 1.33

Participant Success: 50% with ease, 40% with difficulty, 10% failed to complete

Average task score: 0.60

Marker Distribution: 25% medium, 75% severe

Marker Types: 20% user needs help, 50% participant prompted, 25% error

Task 4c-Find a link to MIT's Dataverse.

Average mouse clicks: 7.30

Average time on task: 1:29 minutes

Average marker score: 1.33

Participant Success: 70% completed with ease, 30% completed with difficulty

Average task score: 0.30

Marker Distribution: 75% medium, 25% severe

Marker Types: 50% user needs help, 50% participant prompted

Task 5a-Find the study named "Textbooks and Test Scores".

Average mouse clicks: 3.70

Average time on task: 1:14 minutes

Average marker score: 0.50

Participant Success: 90% completed with ease, 10% completed with difficulty

Average task score: 0.10

Marker Distribution: 50% minor, 50% severe

Marker Types: 100% participant prompted

Task 5b-You want to download the "96pupil1_2.tab" data file as an "R" file. How would you do that?

Average mouse clicks: 4.70

Average time on task: 1:39 minutes

Participant Success: 100% completed with ease

Average task score: 0.00

Task 6a-Next, find the "96pupil1_2.tab" file in the same study. You want to download the subset of data for the "Student ID", "Favorite subject #1", and "Favorite subject #2" variables in the R Data format, how would you do that?

Average mouse clicks: 16.20

Average time on task: 3:28 minutes

Average marker score: 1.00

Participant Success: 80% completed with ease, 20% completed with difficulty

Average task score: 0.20

Marker Distribution: 50% minor, 50% severe

Marker Types: 50% user needs help, 50% participant prompted

Task 6b-You are going to use the "96pupil1_2.tab" file you found for your research paper, how would you cite the source?

Average mouse clicks: 11.90

Average time on task: 2:43 minutes

Average marker score: 1.00

Participant Success: 20% completed with ease, 60% completed with difficulty, 20% failed to complete

Average task score: 1.00

Marker Distribution: 25% minor, 50% medium, 25% severe

Marker Types: 25% user needs help, 75% participant prompted

Task 6c-Now you want to download the entire section of study files labeled "2a. SAP 1996-2000 Pupil Questionnaire, 1997 -1999 Pupil Interview: Data Files". How would you do that (Do not actually download the files)?

Average mouse clicks: 5.10

Average time on task: 1:36 minutes

Average marker score: 1.00

Participant Success: 50% completed with ease, 50% completed with difficulty

Average task score: 0.50

Marker Distribution: 33.33% minor, 33.33% medium, 33.33% severe

Marker Types: 33.33% user needs help, 66.67% participant prompted

Task 7- You are interested in using the study titled "KPC October 2010" in your research paper, specifically the "2010_10_01_K_SJ.pdf" file. How would you gain access to this resource?

Average mouse clicks: 8.00

Average time on task: 1:47 minutes

Average marker score: 1.00

Participant Success: 90% completed with ease, 10% completed with difficulty

Average task score: 0.10

Marker Distribution: 100% medium

Marker Types: 100% participant prompted

Task 8-Now that you have found several studies you are interested in analyzing, find a section of Dataverse that gives you information on how to use data visualization in the system.

Average mouse clicks: 10.40

Average time on task: 3:29 minutes

Average marker score: 0.88

Participant Success: 40% completed with ease, 60% completed with difficulty

Average task score: 0.60

Marker Distribution: 33.33% minor, 16.67% medium, 50% severe

Marker Types: 16.67% user needs help, 66.67% participant prompted, 16.67% error

Task 9-You're having an issue with downloading a particular file in Dataverse. How would you report this issue to the site's administration?

Average mouse clicks: 5.60

Average time on task: 1:11 minutes

Average marker score: 0.50

Participant Success: 90% completed with ease, 10% failed to complete

Average task score: 0.20

Marker Distribution: 50% minor, 50% medium

Marker Types: 50% user needs help, 50% participant prompted

Scenario Two

Scenario two focuses on data creators, users who are not searching for data but are creating data, and did include creating a Dataverse account. Creating an account and dataverse, uploading files, releasing studies and dataverses, collections, and permissions were included in this scenario. All tasks include average number of mouse clicks, time on task, participant success rate, and average task score. If markers were added for a task, then average marker score, marker distribution, and marker types will also be listed. The average time for scenario two was 36:06 minutes and the average number of mouse clicks was 158.32 clicks.

Out of the eleven tasks in scenario two, six tasks had participants who failed to complete the task. These tasks are 2, 4, 6, 8a, 9, and 10. Task 2 further supports the recommendation for persistent settings icon on Dataverse. Task 4 only had one participant fail to complete it, however, this participant believed they had completed the task. The participant typed the collection dates into a similar field; looking into better distinguishing study fields when a user is creating a new study is an insight gained from this task. Task 6 further supports the recommendations for a persistent settings icon as well as streamlining the permissions and restricted access pages. Task 8a further supports the recommendations for visualizing Dataverse hierarchy, collection labeling, fixing collections so studies are more noticeable, "click here to add a study or collection" prompt with embedded links in a new user's account, and updating the user guide. Task 9 further supports the recommendations for persistent settings icon as well as streamlining the permissions and restricted access pages. Task 10 further supports the recommendations for a persistent settings icon, streamlining the permissions and restricted access pages, and simplifying the homepage.

All quantitative metrics for scenario two tasks:

Task 1-You just completed a research project and you want to upload the data you've collected so you can share it with other researchers. To begin this process you must first create your own basic Dataverse. How would you do this?
Average mouse clicks: 28.89

Average time on task: 5:23 minutes

Participant Success: 88.89% completed with ease, 11.11% completed with difficulty

Average task score: 0.11

Task 2-You want to edit the description of your Dataverse homepage, where would you go to do this?

Average mouse clicks: 13.22

Average time on task: 2:41 minutes

Average marker score: 0.33

Participant Success: 44.44% completed with ease, 55.56% completed with difficulty

Average task score: 0.56

Marker Distribution: 66.67% minor, 33.33% medium

Marker Types: 33.33% user needs help, 66.67% participant prompted

Task 3-Now that you have created your Dataverse and described it, create a study that you want to share. Give it the name "Usability Sample". Fill in only required fields when you do this.

Average mouse clicks: 9.44

Average time on task: 2:19 minutes

Participant Success: 88.89% completed with ease, 11.11% completed with difficulty

Average task score: 0.11

Task 4-Now that you have entered the basic study information, add the data collection start and end date information to the study's description.

Average mouse clicks: 5.56

Average time on task: 1:51 minutes

Participant Success: 88.89% completed with ease, 11.11% failed to complete

Average task score: 0.22

Task 5-Now upload the two data files to this study. File #1: dataverse_usability_readme.txt File #2: dataverse_usability_survey.sav Move on to the next task when you can confirm that the files have been successfully uploaded.

Average mouse clicks: 25.33

Average time on task: 3:47 minutes

Average marker score: 1.00

Participant Success: 88.89% completed with ease, 11.11% completed with difficulty

Average task score: 0.11

Marker Distribution: 50% minor, 50% severe

Marker Types: 50% user needs help, 50% participant prompted

Task 6-Now that you have uploaded your data, you want to restrict access to your data file and allow users to contact you for permission to access the file. How would you do this?

Average mouse clicks: 10.78

Average time on task: 2:35 minutes

Average marker score: 1.00

Participant Success: 55.56% completed with ease, 33.33% with difficulty, 11.11% failed to complete

Average task score: 0.56

Marker Distribution: 50% minor, 50% severe

Marker Types: 50% user needs help, 50% participant prompted

Task 7-Now that you have your preferences and information set, release your study.

Average mouse clicks: 2.33

Average time on task: 26 seconds

Participant Success: 100% completed with ease

Average task score: 0.00

Task 8a-Create a static collection named DVN Usability Project in your Dataverse. This Collection will have only one study, which is "Sample Test Data"

Average mouse clicks: 21.44

Average time on task: 7:06 minutes

Average marker score: 1.64

Participant Success: 22.22% completed with ease, 33.33% completed with difficulty, 44.44% failure to complete

Average task score: 1.22

Marker Distribution: 53.85% medium, 46.15% severe

Marker Types: 23.08% user needs help, 61.54% participant prompted, 15.38% error

Task 8b-Next, create a dynamic collection that will include all studies in your Dataverse that have the word "usability" in the title.

Average mouse clicks: 5.56

Average time on task: 2:02 minutes

Average marker score: 1.33

Participant Success: 77.78% completed with ease, 22.22% completed with difficulty

Average task score: 0.22

Marker Distribution: 33.33% minor, 66.67% severe

Marker Types: 66.67% user needs help, 33.33% participant prompted

Task 9-Now that your Dataverse is ready to be published, release it so that others can view it.

Average mouse clicks: 15.44

Average time on task: 4:04 minutes

Average marker score: 1.17

Participant Success: 22.22% completed with ease, 66.67% completed with difficulty, 11.11% failed to complete

Average task score: 0.89

Marker Distribution: 25% minor, 50% medium, 25% severe

Marker Types: 50% user needs help, 50% participant prompted

Task 10-Find your released Dataverse on the network homepage to verify that you've successfully shared it. Once you have found the dataverse, unrelease it and verify that it no longer shows up on the homepage.

Average mouse clicks: 20.33

Average time on task: 3:52 minutes

Average marker score: 1.00

Participant Success: 44.44% completed with ease, 55.56% completed with difficulty

Average task score: 0.56

Marker Distribution: 33.33% minor, 33.33% medium, 33.33% severe

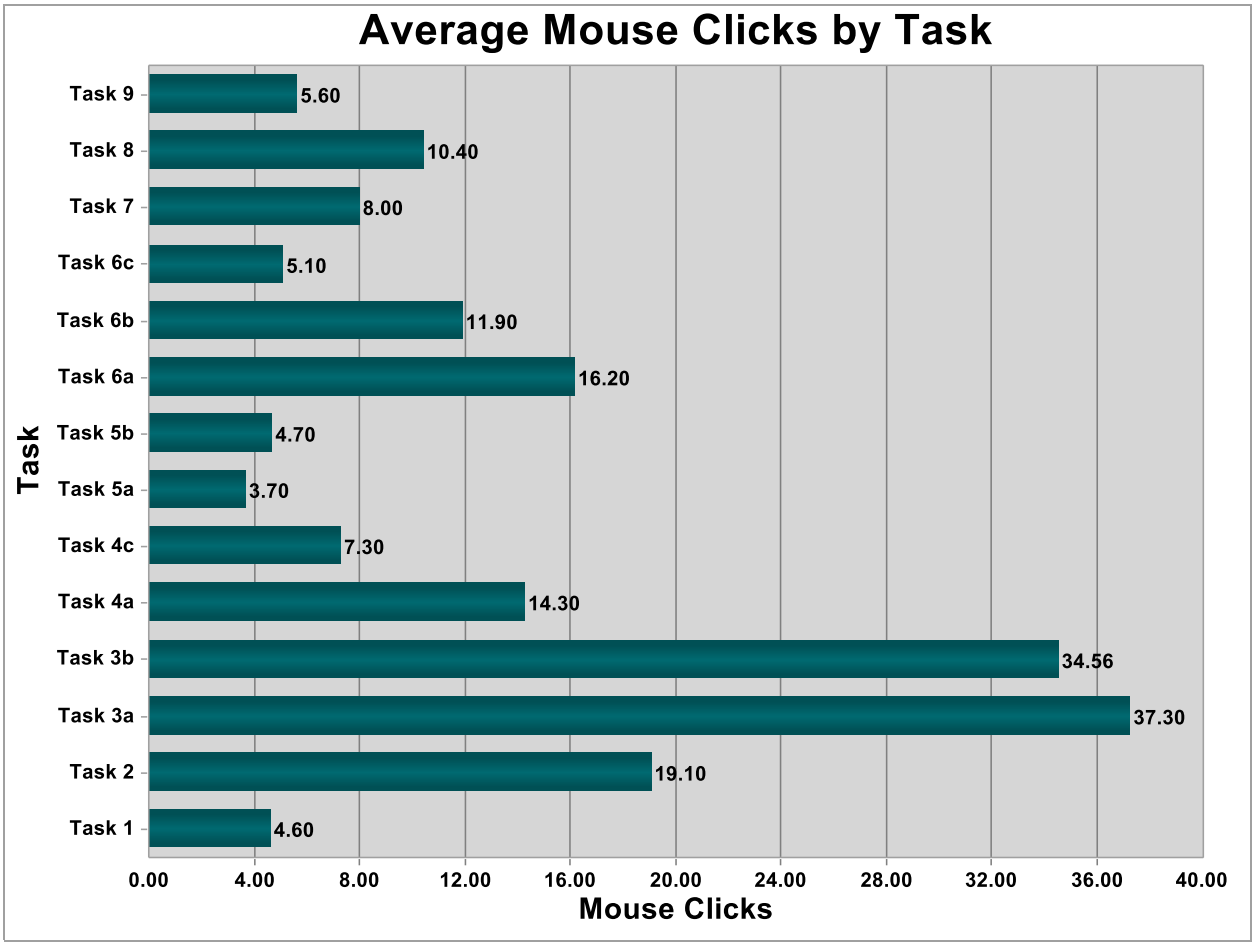
Marker Types: 33.33% user needs help, 33.33% participant prompted, 33.33% error

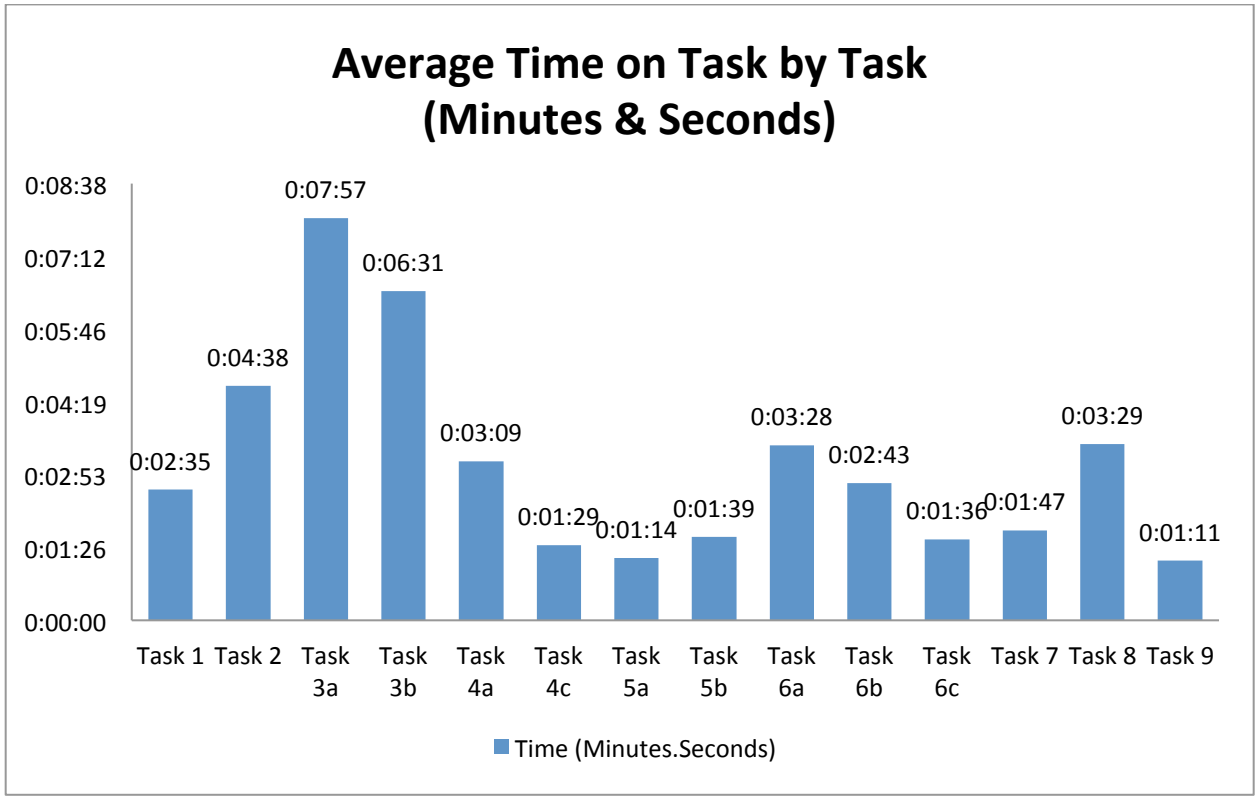
Conclusion

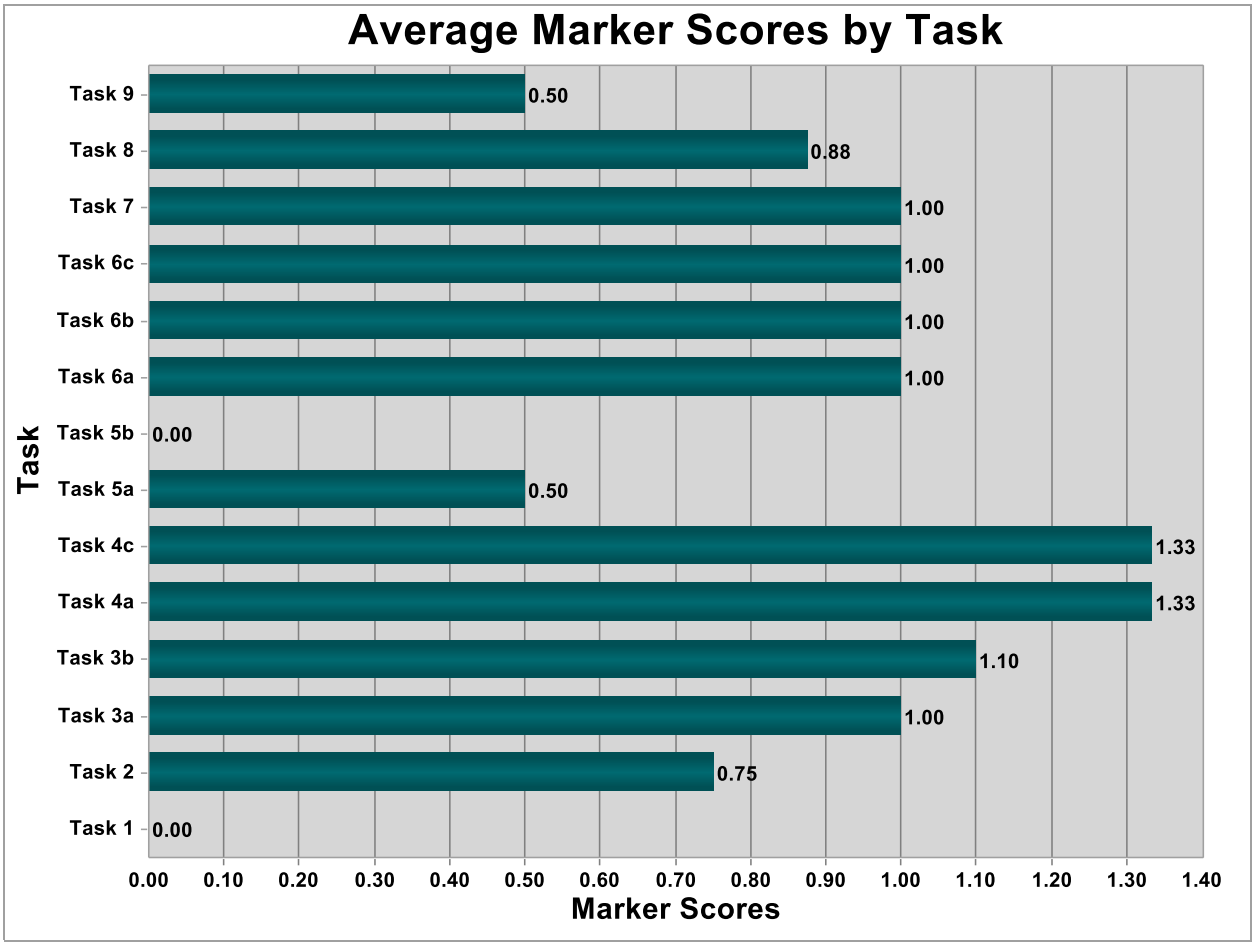
The quantitative analysis from this round of Dataverse user testing sessions strengthens the findings, recommendations, and next steps presented by the usability research team following the qualitative analysis. Though there is a not a high rate of failure across the tasks, there is now quantitative proof to show users struggle to complete the majority of tasks within Dataverse. Continuous analysis of Dataverse as it evolves will help to create the smoothest user experience for both data users and data creators.

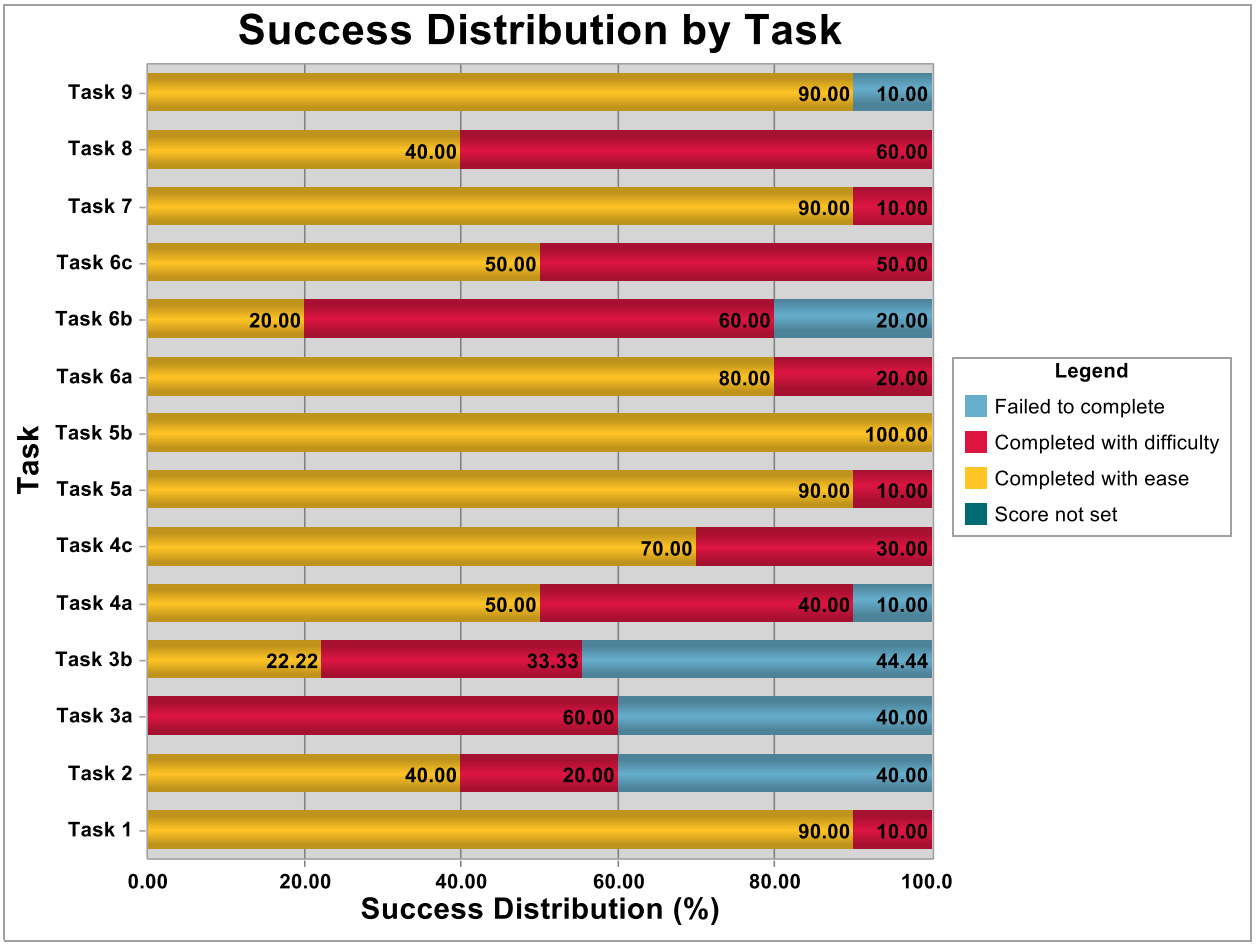
Scenario One:

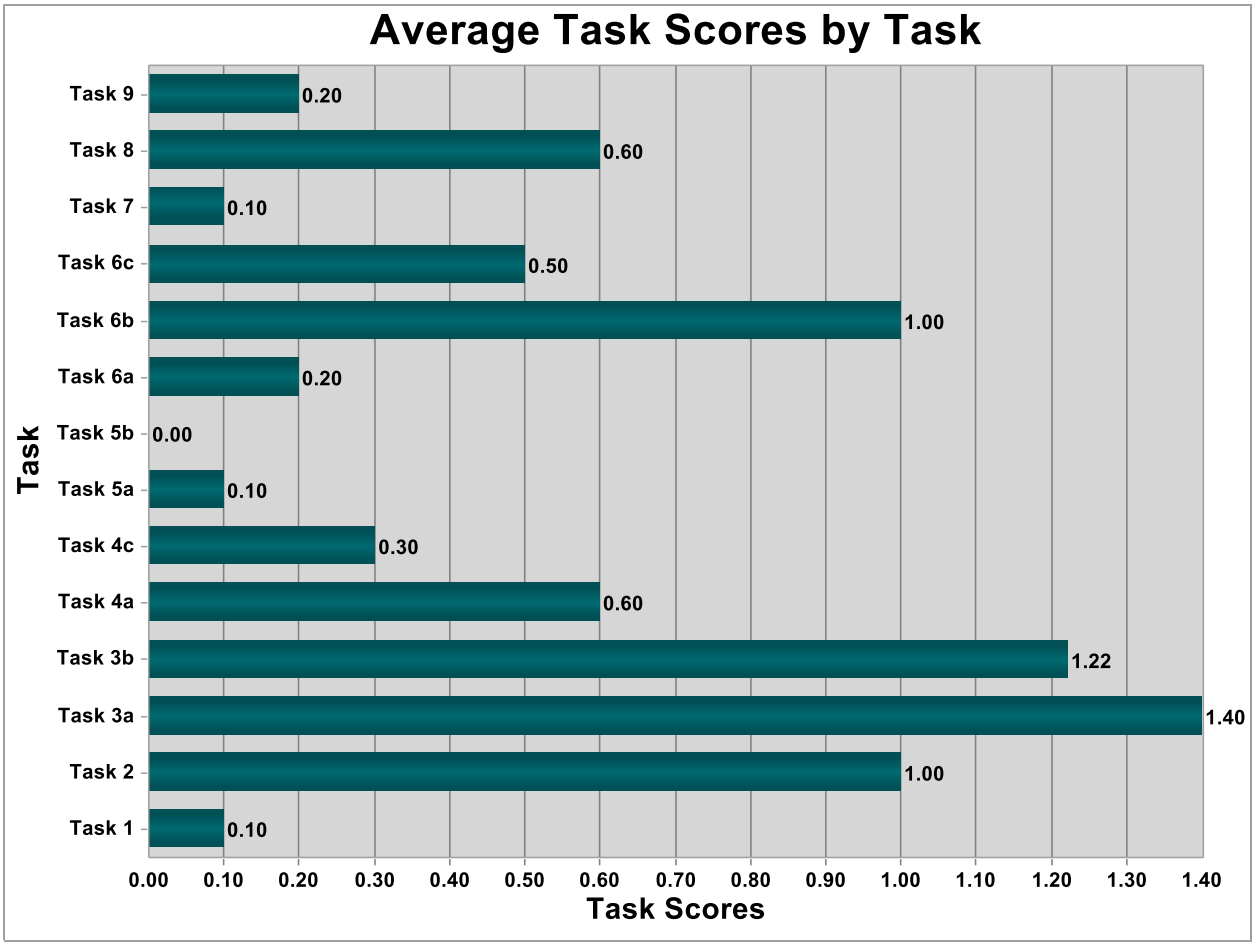
Data Users

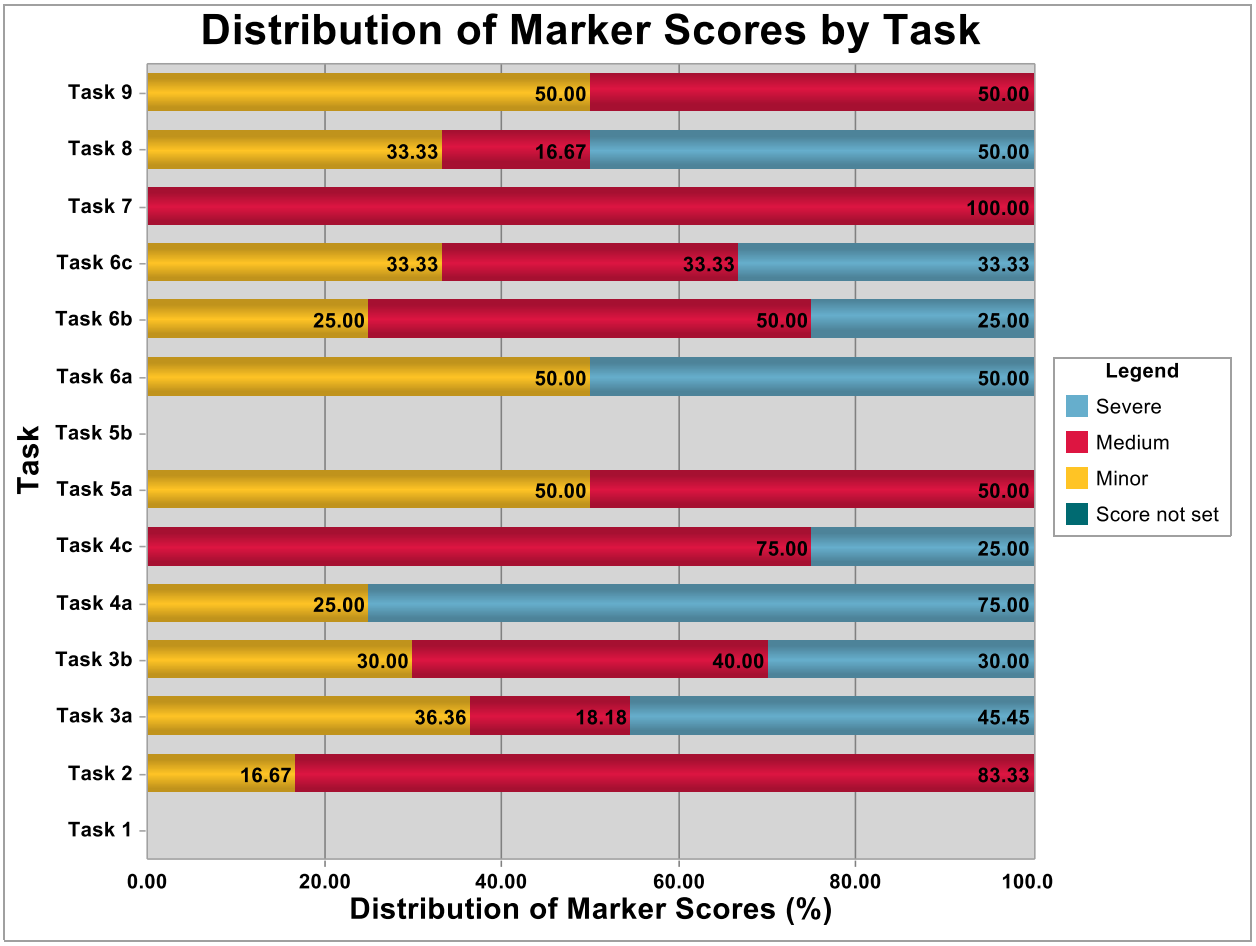

Average Mouse Clicks by Task
Task 9
Task 8
Task 7
Task 6c
Task 6b
Task 6a
Task 5b
Task 5a
Task 4c
Task 4a
Task 3b
Task 3a
Task 2
Task 1
5.60
10.40
8.00
5.10
11.90
16.20
4.70
3.70
7.30
14.30
34.56
37.30
19.10
4.60
Task
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
36.00
40.00
Mouse Clicks

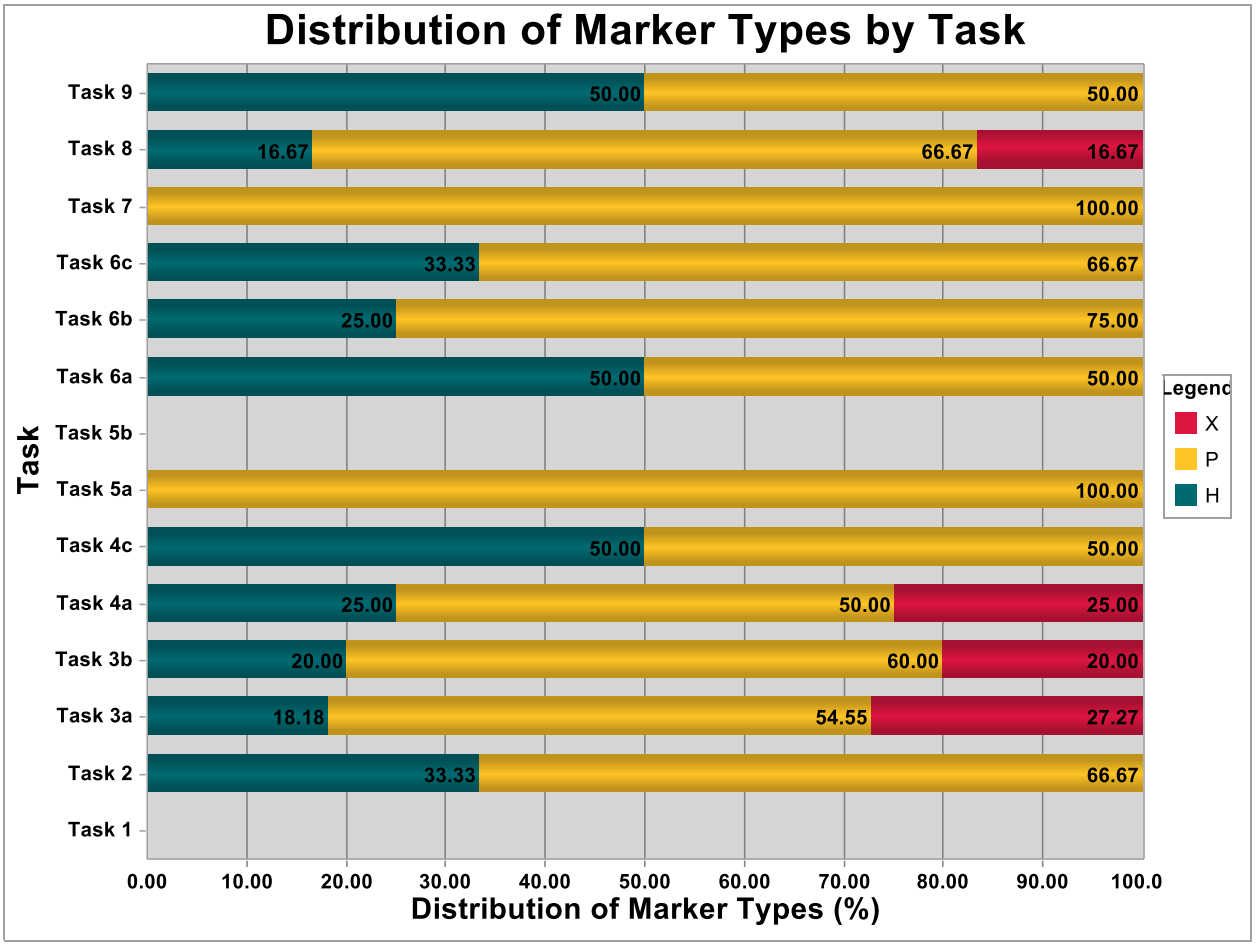

Average Time on Task by Task
(Minutes & Seconds)
0:08:38
0:07:12
0:05:46
0:04:19
0:02:53
0:01:26
0:00:00
0:02:35
0:04:38
0:07:57
0:06:31
0:03:09
0:01:29
0:01:14
0:01:39
0:03:28
0:02:43
0:01:36
0:01:47
0:03:29
0:01:11
Task 1
Task 2
Task 3a
Task 3b
Task 4a
Task 4c
Task 5a
Task 5b
Task 6a
Task 6b
Task 6c
Task 7
Task 8
Task 9
Time (Minutes.Seconds)

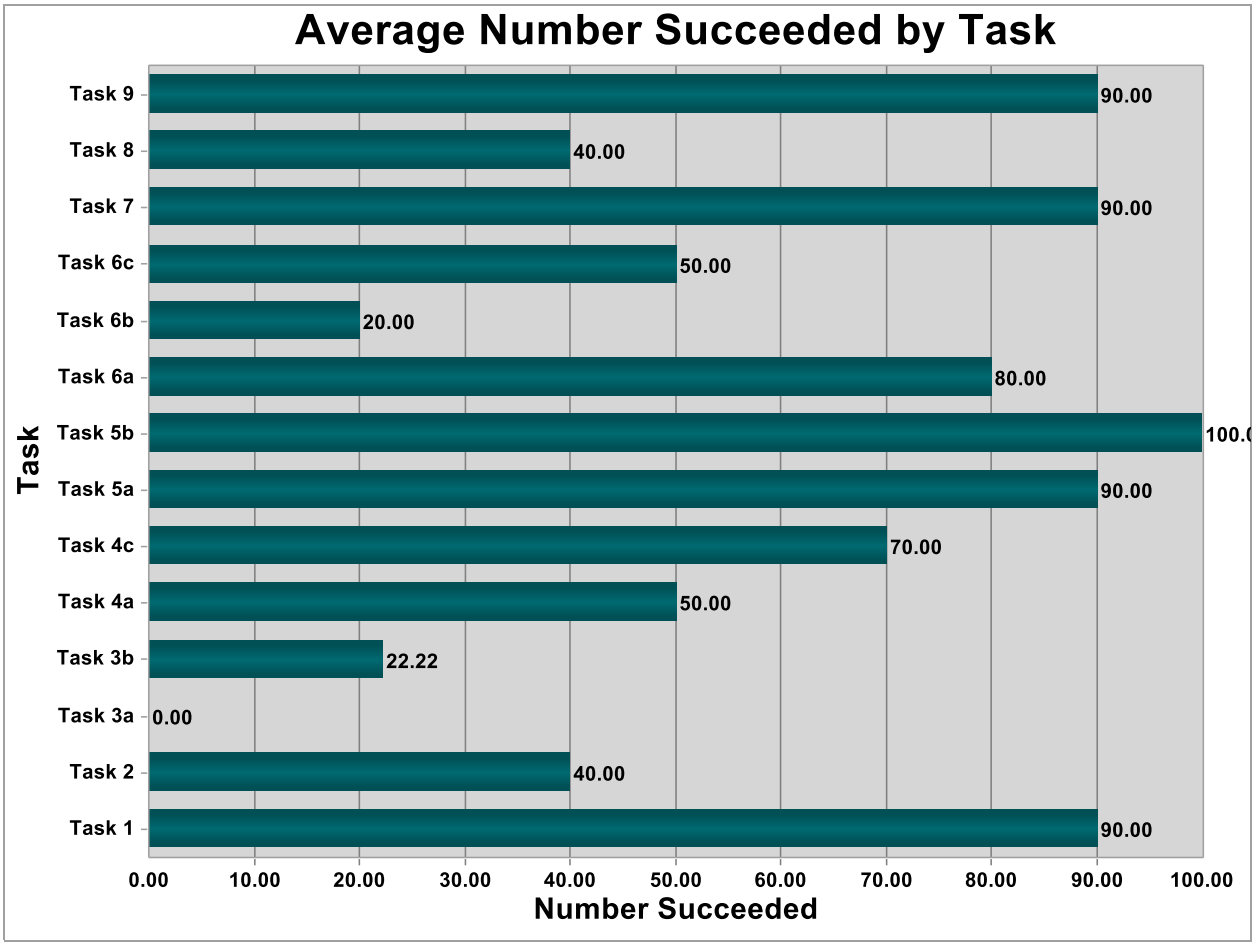

Average Marker Scores by Task
Task 9
Task 8
Task 7
Task 6c
Task 6b
Task 6a
Task 5b
Task 5a
Task 4c
Task 4a
Task 3b
Task 3a
Task 2
Task 1
0.50
0.88
1.00
1.00
1.00
1.00
0.00
0.50
1.33
1.33
1.10
1.00
0.75
0.00
Task
0.00 0.10 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00 1.10 1.20 1.30 1.40
Marker Scores


Success Distribution by Task
Task 9
Task 8
Task 7
Task 6c
Task 6b
Task 6a
Task 5b
Task 5a
Task 4c
Task 4a
Task 3b
Task 3a
Task 2
Task 1
90.00
10.00
40.00
60.00
90.00
10.00
50.00
50.00
20.00
60.00
20.00
80.00
20.00
100.00
90.00
10.00
70.00
30.00
50.00
40.00
10.00
22.22
33.33
44.44
60.00
40.00
40.00
20.00
40.00
90.00
10.00
Task
0.00
20.00
40.00
60.00
80.00
100.0
Success Distribution (%)
Legend
Failed to complete
Completed with difficulty
Completed with ease
Score not set

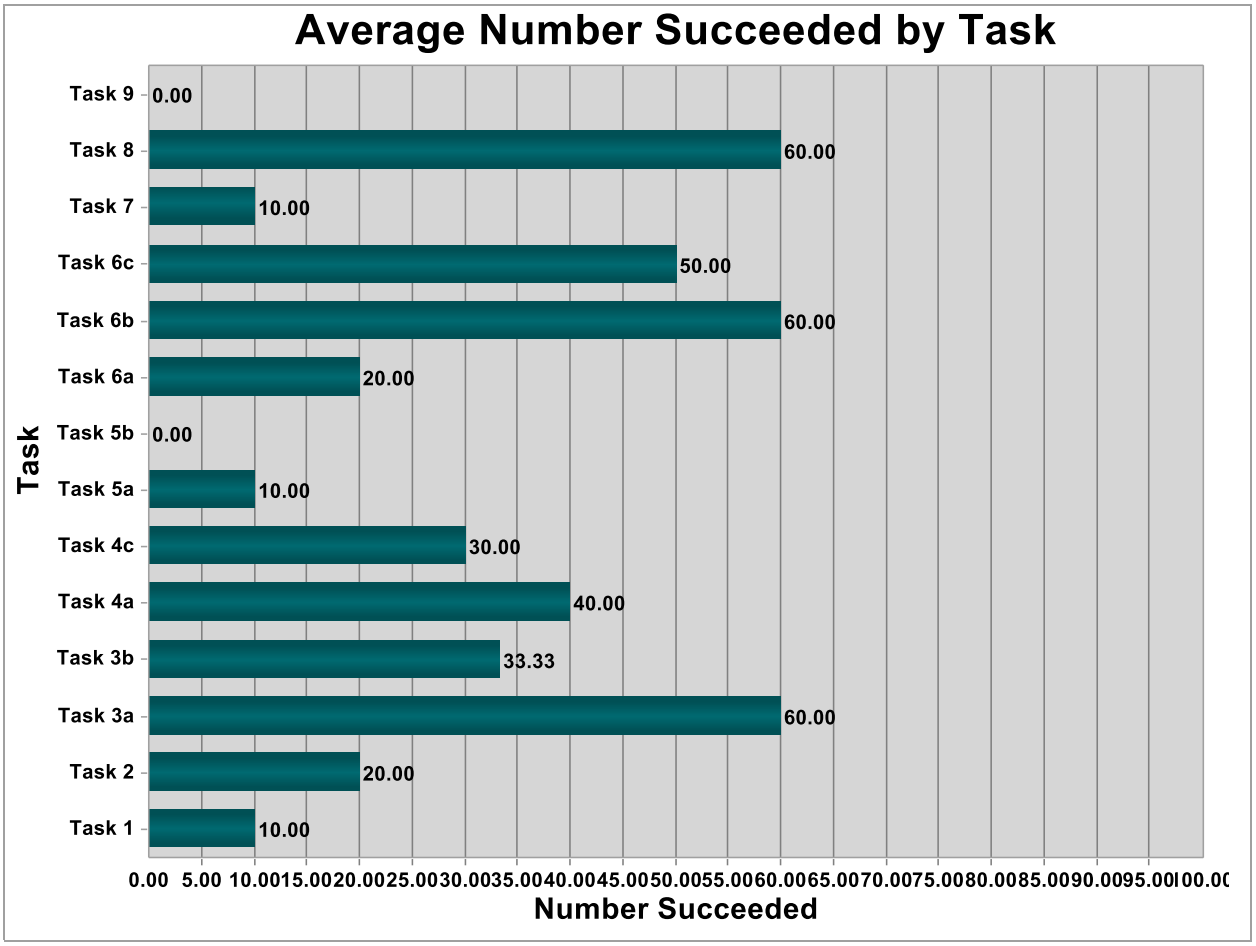

Average Task Scores by Task
Task
Task 9
Task 8
Task 7
Task 6c
Task 6b
Task 6a
Task 5b
Task 5a
Task 4c
Task 4a
Task 3b
Task 3a
Task 2
Task 1
0.20
0.60
0.10
0.50
1.00
0.20
0.00
0.10
0.30
0.60
1.22
1.40
1.00
0.10
0.00 0.10 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00 1.10 1.20 1.30 1.40
Task Scores


Distribution of Marker Scores by Task
Task 9
Task 8
Task 7
Task 6c
Task 6b
Task 6a
Task 5b
Task 5a
Task 4c
Task 4a
Task 3b
Task 3a
Task 2
Task 1
50.00
50.00
33.33
16.67
50.00
100.00
33.33
33.33
33.33
25.00
50.00
25.00
50.00
50.00
50.00
50.00
75.00
25.00
25.00
75.00
30.00
40.00
30.00
36.36
18.18
45.45
16.67
83.33
Task
0.00
20.00
40.00
60.00
80.00
100.0
Distribution of Marker Scores (%)
Legend
Severe
Medium
Minor
Score not set

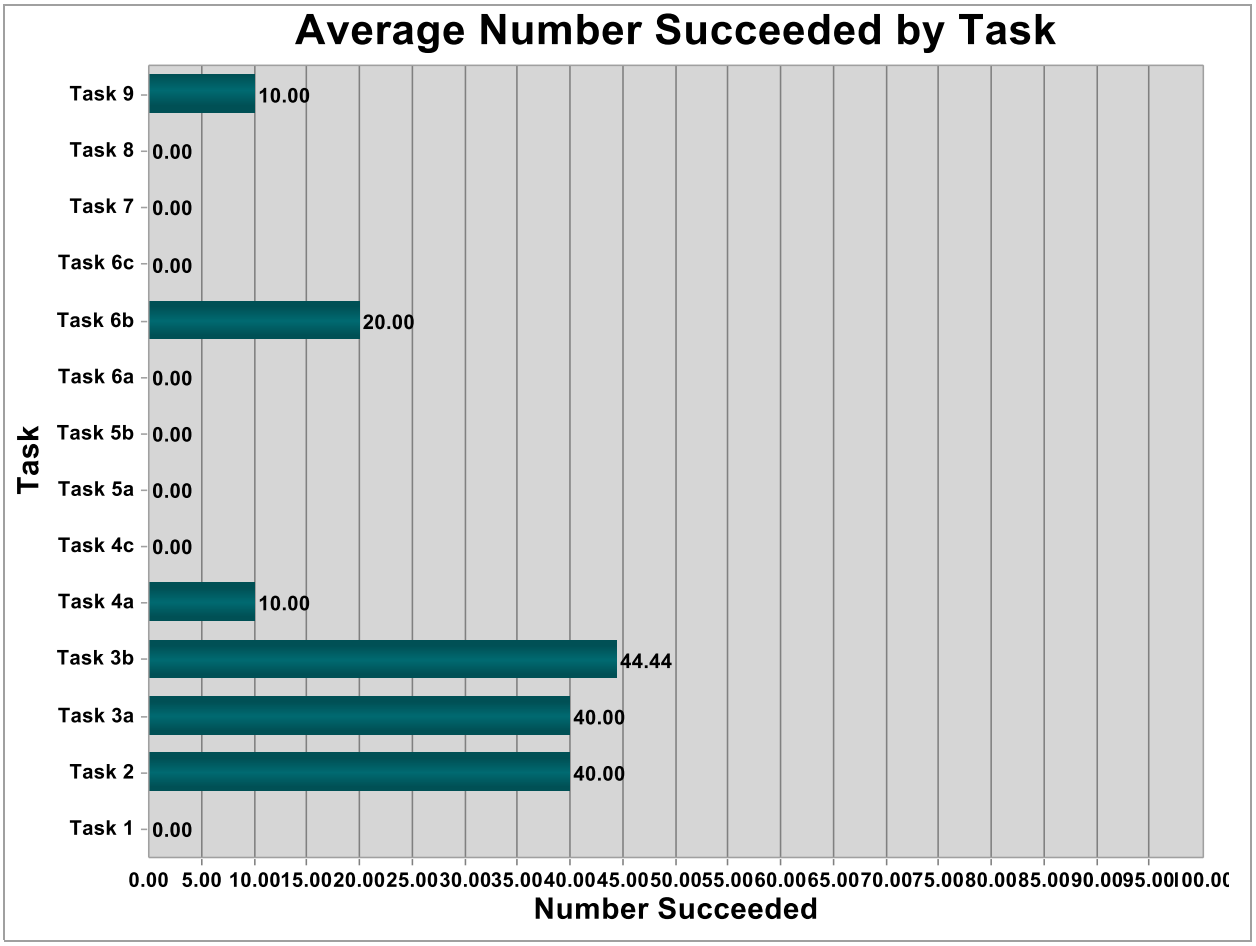

Distribution of Marker Types by Task
Task
Task 9
Task 8
Task 7
Task 6c
Task 6b
Task 6a
Task 5b
Task 5a
Task 4c
Task 4a
Task 3b
Task 3a
Task 2
Task 1
50.00
50.00
16.67
66.67
16.67
100.00
33.33
66.67
25.00
75.00
50.00
50.00
100.00
50.00
50.00
25.00
50.00
25.00
20.00
60.00
20.00
18.18
54.55
27.27
33.33
66.67
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00
100.0
Distribution of Marker Types (%)
Legend
X
P
H



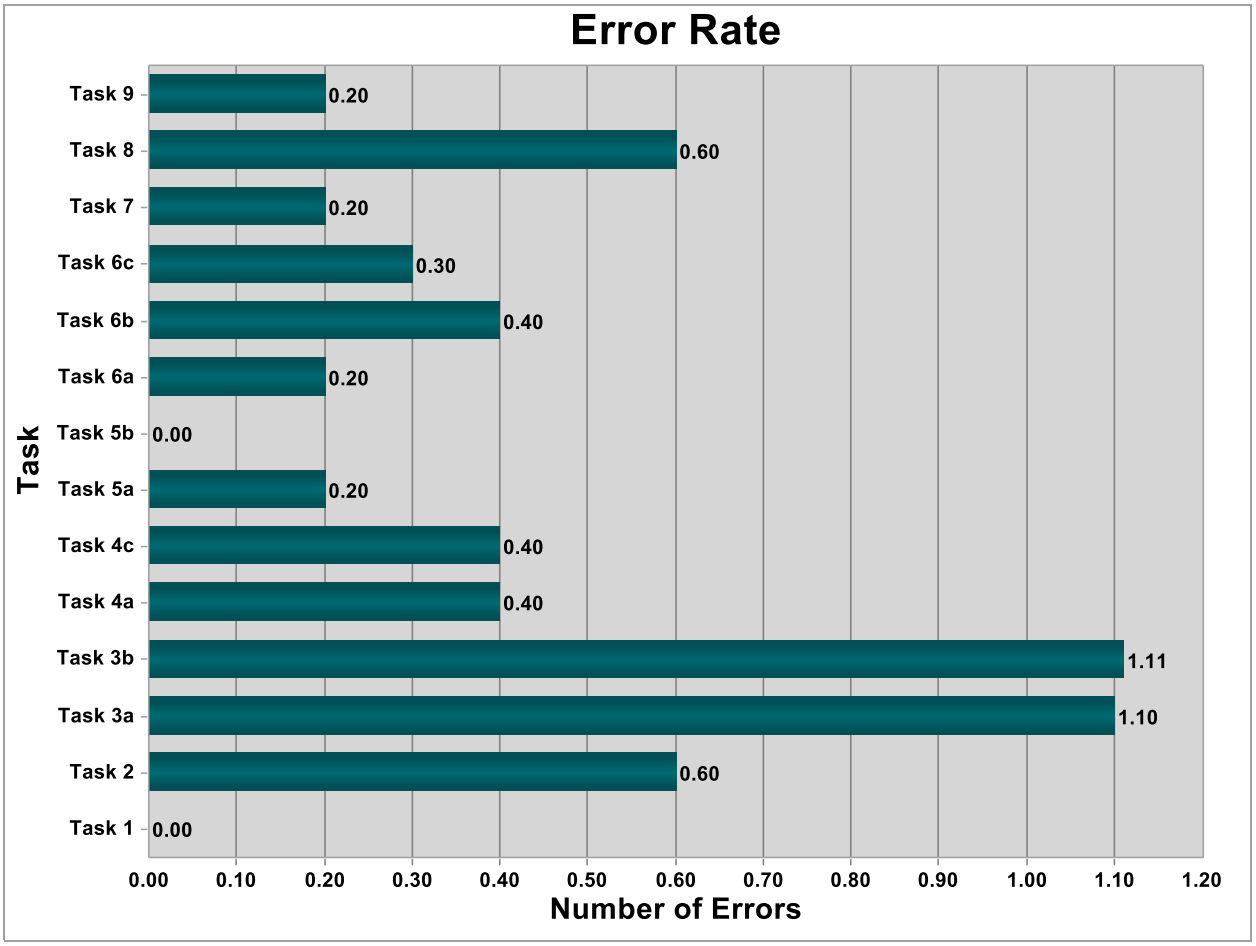
Completed with Ease



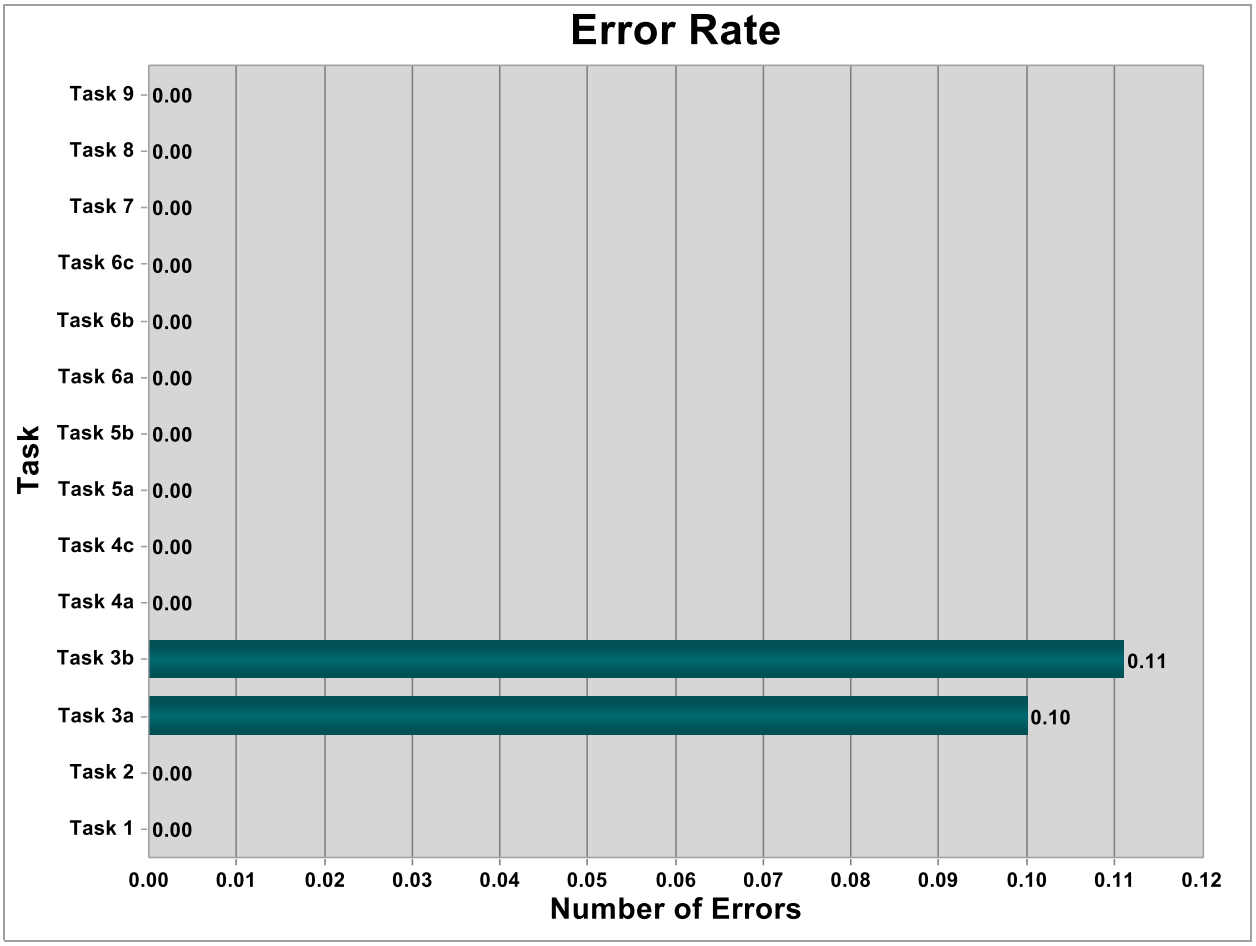
Completed with Difficulty



Failed to Complete

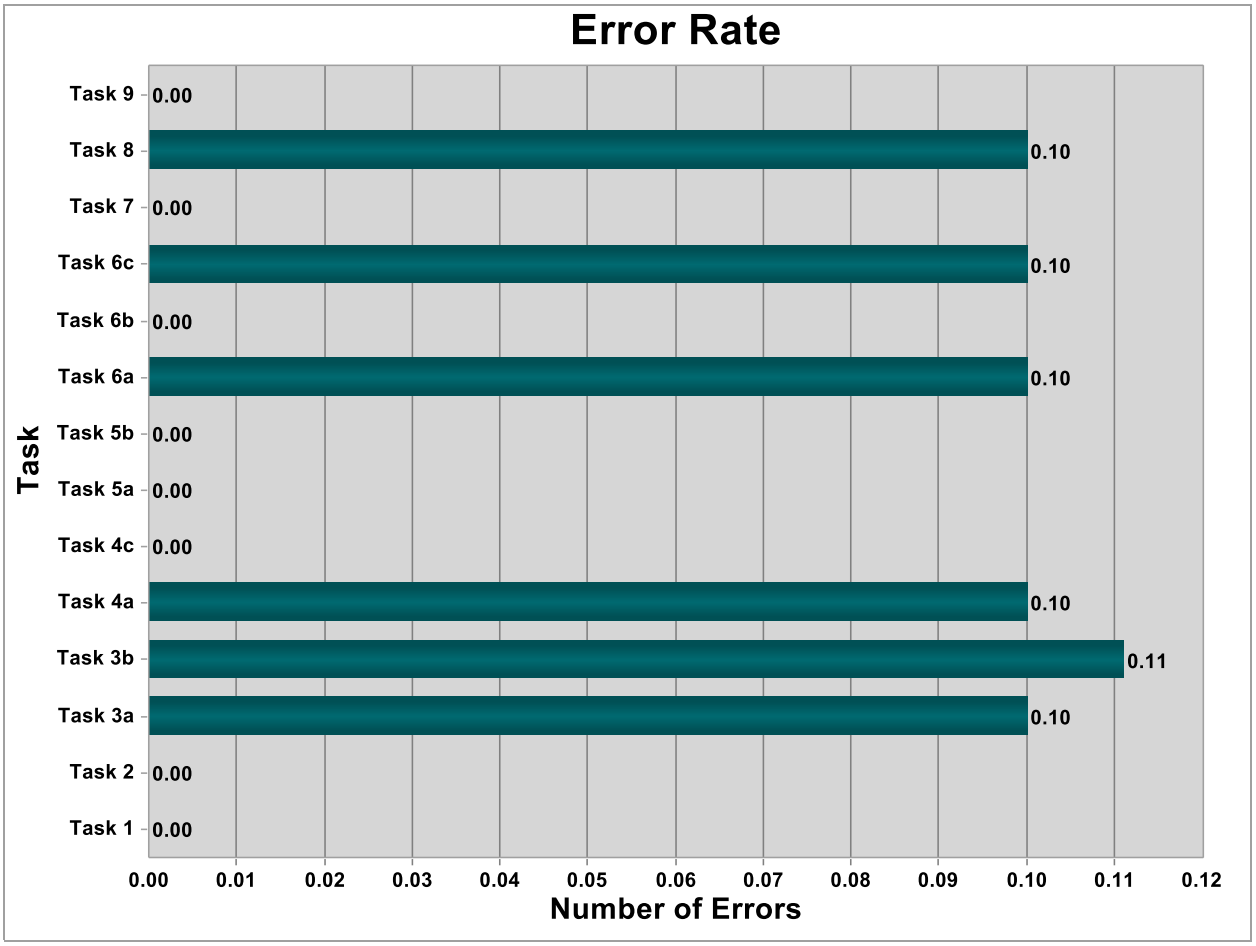


Error Rate, Total

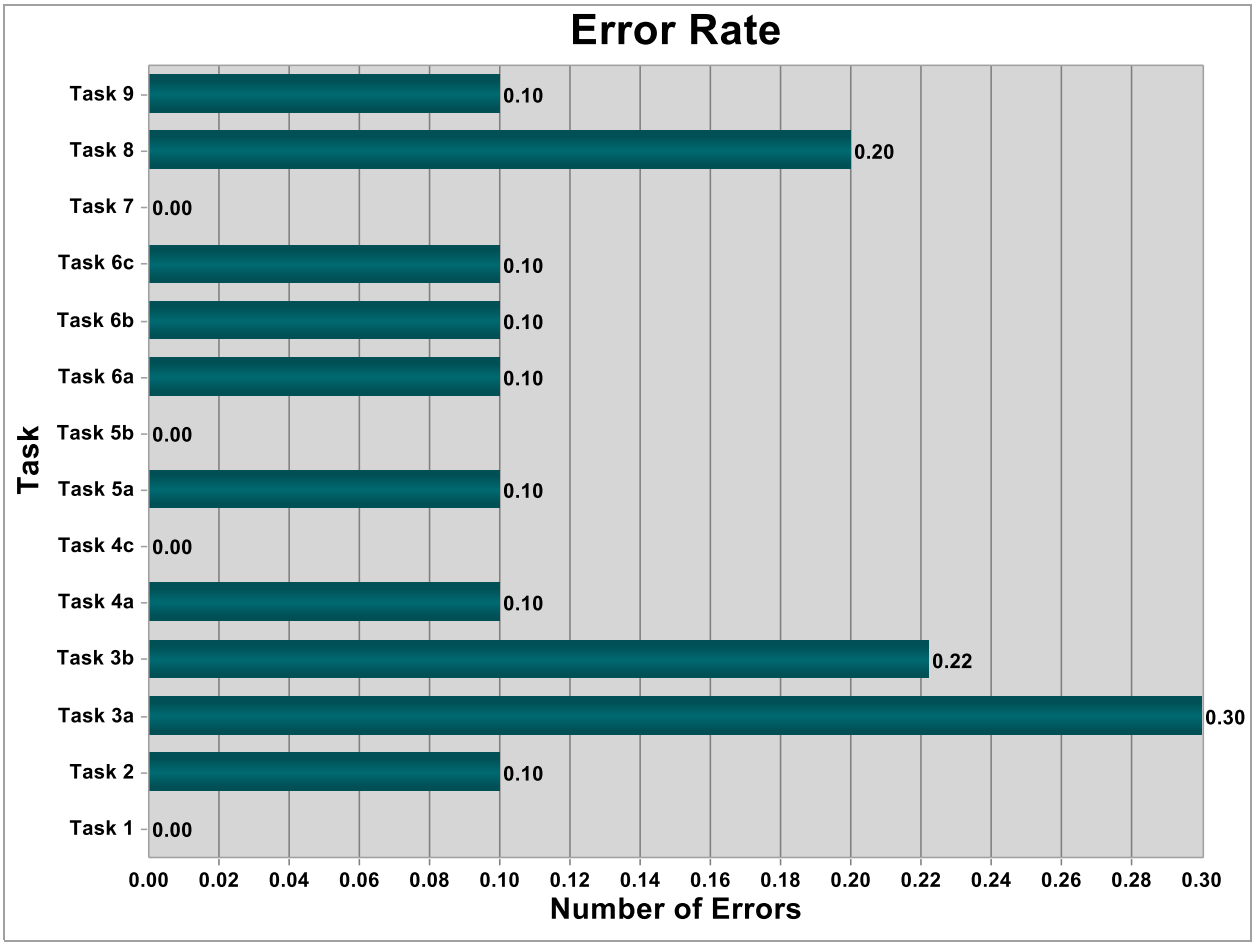


User Needs Help (Minor)

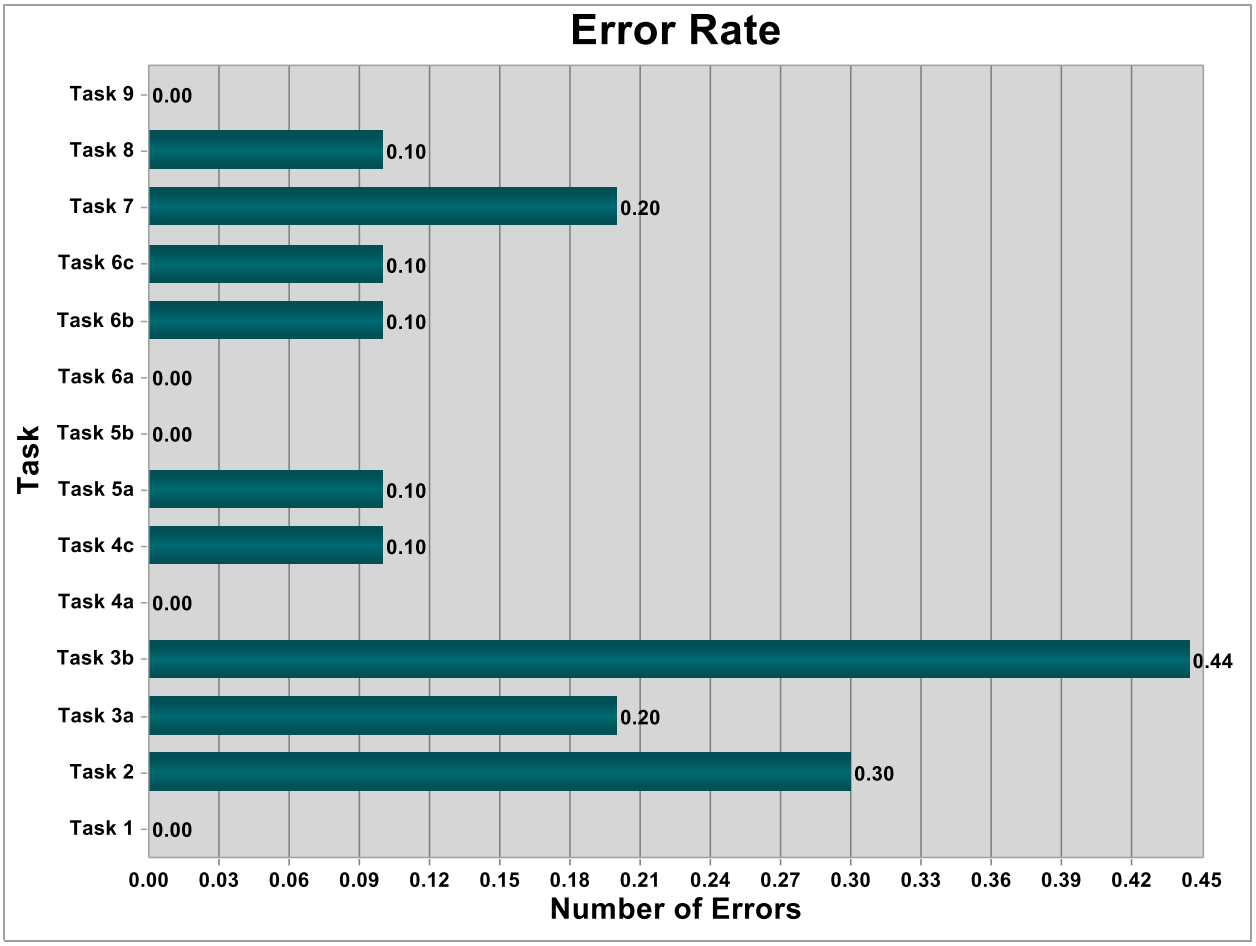
User Needs Help (Medium)



User Needs Help (Severe)

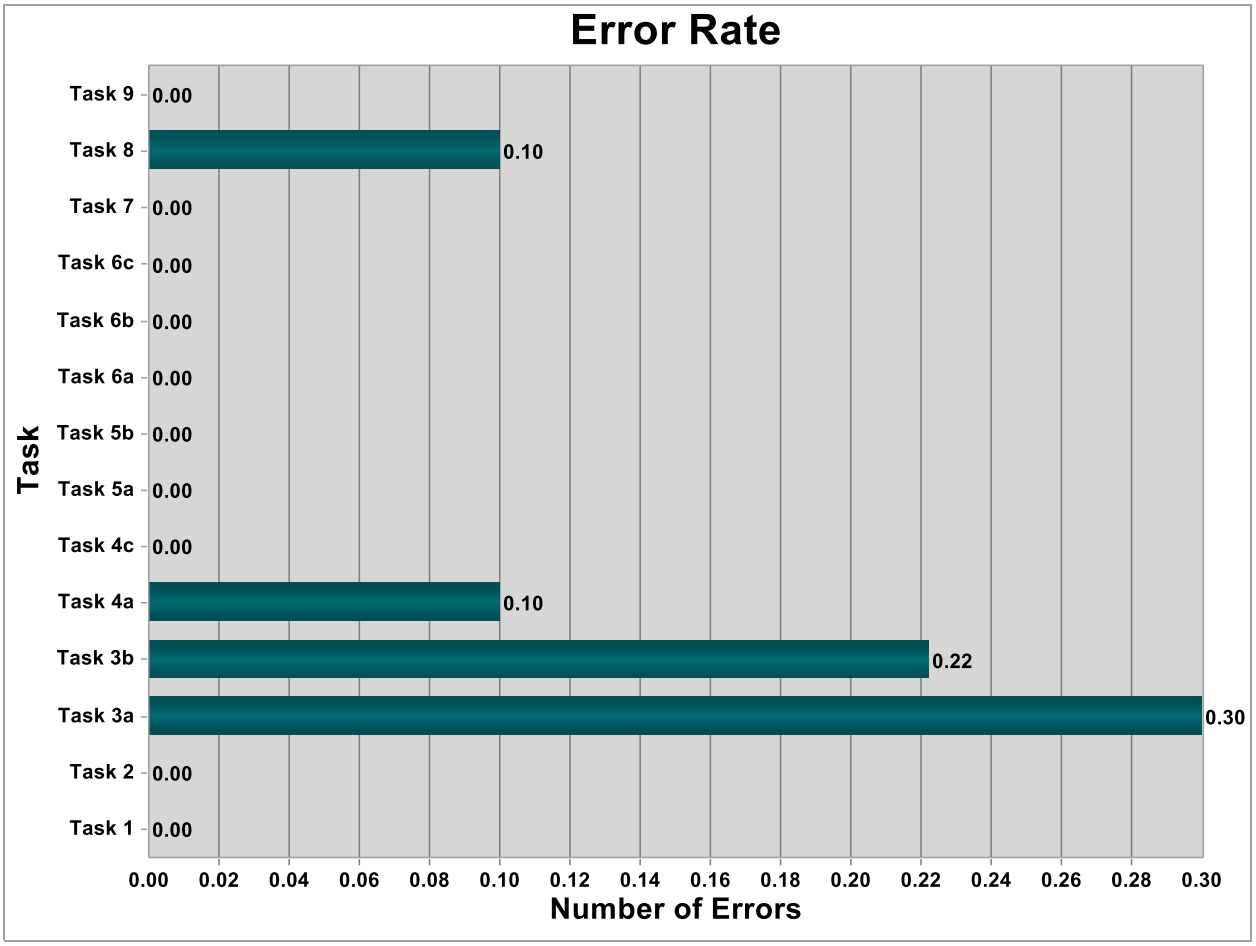


Participant Prompted (Minor)



Participant Prompted (Medium)

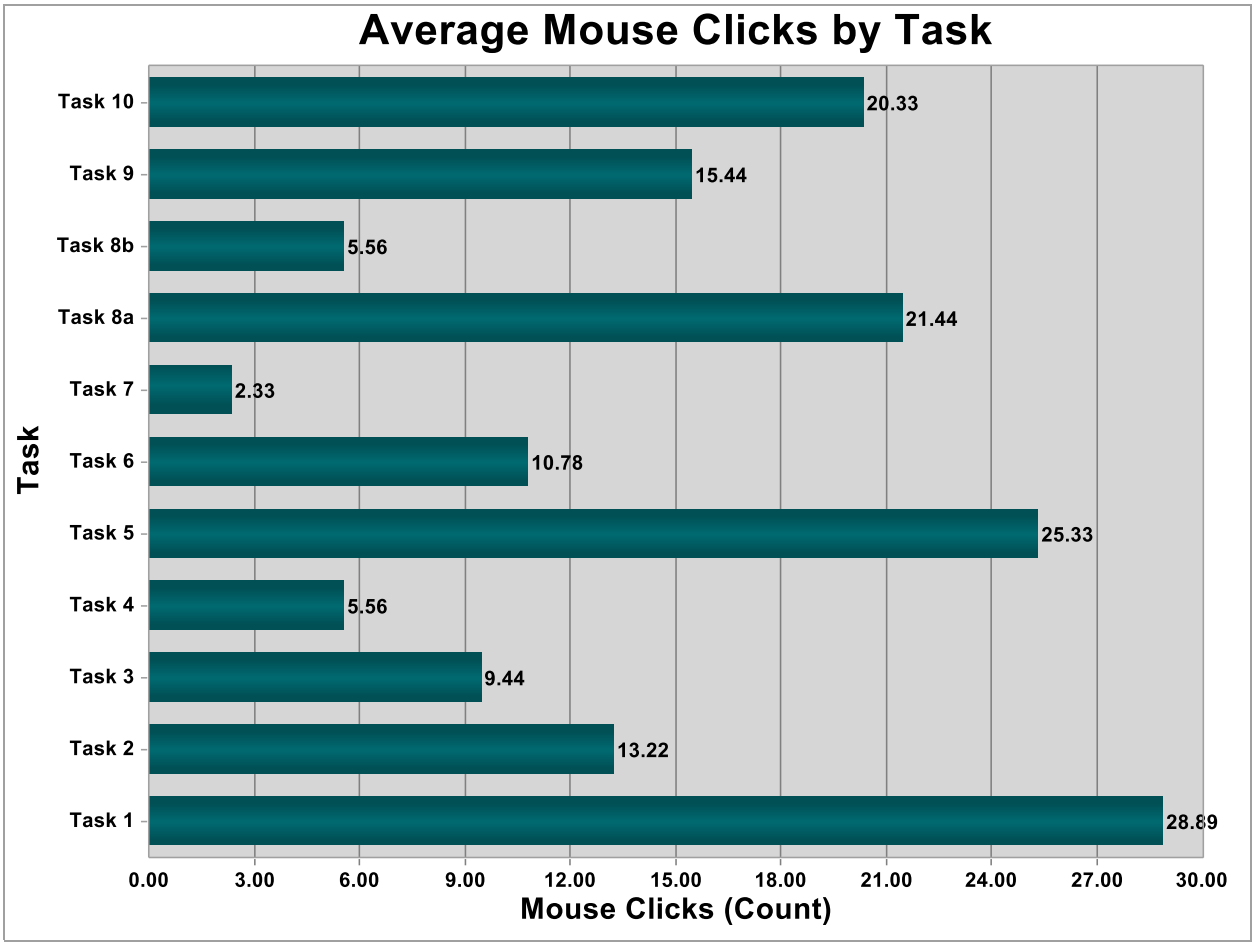
Participant Prompted (Severe)

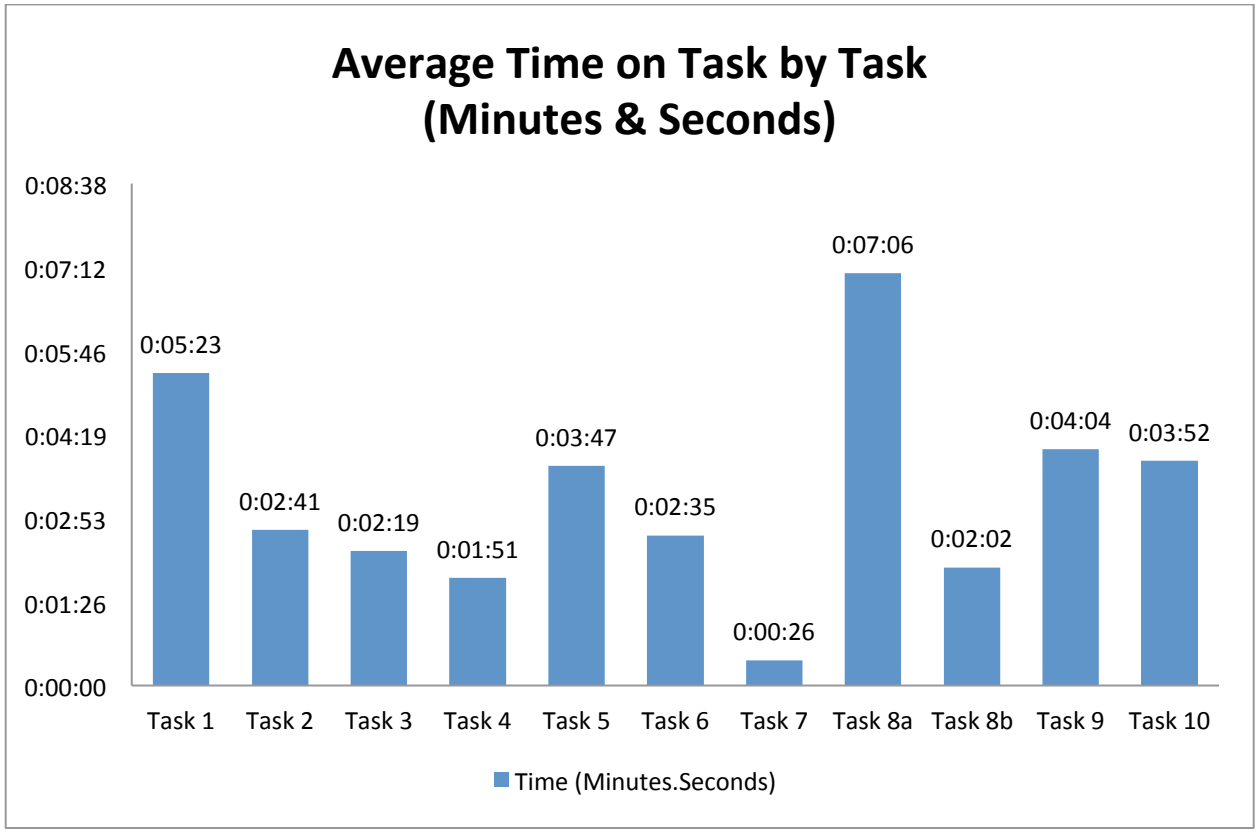


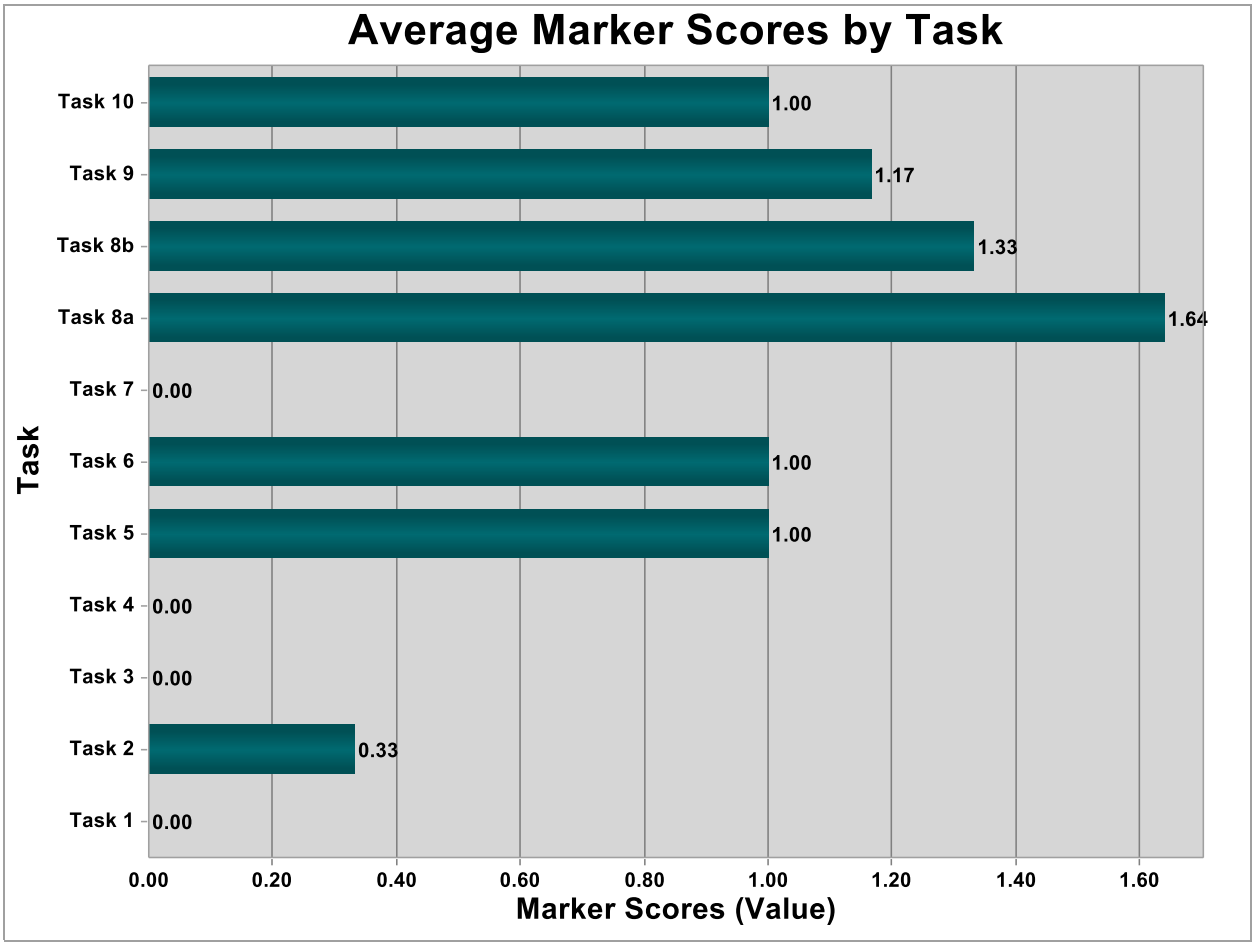
Error Rate (Severe)

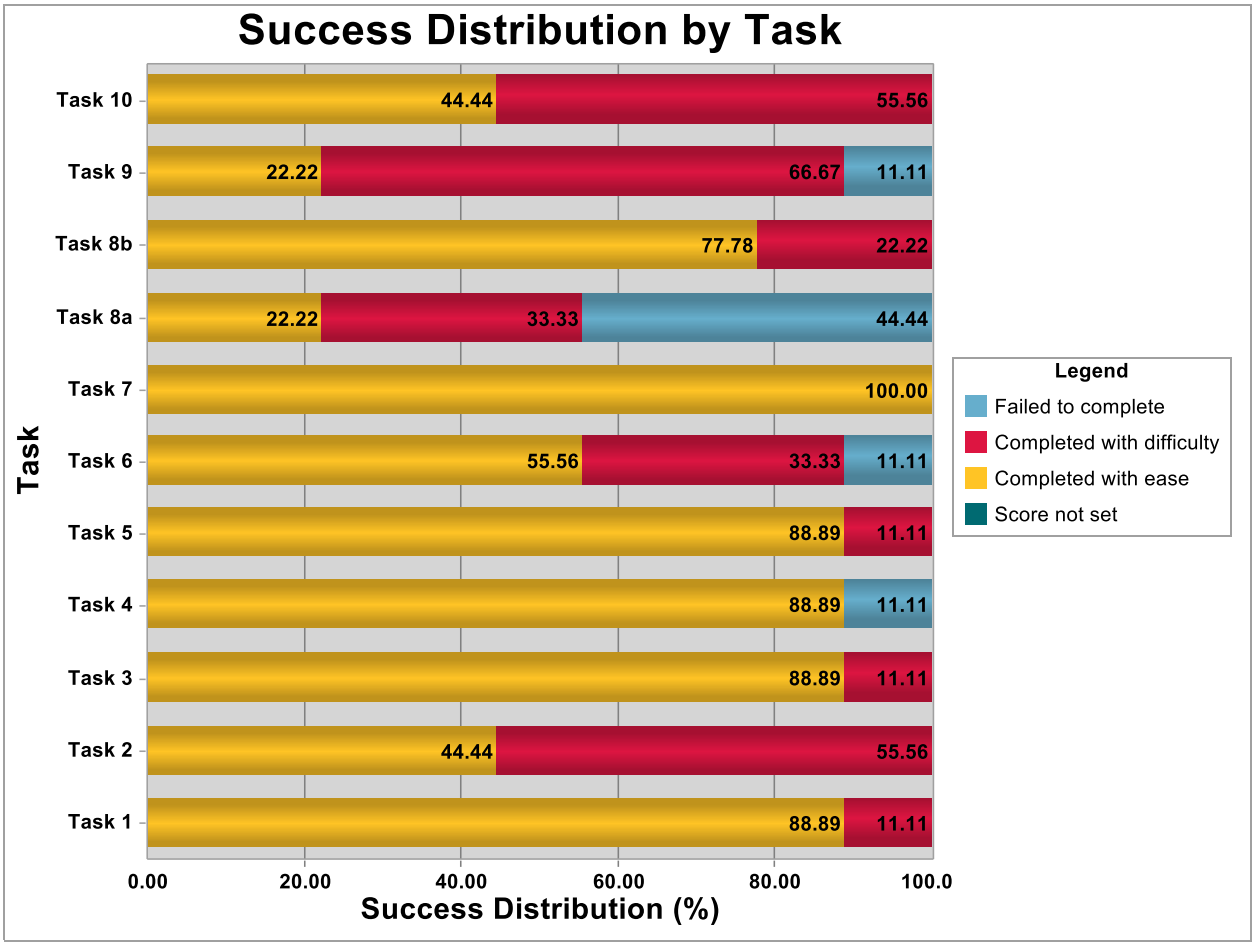
Scenario Two:

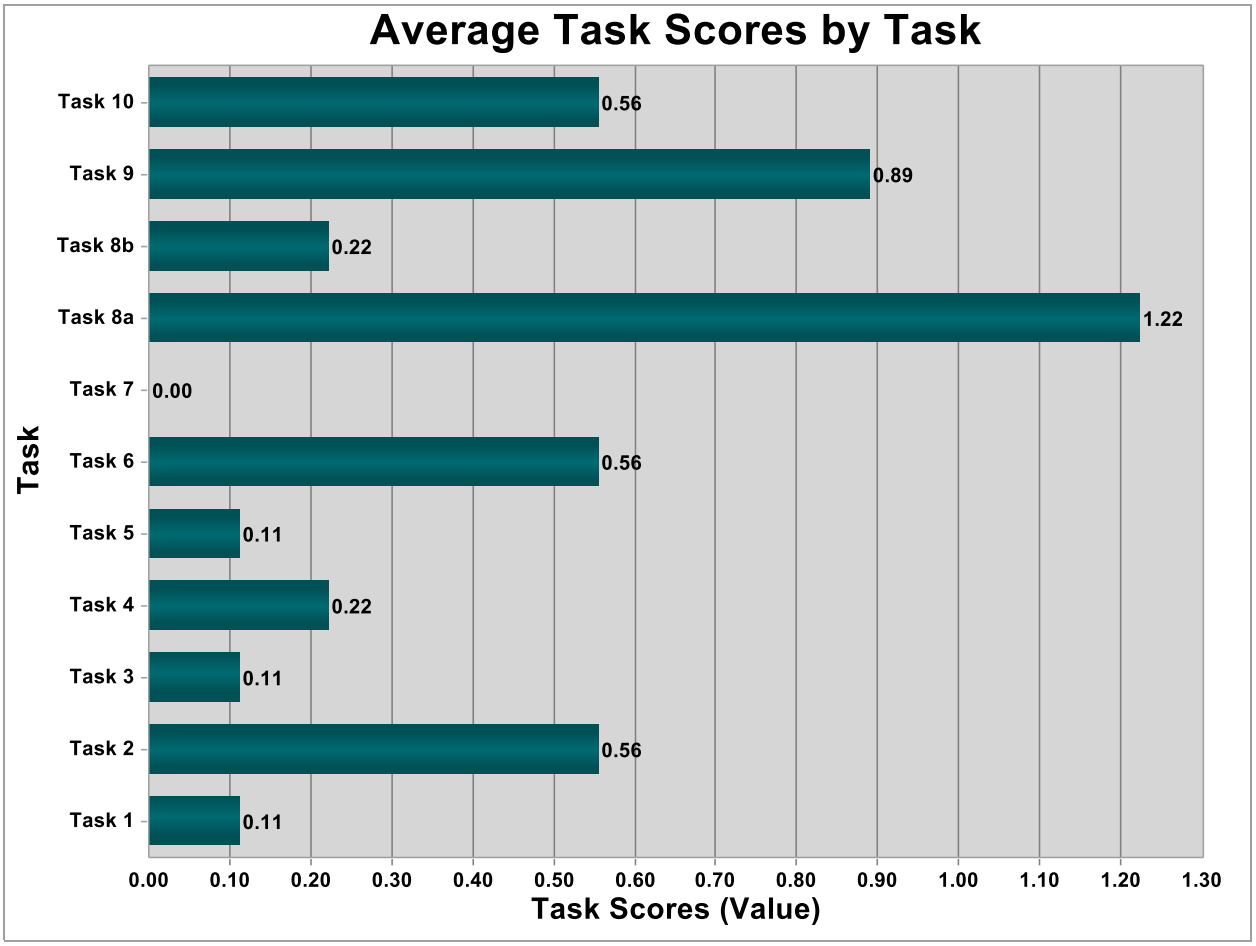
Data Creators

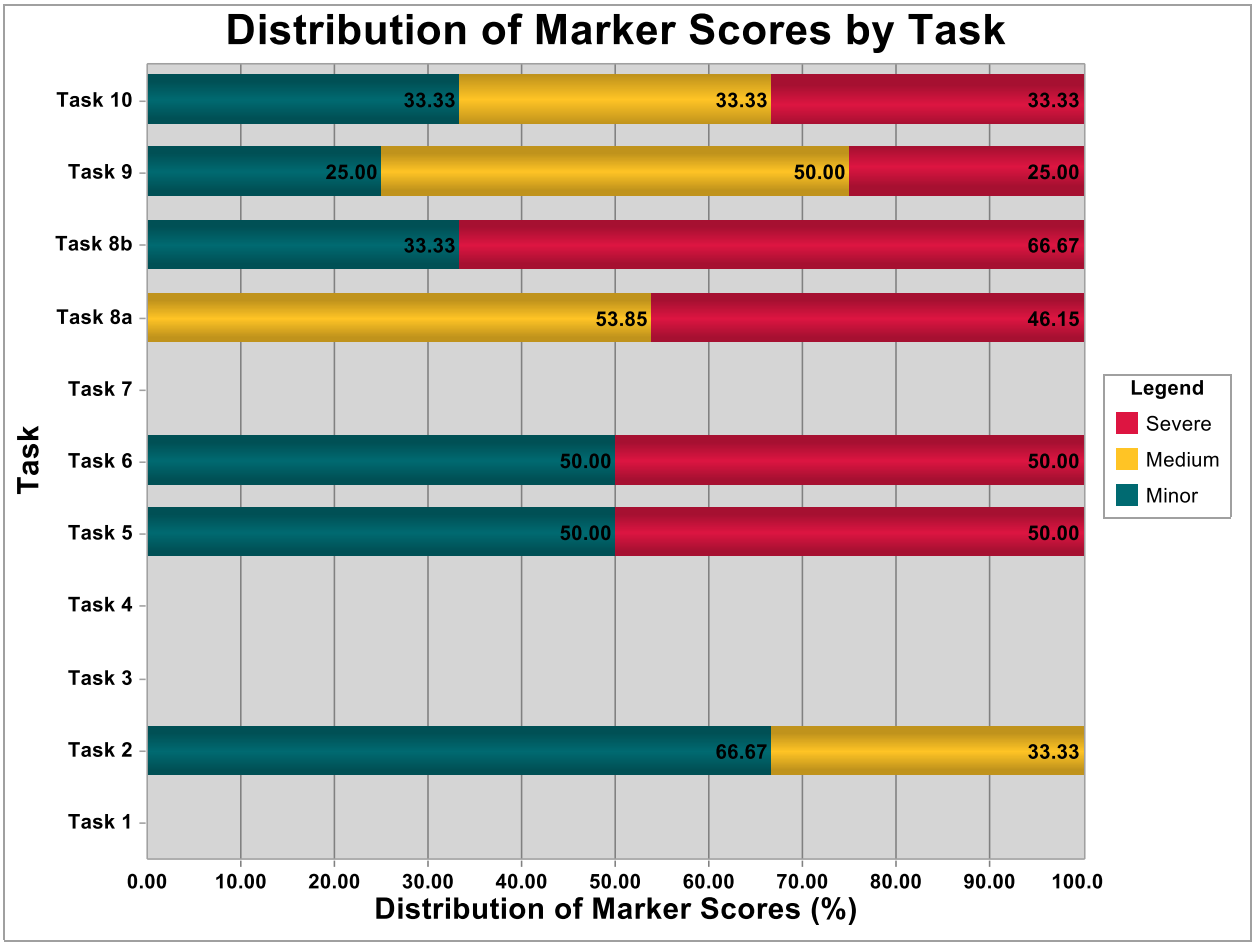

Average Mouse Clicks by Task
Task
Task 10
Task 9
Task 8b
Task 8a
Task 7
Task 6
Task 5
Task 4
Task 3
Task 2
Task 1
20.33
15.44
5.56
21.44
2.33
10.78
25.33
5.56
9.44
13.22
28.89
0.00
3.00
6.00
9.00
12.00
15.00
18.00
21.00
24.00
27.00
30.00
Mouse Clicks (Count)

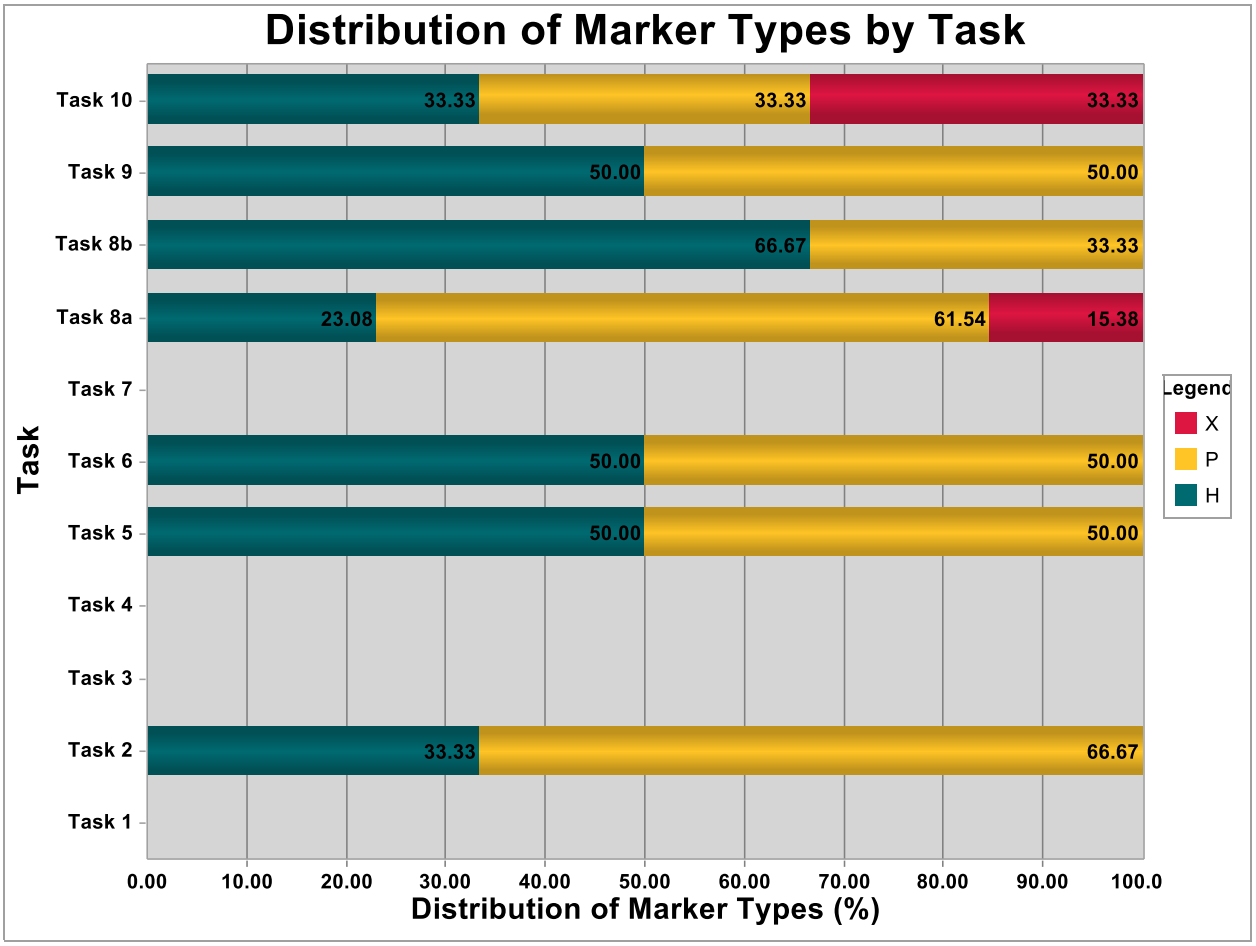

Average Time on Task by Task
(Minutes & Seconds)
0:08:38
0:07:12
0:05:46
0:04:19
0:02:53
0:01:26
0:00:00
0:05:23
0:02:41
0:02:19
0:01:51
0:03:47
0:02:35
0:00:26
0:07:06
0:02:02
0:04:04
0:03:52
Task 1
Task 2
Task 3
Task 4
Task 5
Task 6
Task 7
Task 8a
Task 8b
Task 9
Task 10
Time (Minutes.Seconds)

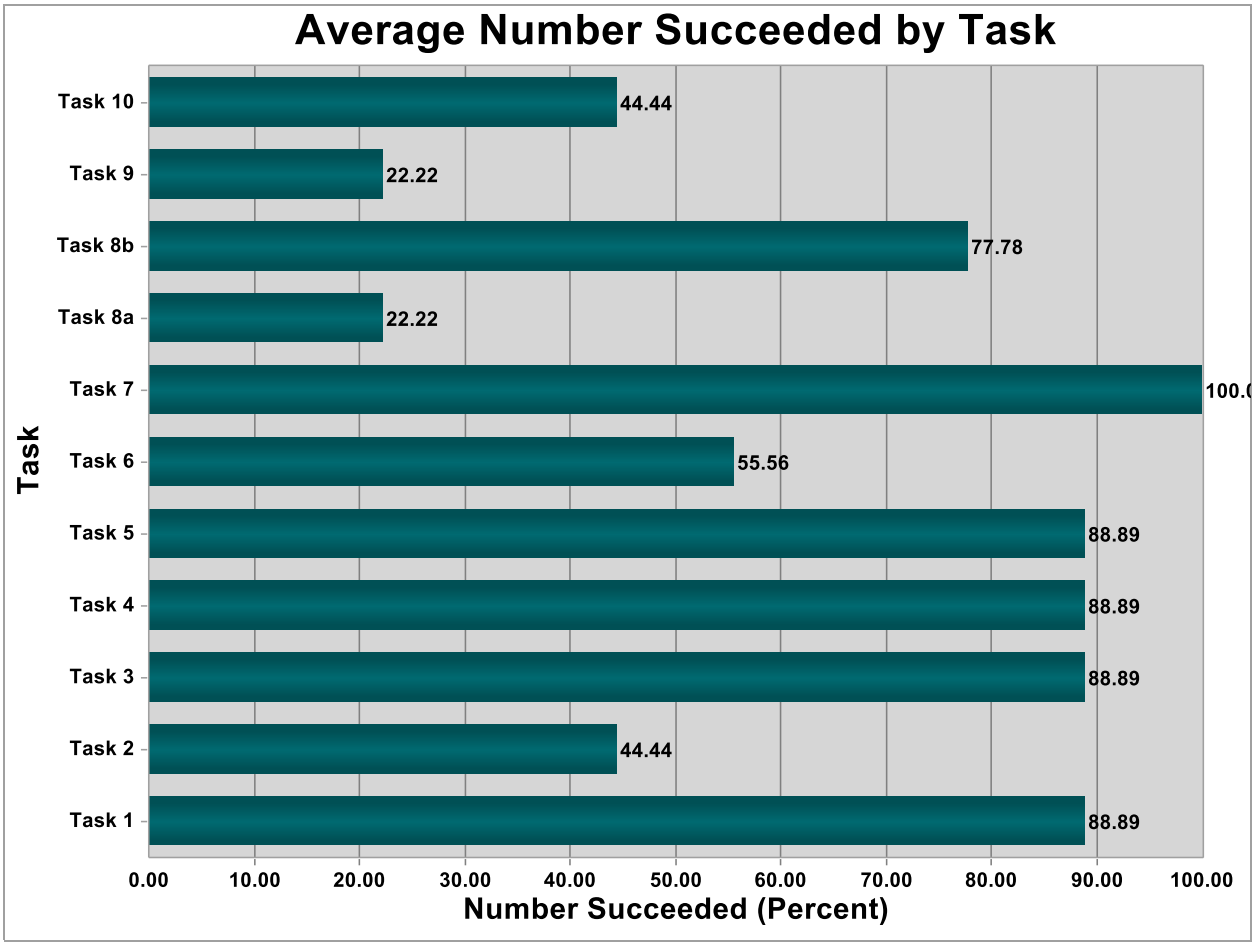

Average Marker Scores by Task
Task
Task 10
Task 9
Task 8b
Task 8a
Task 7
Task 6
Task 5
Task 4
Task 3
Task 2
Task 1
1.00
1.17
1.33
1.64
0.00
1.00
1.00
0.00
0.00
0.33
0.00
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
Marker Scores (Value)


Success Distribution by Task
Task 10
Task 9
Task 8b
Task 8a
Task 7
Task 6
Task 5
Task 4
Task 3
Task 2
Task 1
44.44
55.56
22.22
66.67
11.11
77.78
22.22
22.22
33.33
44.44
100.00
55.56
33.33
11.11
88.89
11.11
88.89
11.11
88.89
11.11
44.44
55.56
88.89
11.11
Task
0.00
20.00
40.00
60.00
80.00
100.0
Success Distribution (%)
Legend
Failed to complete
Completed with difficulty
Completed with ease
Score not set

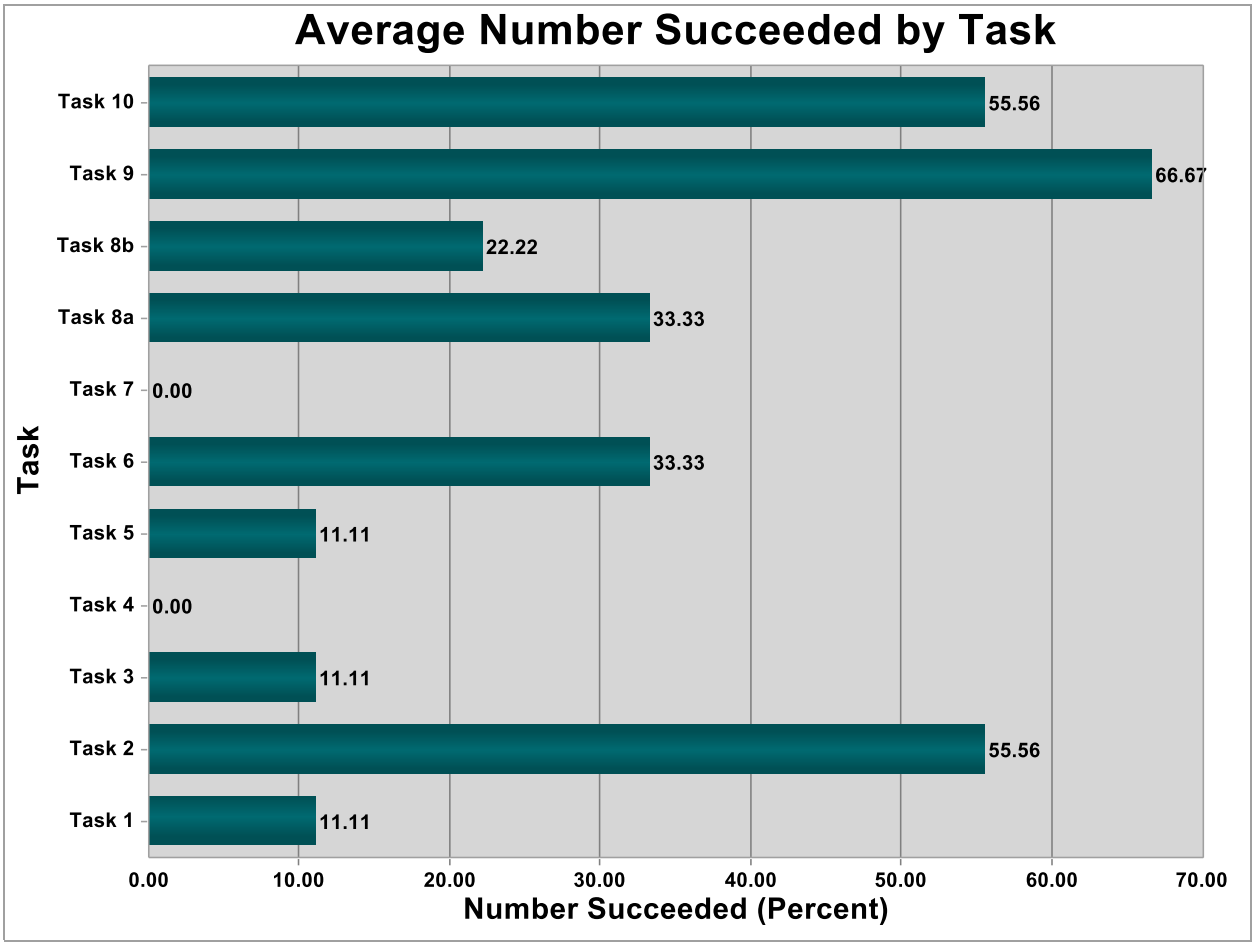

Average Task Scores by Task
Task
Task 10
Task 9
Task 8b
Task 8a
Task 7
Task 6
Task 5
Task 4
Task 3
Task 2
Task 1
0.56
0.89
0.22
1.22
0.00
0.56
0.11
0.22
0.11
0.56
0.11
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00
1.10
1.20
1.30
Task Scores (Value)


Distribution of Marker Scores by Task
Task 10
Task 9
Task 8b
Task 8a
Task 7
Task 6
Task 5
Task 4
Task 3
Task 2
Task 1
Task
33.33
33.33
33.33
25.00
50.00
25.00
33.33
66.67
53.85
46.15
50.00
50.00
50.00
50.00
66.67
33.33
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00
100.0
Distribution of Marker Scores (%)
Legend
Severe
Medium
Minor

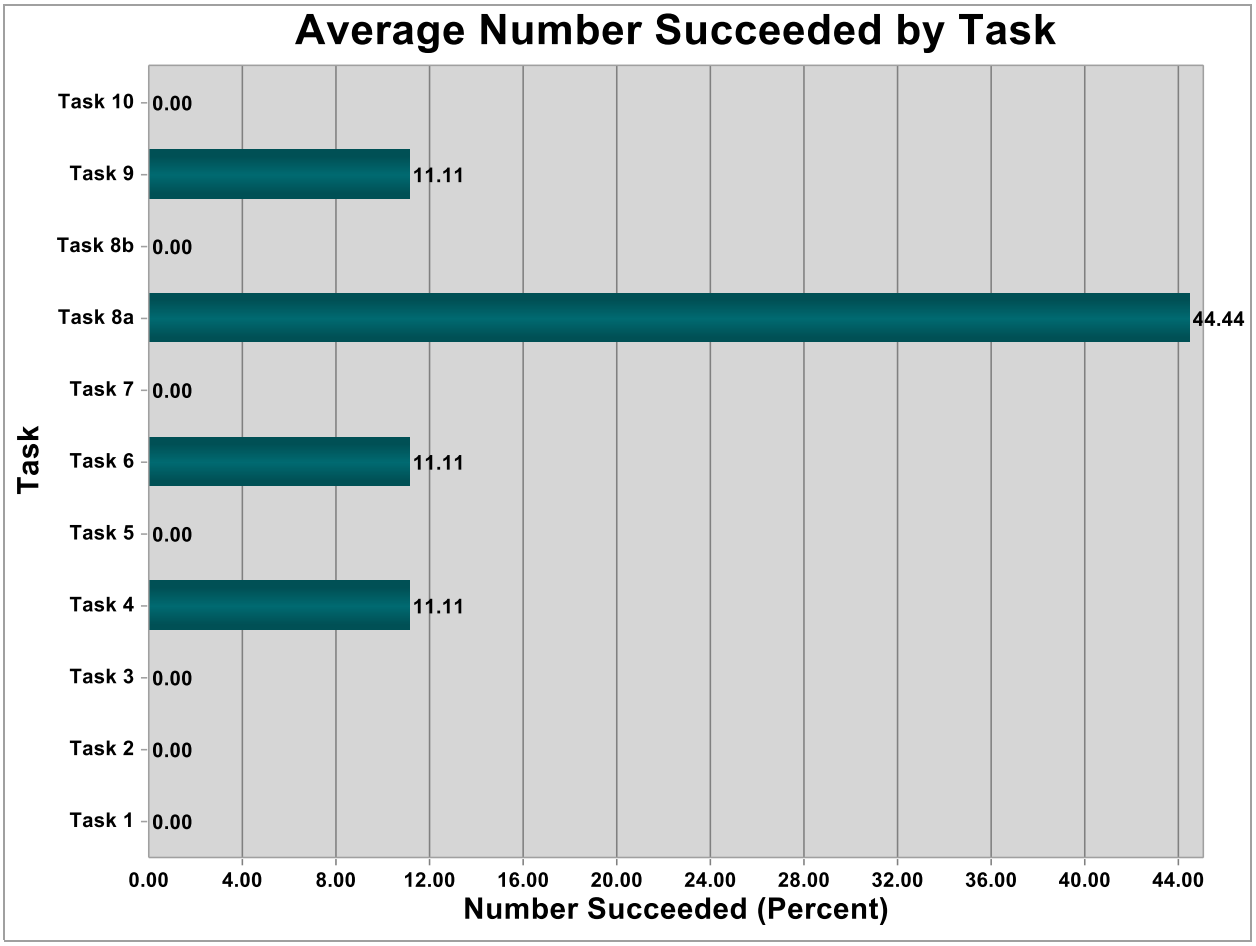

Distribution of Marker Types by Task
Task 10
Task 9
Task 8b
Task 8a
Task 7
Task 6
Task 5
Task 4
Task 3
Task 2
Task 1
Task
33.33
33.33
33.33
50.00
50.00
66.67
33.33
23.08
61.54
15.38
50.00
50.00
50.00
50.00
33.33
66.67
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00
100.0
Distribution of Marker Types (%)
Legend
X
P
H



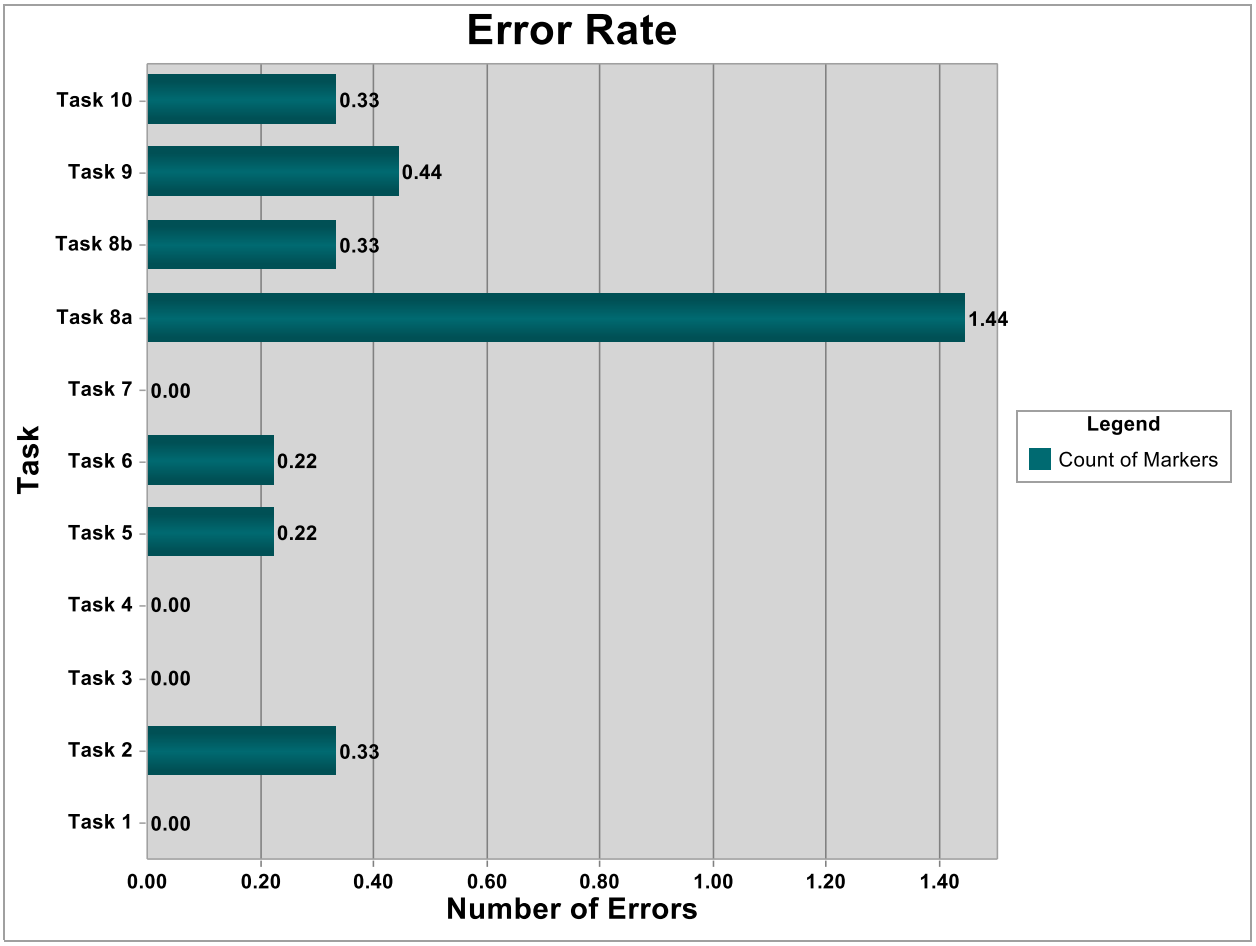
Completed with Ease



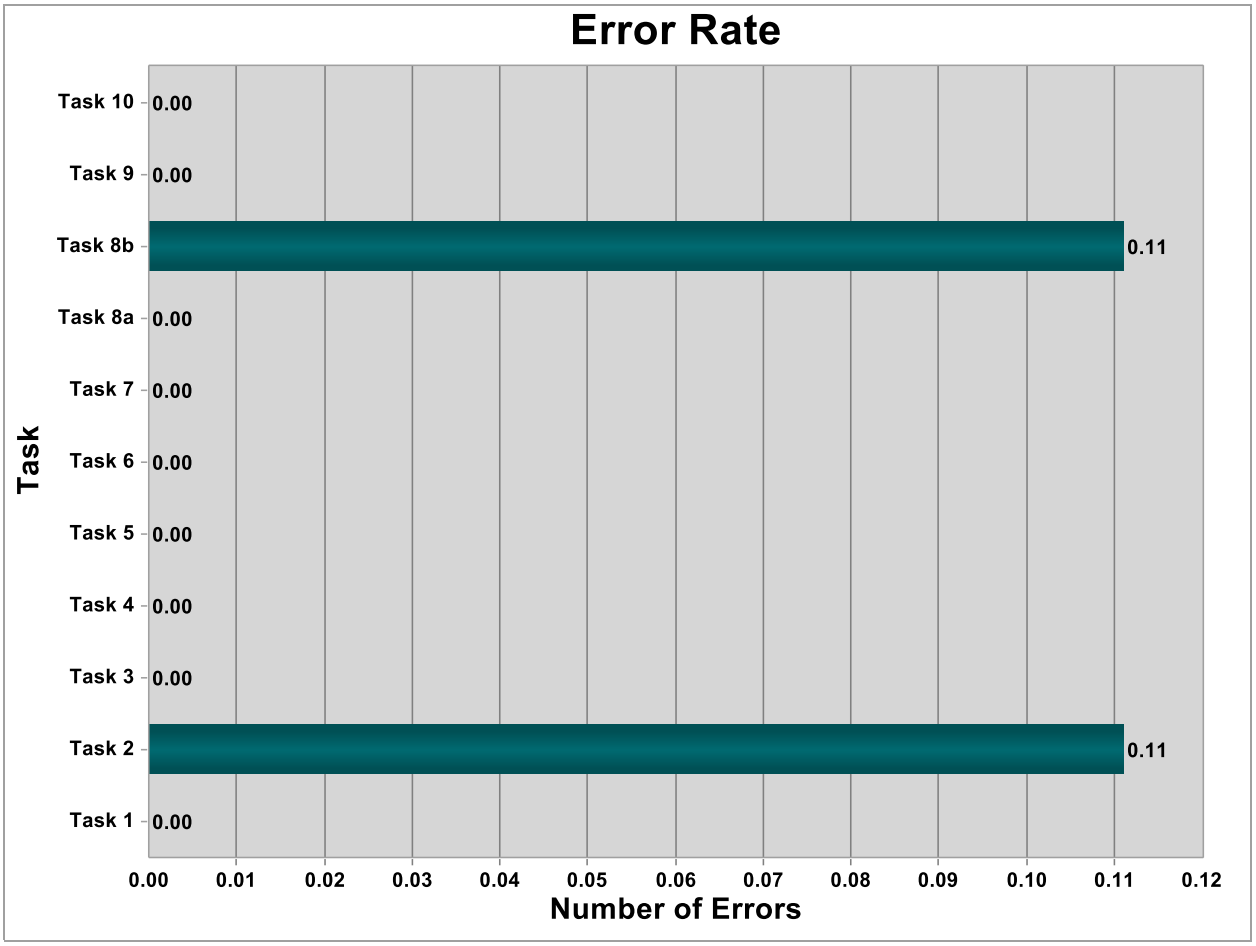
Completed with Difficulty



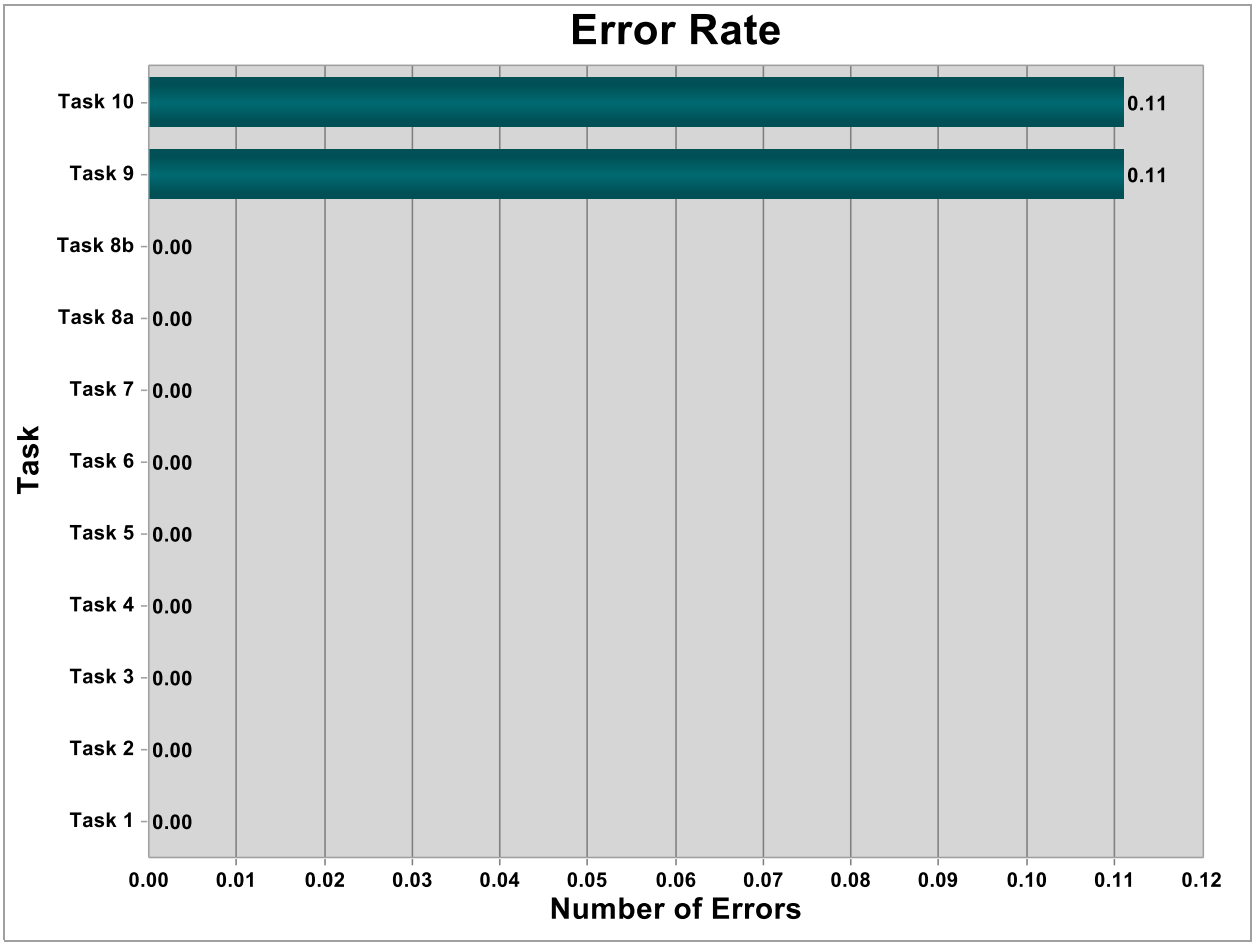
Failed to Complete



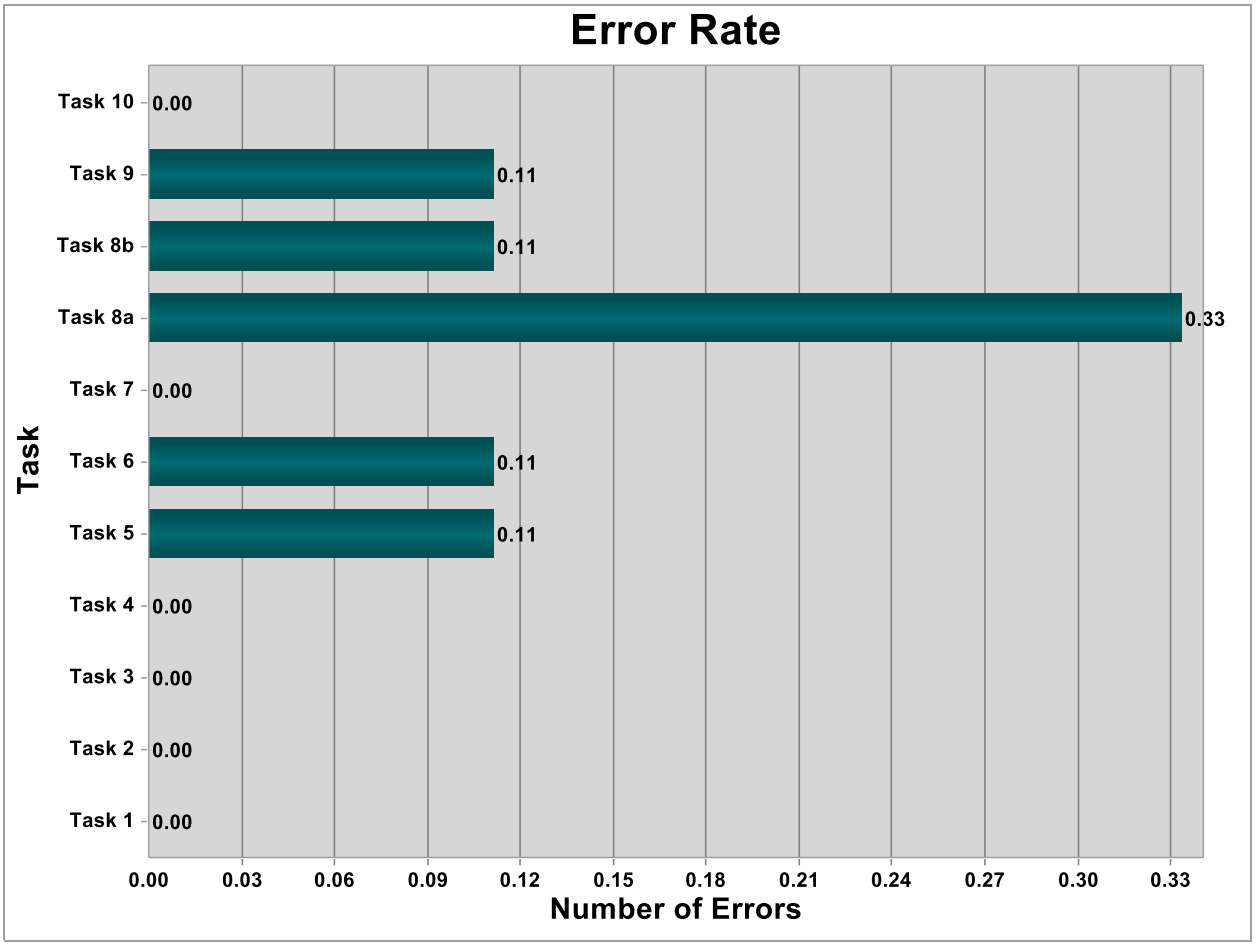
Error Rate, Total



User Needs Help (Minor)

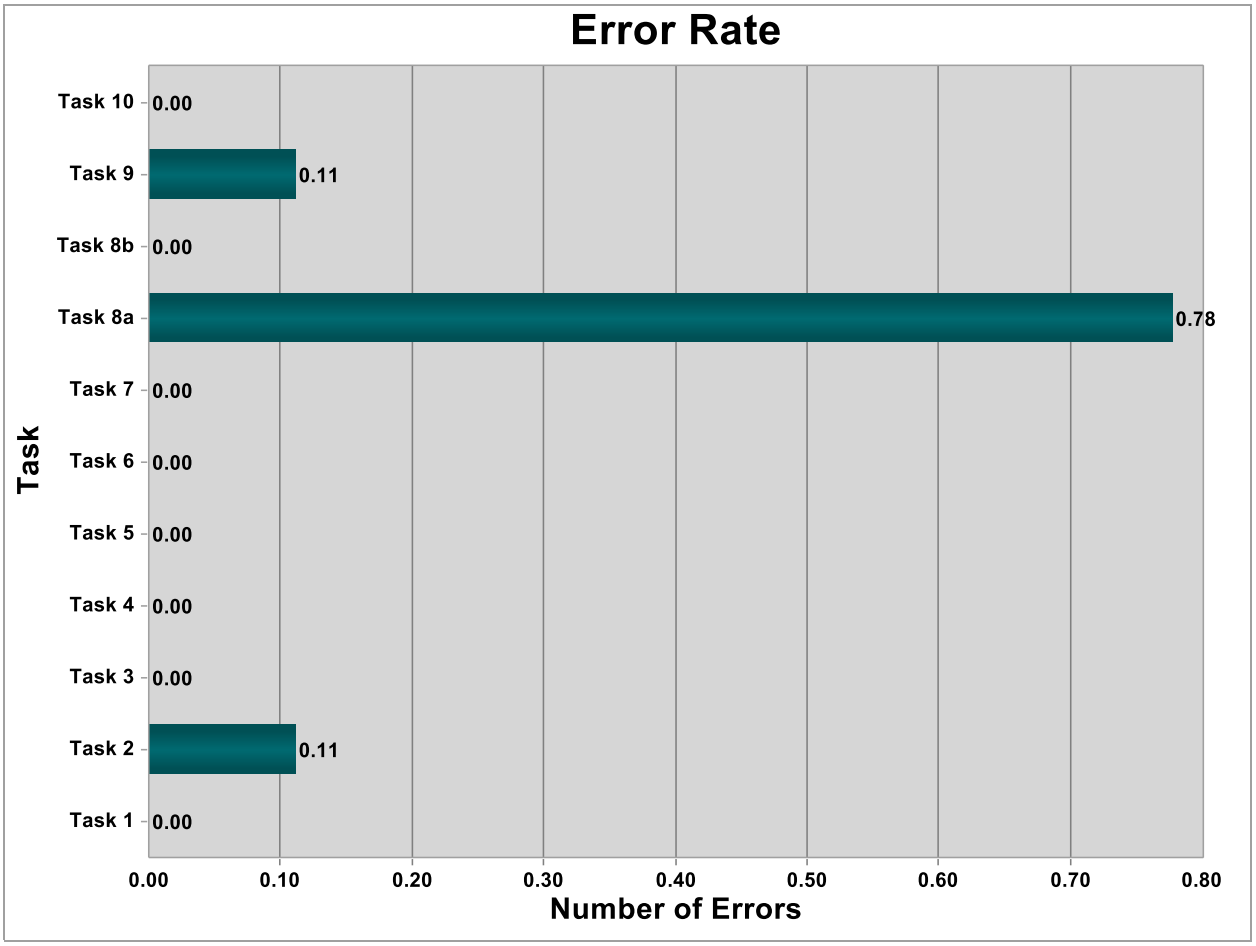


User Needs Help (Medium)

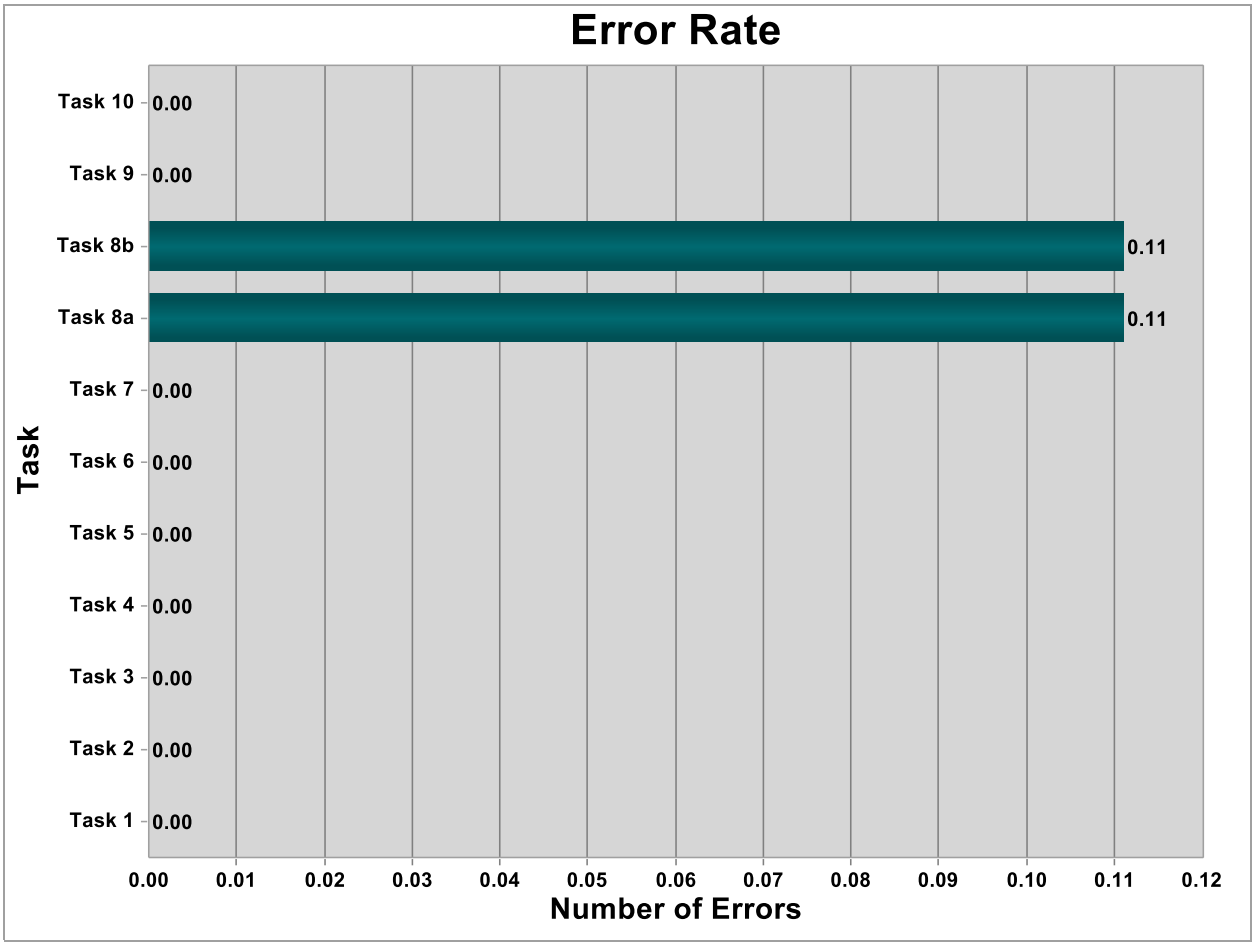


User Needs Help (Severe)

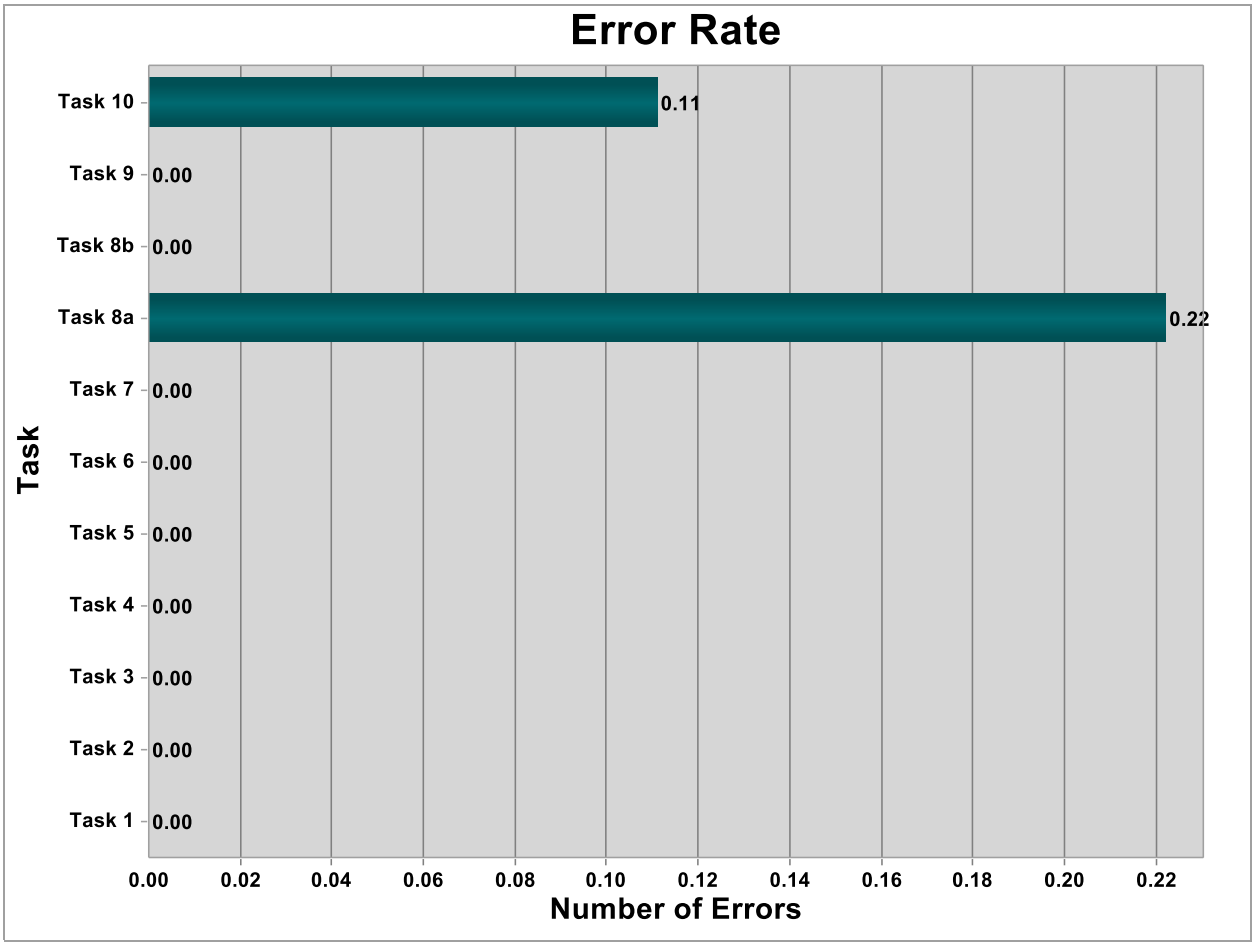
Participant Prompted (Minor)



Participant Prompted (Medium)



Participant Prompted (Severe)



Error (Severe)