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Keeping Users Stuck to Your Site

White paper

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About the author

■ **COLIN HYNES, M.S., M.S.H.F.I.D.**, has more than 10 years experience in designing user-centered online applications. He founded, built and currently runs the usability group at Staples which is responsible for information architecture, functional definition and usability testing of online products.

Last year alone, Colin's group tested online products with more than 500 users in their in-house lab. He also established the Staples online surveying and testing capability which consists of 8500 registered members and was used to run more than 40 online studies last year.

The main focus of Colin's group is on the Staples family of Web sites including the flagship site, Staples.com. The Staples Web sites accounted for about \$1 billion in sales last year. Colin's group also consults on the Staples catalog, corporate projects and store applications including the in-store kiosks.

Previously, he led the information architecture and user experience strategy of web sites for FedEx, AT&T, Fidelity Investments, SmithKline Beecham, Seagram Americas and many others. He has been a keynote speaker and presenter at conferences in the areas of Web usability with a focus on the business aspects of user experience.

Colin holds a Master of Science degree in human factors in information design from the McCallum School of Business at Bentley College, where he graduated beta gamma sigma. He also received a Master of Science degree in journalism from Boston University's College of Communication.

Introduction

(Note: For confidentiality reasons I am unable to give specific drop-off percentages or return on investment numbers in this paper. I can, however, give percentages of improvement or decline.)

As web site operators, we are constantly striving to better understand our customer behaviors so that we can optimize our sites to increase sales and deepen customer loyalty and retention. While the understanding of customer behavior is an admirable goal, it is also a complex conundrum often filled with mountains of inactionable or conflicting data. To compound matters, it can seem that the deeper we explore, the more confused we become.

We are extremely data driven at Staples and often face these challenges. Over time we have learned that some indicators in the data are more directional and thus more actionable. One of those criteria is called drop-off data. When used correctly, drop-off data is a valuable input in alerting us to potential site issues and focusing our projects on areas of greatest opportunity.

This discussion will begin with a definition of drop-off and move into an explanation of the value of drop-off data. Then we will delve into the correlation between drop-off and return on investment. Finally, we will highlight two examples of Staples.com initiatives that were focused on reducing drop-off by using a systematic process of customer research and redesign.

The Value of Drop-off Data

Simply put, a drop-off occurs when a user leaves your Web site. Often referred to as the last page viewed or the last page visited, a drop-off report outlines the pages or areas where those drop-offs occur.

Note: Throughout this paper “page/area” is coupled because there may be instances when a whole section of a site is redesigned (e.g., a registration process) or a single page (e.g., the home page). When measuring the effectiveness of the redesign effort you must combine or delineate according to the pages primarily affected.

Since all users will leave at some point in the shopping process, the overall drop-off rate will always equal 100 percent. With drop-off being 100 percent of all visits, the real value in analyzing drop-off data is in determining the degrees of drop-off “badness.” In some areas drop-off will be more acceptable for an ecommerce site, like on the submitted order page or any page after the user purchases. However, even if a typical conversion rate for an ecommerce site is 5 percent—meaning that 5 percent of overall site visitors buy during a visit—that means that 95 percent of all visits end in a user leaving without consummating a sale.

So, are all departures within that 95 percentile unacceptable? I contend that they are not. This is where understanding the goals of your users and their behavior must be considered to fully understand those degrees of badness. For example, if your drop-off rate on your Find a Store page is high, is that cause for alarm? Some web site operators may say that because cost per transaction is lower than in the store that those users should have been driven back into the web site to make a purchase. With that logic, the operator may contend that the Find a Store drop-off was indeed “bad.” However, what if the user was trying to find a store so that they could make a return and there was little or no possibility for a sale in that visit? Or what if the user came to the Find a Store page from a Leather Chair product page? As we hypothesize, the degrees of badness become less clear.

While the example above creates many murky scenarios, there are many other drop-off examples that are cause for alarm whenever they occur. Generally, the further the user is in their transaction the less acceptable is the drop-off. It can be hypothesized that the more invested the user is into the buy process--and thus the relationship with the company--the more likely they should be to complete that transaction. For example, it is clearly unacceptable if users are dropping off from the last page before they complete the transaction.

As we peel back the layers of the drop-off onion, we can be sure of one thing: If the user has given an indication that they want to buy (or transact with the site in some other form) and then leave without completing

that transaction, we should explore the reasons why. However, as shown through the examples above, drop-off data is “blind” to some extent. Drop-off data can report where users are leaving from and, to a lesser extent, their behavior. However, even with a sophisticated log file analysis tool, a drop-off report alone does not accurately indicate the “why” of user behavior. It is this “why” that is the key knowledge tool that enables us to address site issues in a deep and effectual way.

To fully dig into the actual causal factors we must conduct scientific research with our users through surveying, focus groups, field studies, usability testing, and other methods that get at the real reasons why users leave our sites.

The Effect of Drop-off on ROI

As businesses stress return on investment (ROI) in making decisions, it is important to have solid metrics that can be relied on to help produce a ROI calculation. Some areas that are considered in calculating ROI are the following:

- Reduction in contacts via a decrease in calls, emails or other contacts to the company
- Increase in average order size
- Increase in frequency of orders across customer base
- Reduction in material costs (e.g., print-outs at the kiosks)
- Employee efficiency improvement

Drop-off data can also be used as a valuable tool in quantifying the ROI effects of a redesign to a page or site area. Before we discuss drop-off and ROI, it is necessary to first define a few key terms:

Visitor: A user who downloads pages on the web site during a single or multiple sessions.

Page View: The registration entry in the log files (used to measure site traffic) that a page has been downloaded and thus assumed to have been viewed by a visitor. Every time a single page is downloaded, one page view is registered.

Note: Different log file analysis tool have different ways of handling the effects of caching on visitor page view count (caching is when a previously viewed page is held on the visitor’s computer and loaded from their hard drive, not the web site’s server)

Last Page View: The final page a visitor requests on the host site’s server before leaving the site. Mentioned earlier, this is the point that we refer to as drop-off.

Visit: A continuous interaction from a visitor on a specified web site. A single visit starts with the first page viewed and ends with the last page viewed and consists of every page view in between.

To calculate yearly ROI using drop-off, the following data points are necessary:

- Change in Monthly Average Page/Area Drop-off
- Conversion Rate
- Average Order Size
- Time Frame
- Project Costs

Arriving at accurate figures for the above can be challenging. To help demystify this ROI process, we provide detailed explanations of the data points and some tips on how to gather the information:

➤ **Change in Monthly Average Page/Area Drop-off (DO)**

This figure represents the change in number of visitors who drop-off from a page or area. It is important that this be adjusted to normalize for fluctuations in traffic over the compared durations. For example, if the drop-off on a page decreased significantly and the traffic also decreased, the page may not have necessarily improved. To calculate Change in Monthly Average Page/Area Drop-off, you need three numbers:

- **Pre-redesign drop-off percentage (PreDO)**

- This is the pre-redesign level of drop-off to your targeted page/area for a specific period of time. This is calculated by:

$$\text{PreDO} = \frac{\text{Pre-redesign Last Page Views}}{\text{Pre-redesign Page Views}}$$

- **Post-redesign drop-off percentage (PostDO)**

- This is the post-redesign level of drop-off to your targeted page/area for an equivalent period of time as PreDO. This is calculated by:

$$\text{PostDO} = \frac{\text{Post-redesign Last Page Views}}{\text{Post-redesign Page Views}}$$

- **Current Page Traffic (CPT)**

- This is the number of page views to the page/area for the same time period as PostDO.

After you have calculated the above numbers:

- $(\text{PreDO} - \text{PostDO}) \times \text{CPT} = \text{DO}$

➤ **Conversion Rate (CR)**

Conversion rate is the percentage of visitors who buy during a single visit. If out of every 100 visitors, five transact, the conversion rate is five percent. This can also be calculated over certain durations. For example, a site may calculate monthly conversion rate by tracking visitors over that month and count multiple visits within that month as one interaction. So, if a user visits the site several times that month and buys once, then the conversion rate for that one visitor is 100 percent. This can get a bit complex when you start to factor in multiple purchases over a certain duration and other variables. Adding further complexity is that with advanced reporting the conversion rate may be adjusted to reflect the specific rate from one page or area. As mentioned earlier, the further the user is in the purchase path the higher the conversion rate will be in most cases. Ideally, site operators should map paths or page views to conversion and adjust the conversion rate in the ROI calculation accordingly.

➤ **Average Order Size (AO)**

The mean dollar amount of orders over a specified time frame.

➤ **Time Frame (TF)**

Because this is an annual figure, use 12 months

➤ **Project Costs**

Costs from the project can come in many different forms. These should all be factored into the equation to get an accurate determination of the overall ROI. Material costs, labor costs, marketing costs, and opportunity costs should all be used in calculating Project Costs.

Once the data points are gathered, the calculations are done in a simple two-step process:

Step 1: Calculate Annual Sales Increase:

$DO \times CR \times AO \times TF = \text{Annual Sales Increase}$

Step 2: Subtract Sales Increase from Project Costs:

$\text{Annual Sales Increase} - \text{Project Costs} = \text{First-Year ROI Impact}$

Case Study 1: Search

As seen from the previous section, drop-off serves as an essential piece of one ROI puzzle. As user experience practitioners, however, the real value of drop-off is in monitoring the rates of user departure on certain pages, searching for aberrations and opportunities and then conducting

further research in order to optimize the experience. This measure/monitor/test/optimize is the approach we took with the redesign efforts made to the Staples.com search results page in March of 2001.

After a large-scale redesign effort months earlier, we began to see an increase in the amount of drop-off the valid search results was receiving.

Note: We characterize the valid search results page as one that returns products, not a “No Results” page. We monitor the No Results page as well and examine which keywords produced no results.

We also noticed that pages linked from the valid search results page were receiving a higher than expected drop-off.

At the same time we saw this gain in drop-off, we were completing a competitive usability analysis related to the overall site experience—including search. The results from the competitive usability analysis shed much light on the reasons why we were experiencing drop-off through Search Results and the associated pages.

We found through testing that users were expecting to see products in the first screen on the page (we test on a target resolution of 800 x 600 screen pixels). Unfortunately, the content on the top of the page pushed down the product image results below the first screen fold (see screen shot below).

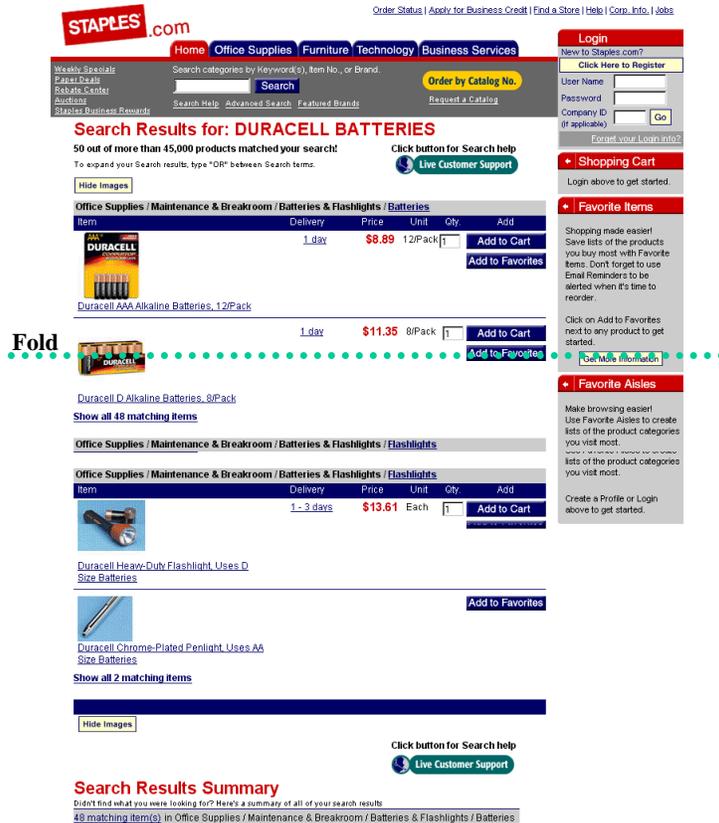


Instead of seeing products, users saw category links. When they saw category links that resonated with them based on their search query, the users immediately clicked those links without scrolling down. Unfortunately, the category links did not carry the search terms through to the next page but instead gave a full list of items in that category. As such, after clicking the category links, they were met with a long list of products that may or may not match up with their search terms. The users either deduced that we did not carry the product or tried the search again and were frustrated in either case.

Based on this feedback, we took a two-stepped approach to redesigning the screens. First, we commissioned Human Factors International to conduct a best practices analysis of search functionality on ecommerce and non-ecommerce sites. We then used that study with the testing feedback to form hypotheses about a redesign of the Search Results screens. We measured those hypotheses through informal heuristic review by both HFI and Staples usability staff.

We then collectively arrived at a screen design that we sent through another round of usability testing (screen shot below).

Current Search Results Page



The new screens incorporated several important changes. First, we tightened up the top area of the page so that products came above the fold in our target resolution. The former grey box that contained the category links was also moved to the bottom of the page. We hoped that at the bottom of the page, the grey summary box could serve as a “catch all” if the user did not find what they were looking for. This is emphasized in the copy on top of the summary box, “Didn’t find what you were looking for? Here’s a summary of all of your search results.” We also reformatted the grey box to remove the category links and tie together the amount of products found with the category areas. Finally, we added the Live Chat icon on all search results pages so that users could contact our customer service representatives to help find products while staying on the site.

During usability testing with the new screens we found that users made it through the searching task more quickly with a decrease in errors and increase in overall satisfaction. After only minor tweaks, the screens that went through testing were the same that are live on the site today.

In addition to the qualitative improvements, the overall drop-off from the Search Results page and the category pages after a search decreased by 10 percent. We did not have a specific drop-off decrease in mind but were pleased in the improvement made from the redesign process. Although we can not release specific ROI figures, the benefits of the Search Results redesign project far outweighed the cost.

Case Study 2: Registration

In the second case study we will explore the improvements made in the Staples.com registration process. The Staples.com registration process is the area of the site where users fill in billing and shipping information and create a user name and password so that they can access their saved information on future visits. Without filling in this information, the user can not complete a purchase process or access some “members only” tools.

The registration process can be accessed in two ways. In the first way, the user proactively locates the link in the upper right-hand corner of the web site and proceeds to the registration process. By registering, users are able to use members-only features like favorite lists and access their information on subsequent visits without having to fill in the information again.

The second and most prevalent use of the registration process is in the order flow. In this situation, the user comes to the site, puts products in their cart and clicks checkout. Upon clicking checkout, the user is prompted to register on the site. Then, they proceed to review their order and eventually to the submitted order screen.

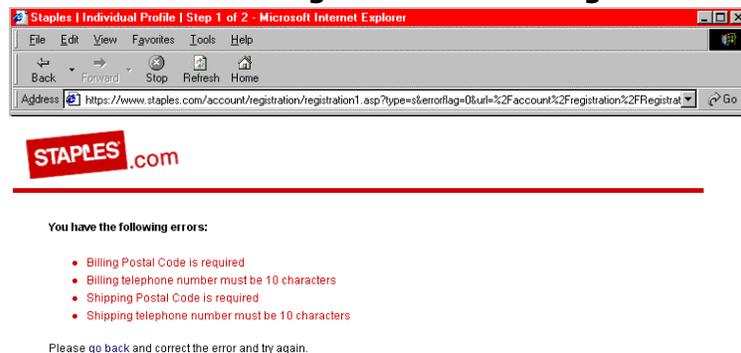
Similar to the search redesign, we were also seeing a drop-off rate throughout our registration process that was high and growing. During the competitive usability analysis we began to uncover many of the reasons that users were having issues with the registration process and were, presumably, leaving the site during this process. The main issues we found in testing were the following:

➤ **Users found the first page of registration to be extremely ominous in its data requirements, length and complexity.**

There were several factors for this reaction from users. First, there was a significant amount of extraneous copy at top that added white space and made the form appear very long. Second, the number of fields relative to what users had experienced on other ecommerce registration seemed excessive. For example, in the additional shipping information we had one required question and three optional shipping fields. Finally, there was a large optional information area that made the form appear even longer. Many users also questioned the need for these questions.

➤ **Error handling was not efficient.** When an error occurred throughout the registration process, the user would receive the list of errors on a separate page. (see screen shot below)

Previous Registration: Error Page



The user would then have to read the errors, understand what they did to provoke the error, determine how to fix the errors, and then remember the errors so that they could fix them on the subsequent page. Keeping the errors in working memory long enough to go back to the previous page and then fully correct them was highly problematic for users. As we know from research pioneered by George Miller, people can hold between 5 and 9 chunks of information at

one time in their working memory for about 15-30 seconds. (Miller, 1956) Miller's findings have been known as the "magic number seven, plus or minus two." This concept is particularly relevant for the error handling in the Staples.com registration because of the many fields needed to be completed and the likelihood that errors may be encountered (even with good error prevention design on the entry page). The retention of errors that we required in registration resulted in a taxing of the user's working memory that in turn increased their anxiety and the possibility that more errors would be created. Compounding this memory issue was the fact that the users would need to retain errors in working memory while they corrected the errors on the previous page. In some cases, the users would need to gather information before correcting the error (e.g., look up a shipping address ZIP code). The cognitive task required the users to then hold all the errors throughout the error correction process. Clearly this was setting up the user for failure, frustration and possible site departure. There were also other technical issues in the error process. For example, if the user clicked the "Back" browser button instead of using the "Go Back" link, they lost the information they entered into the form.

- **Login process was too demanding.** On the final page of registration the user was required to come up with a unique username to identify themselves to the system. This user name would be required so that the user would be able to log in upon subsequent visits to the site. With more than 1 million registered users, it was very difficult to find a unique user name that was easy to remember. Often users would enter user names that they used on other systems and that were no longer available on Staples.com. This would cause them to get into a vicious cycle of trial and error that often resulted in a very non-intuitive user name. Even if the user did not become frustrated enough with this cycle to leave the site, they would often have problems remembering the user name next time they came to the web site. Additionally, we asked for a reminder question so that the user would be able to get their password through our web site if they forgot it on a subsequent visit. This in itself was not an issue for the users. The problem for users was that they had to think up a reminder question and answer and then type in those responses. This again increased cognitive load in the thinking task and physical load in the need for extra typing.

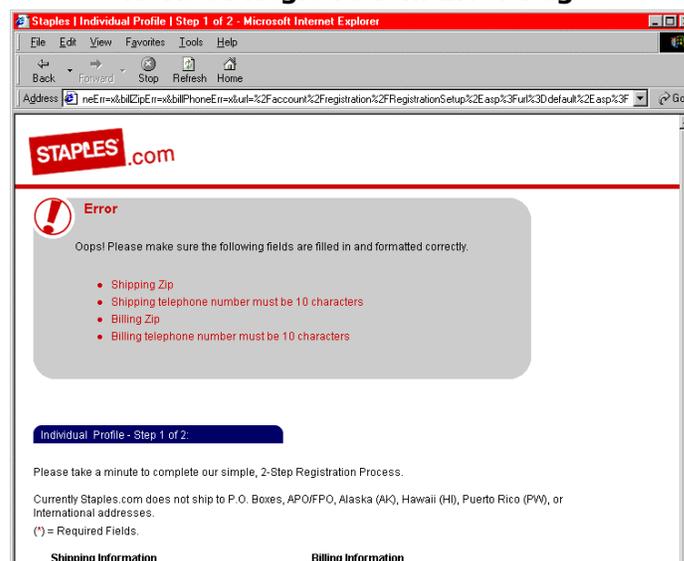
To address these many issues, we enlisted HFI to work with our in-house group to perform a heuristic review of the process and make recommendations for improvement. Additionally, we conducted a best practices analysis of the registration process of major ecommerce web sites for two primary reasons. First, we hoped to leverage best design

practices for error handling, information design, page flow, and other interaction design issues we were facing. Secondly, we had suspected that we asked more questions than most ecommerce registration processes and were interested in comparing the number and type of questions we asked with other sites.

Through the heuristic evaluation and best practices analysis, we found that there were many cosmetic and medium-sized functional changes we could make to the registration process to improve it. We also found that we indeed did ask, on average, more questions than most other sites. The changes we made to the design were many. The highlights were:

- **Tightened up the first registration page and removed several fields.** We trimmed the introduction copy to only relevant information. We also made the copy less “salesy” and more instructional. Additionally, the spacing between the fields was tightened up significantly to give a more compact look. We also ensured that all required fields were marked prominently. To lessen the information requirements, we consolidated 1 required and 3 optional delivery information fields into 1 optional information field. Finally, we relocated optional user information to the second page. From the heuristic review we determined that the type of questions asked in the Optional Customer Information area (e.g., number of employees at your location) was more closely related to the second page. To better group this information we moved it to the second page.
- **Integrated error messaging into the page where errors occurred.** Whenever a user made an error during the registration process we replayed the original page back with a list of errors back on the top of the page for reference (see screen shot below).

Revised Registration: Error Page



Additionally, to create further field-specific context we highlighted the field with an error in red bold. Finally, we softened the language from the previous “You have the following errors” to “Oops! Please correct the following errors.” This wording change was done to direct the error blame away from the user and put it on the system. We thought this to be especially important in an error situation when anxiety level is increased because users often feel that they have taken an incorrect action. We know from our research that the users of Staples.com are often not advanced computer or internet users, and are apprehensive when interacting with a computer. Our goal is to ease that anxiety and provide a smooth experience.

➤ **Reduced the physical and cognitive effort on the second page.**

Similar to the first page of registration, we tightened the field spacing and trimmed overall text on the second page related to login. However, the biggest change to the second page was the pre-population of two fields that proved confusing and frustrating to users in the competitive usability test. First, we carried the email address the users entered on the first page into the User Name field on the second page. Because an e-mail address is unique to that user, we hoped to mitigate the vicious cycle mentioned earlier related to trial and error with user name creation. The field was editable so that the user could change it if they chose on that initial sign up or in future visits (e.g., if they changed their email address and no longer wanted to use an old email address for their user name). Second, we pre-populated the Reminder Question field with “Mother’s maiden name.” This was done to decrease the cognitive load of the user in creating a question and the physical typing task of entering the information. Furthermore, by using mother’s maiden name as the default, we hoped to leverage an well-accepted security measure used in many offline transactions like credit cards applications. This field was also editable.

We then conducted usability testing of the new registration process. Overall, the testing went very smoothly. From the user feedback, we made further changes to copy for readability and clarity. Additionally, users often asked in testing why we needed certain information and what would be done with that information. To respond to this need we added explanation copy next to fields that provoked user questions. Under the email address field we added a link that said, “Why do we need your email address?” When user clicked the link they were shown a pop-up window that explained the reasons why we needed their email address and how we would use it. From the pop-up window there was a link to our privacy policy.

The error pages worked very well for the users in testing also. They appreciated the softening of the message to be less blame-oriented and

more constructive in tone. The vast majority of user worked through the errors easily and referred back to the top of the page for more context when needed.

The users also saw the pre-population of the fields as a very useful aid. Some users chose to change the information but all understood why we had pre-populated the information and appreciated the time and effort it would save them.

After the changes were made from testing results the page was launched live in March 2001. In the months following the launch of the redesigned screens, the drop-off in the entire registration area decreased by 73 percent. Although we can not release ROI impact of this change, due to the nature of registration and it's criticality to the checkout process, even a slight improvement in drop-off has large ramifications to conversation rate. A 73 percent improvement has a dramatic affect on bottom line for the business.

Conclusion

As can be seen through the case studies, drop-off data is a valuable measure in gauging potential missed opportunities. Drop-off can help in identifying areas for improvement and then as a key metric in calculating ROI of initiatives.

It is important, however, to understand that drop-off is not a simple number that communicates a singular and clear message. Instead, there are nuances and complexities to working with drop-off data like remembering that impact is relative based on where in the user is in the shopping experience.

In our never-ending quest to better understand and improve the user experience, drop-off is just one piece of the puzzle. The best approach integrates site activity data like drop-off with a systematic and scientific analysis to site evaluation.

References

Miller, George. The Psychological Review, 1956, vol. 63, pp. 81-97.