Soliciting Reader Contributions to Software Tutorials

by

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Abstract

Online software tutorials help a wide range of users acquire skills with complex software, but are not always easy to follow. For example, a tutorial might target users with a high skill level, or it might contain errors and omissions. Prior work has shown that user contributions, such as user comments, can add value to a tutorial. Building on this prior work, we investigate an approach to soliciting structured tutorial enhancements from tutorial readers. We illustrate this approach through a prototype called Antorial, and evaluate its impact on reader contributions through a multi-session evaluation with 13 participants. Our findings suggest that structuring tutorial contributions has positive impacts on both the number and type of reader contributions. Our findings also point to design considerations for systems that aim to support community-based tutorial refinement, and suggest promising directions for future research.

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Chapter 1

Introduction

When learning a new complex application, or seeking to improve their skills, users frequently consult online software tutorials [12]. While there is no shortage of such resources available, applying the workflows as described is not always straightforward. First, a given tutorial is typically written from a single perspective in terms of software knowledge and version, which is not always adequate for the tutorial's potentially wide and diverse user base. For example, users of varying levels of software expertise sometimes desire more explanation than the tutorial author has provided and can have difficulty adapting the instructions to their particular versions of the software [22]. In addition, like many forms of user-generated content, online tutorials also vary in quality [27], and can contain errors and omissions [22].

One way that the tutorial community has attempted to address these challenges is through comment sections, where, in addition to expressing their appreciation to the author, tutorial readers post a range of tips, suggestions and corrections to the tutorial [22]. Prior work has shown that categorizing and placing these user comments next to a tutorial improves their perceived utility [3]. We can see that people are willing to help improve documents and that these contributions have the potential of being beneficial, but we know little about how soliciting these contributions in the context of software tutorials can impact the quantity and type of submissions.

In this thesis, we describe how we approach the problem of developing and evaluating an interface which allows readers to contribute content to software tutorials. The goal is to gain insight into how interface design can impact the manner in which community members contribute to online software tutorials.

1.1. Research Questions

While exploring potential interfaces, and creating and evaluating our system for supporting community contributions, Antorial, we had the following research questions:

1) How can community contributions be integrated into software tutorials in such a way as to respect tutorial authors' reasons for posting initial tutorials? Other readers have information that everyone can benefit from [22], and we can possibly emphasize the role of these contributions through their presentation. However, authors have personal reasons for making their tutorials available [30], and so, we explore designs that leave the originally authored content intact.

2) How does the manner in which the interface solicits contributions impact the frequency and content of submissions? Prior work has shown that promoting, tagging, and placing user comments next to a tutorial improves their perceived utility [3], but we do not know how their presentation affects comment elicitation.

1.2. Methodology and Approach

We approached our research questions by i) exploring different interfaces using low-fidelity prototypes to help determine what features would be needed, ii) implementing a software prototype, Antorial, and iii) evaluating Antorial through a multi-session evaluation. What follows is a summary of each of these thesis components.

1.2.1. Prototyping and System Development

Building on prior work, we focus on soliciting tutorial enhancements from the tutorial user community. There are many potential interface designs we could use, and to help prevent us from arriving at a local maximum [16] while exploring solutions, we used sketching as a tool to consider as many possible solutions as we could [4,17]. While implementing our chosen prototype, we also came back to paper prototyping when refining certain interactions, and to gather informal feedback.

Using our sketches, we decided on a direction, and implemented the chosen interface as a web application that we call Antorial (Chapter 3.2). With Antorial, tutorial readers are able to submit categorized notes to the tutorial, and associate them to a step. We iteratively improved the system using informal feedback and through a pilot study (Chapter 3.3).

1.2.2. Multi-Session Evaluation

To evaluate Antorial and to see how community contributions are impacted by their placement and organization (our second research question), we conducted a multi-session evaluation among 13 expert Photoshop users. The participants were asked to improve four different Photoshop tutorials on their own time, using Antorial for half the tutorials, and a baseline commenting system for the other half (Chapter 4).

Our results indicate that participants contributed more with Antorial than with the baseline system. Our results also indicate that Antorial's scaffolding might have positive impacts on the type of notes contributed by our study participants. Finally, our discussion of these results highlights the importance of considering the sense of community associated with a tutorial and the perceived social costs of contributing.

1.3. Contributions

In summary, our work contributes the following:

1) We present and illustrate a model for community tutorial enhancement via structured user contributions specific to tutorial content.
2) We present results from a multi-session evaluation demonstrating the impact of our model on tutorial contributions.
3) We derive important design considerations for systems supporting community-driven tutorial enhancement.

The remainder of this thesis is organized in four chapters: Chapter 2 summarizes prior work related to this thesis, Chapter 3 describes our design goals, the system that we implemented and evaluated (Antorial), and an initial pilot study, Chapter 4 describes the multi-session evaluation as well as results and a discussion arising from the study, and Chapter 5 concludes the thesis.

Chapter 2

Related Work

Our related work covers four areas: previous approaches to improving software tutorials, including support for tutorial authoring; prior work on soliciting and structuring community software knowledge; work on collaborative document refinement; and work relating to annotation systems for other educational material.

2.1. Improving Software Tutorials and Authoring

Given the ubiquitous role of tutorials in supporting skill acquisition and development with complex software, there is a rich history of research on improving their utility. Common avenues explored include the design of novel, engaging tutorial formats (e.g., [10,14,18,25,26]), and ways to improve the degree of integration between a tutorial and the target application (e.g., [19,29,31]). Others have acknowledged the workload associated with authoring an effective tutorial, proposing a range of semi-automated or demonstration-based approaches (e.g., [7,15,18]) to help ease this burden.

Most directly relevant to our work are approaches to tutorial authoring and enhancement that promote or facilitate post-hoc contributions from either paid crowd workers or a tutorial's user community. For example, to enable tutorial users to more easily navigate a video tutorial's contents, prior work has used crowd workers to help segment it into individual steps [20]. Like our approach, others have explored systems that capture and/or leverage the perspectives of other tutorial users. One example is allowing users to upload their own demonstrations of a tutorial as a complement to the original [23]. An evaluation showed that having multiple demonstrations available reduced users' frustration when completing a tutorial [23]. Others have enhanced tutorials via tagged user comments, "pinned" at the side of the tutorial [3]. Their evaluation demonstrated that having comments organized in this manner (in their case by the paper authors) improved users' subjective impressions of the utility of these comments [3].

2.2. Eliciting and Sharing Software Knowledge

Central to our approach is the tenet that users are willing to contribute their software knowledge, in our case, as a means of improving a software tutorial. This assumption is supported by a number of prior studies illustrating people's desire and willingness to share their knowledge of and experience with complex software. For example, studies have shown that one of the motivations for authoring a tutorial in the first place is a desire to showcase interesting workflows [30]. Prior work indicates that users are already appropriating tutorial comment sections as a way of contributing additional material to complement the main tutorial (e.g., corrections and tips) [22]. Studies of application- or web-page-specific Q&A systems (e.g., [8,28]) have shown that users are willing and able to answer others' application-specific questions.

We also build on findings demonstrating the value in structuring these community software-related contributions. Examples of ways to structure contributions that others have proposed and explored include attaching Q&As directly to interface elements (e.g., [8,28]), categorizing tutorial comments according to their type and placing them next to the area of the tutorial that they reference [3], and projecting tweets about new and interesting tutorials and workflows onto the interface elements that they reference [11].

The value of structured and/or integrated community contributions has also been demonstrated in a number of domains outside of learning complex software. For example, allowing learners to anchor their comments to an online educational video's timeline led to a greater sense of social presence and likelihood of contribution [24]. Structuring comments through categorization has been shown to increase engagement with online discussions [13] and productivity in collaborative visual analytics tasks [32].

2.3. Other Models of Collaborative Document Refinement

The approach to tutorial enhancement that we investigate in this thesis can be viewed as a form of collaborative document refinement that harnesses the wisdom of the community. A number of models of collaborative document refinement have been proposed and/or extensively studied in the literature. One common approach is the Wiki model, where a group of authors collectively refines a document, a popular instance of which is Wikipedia. The Wiki model generally assumes a single "best" document that the community works to achieve collectively. Within this model, community members take on a number of (evolving) roles to help ensure that articles are held to community standards (e.g., [2,21]). Edits are also tracked to enable documents to revert to prior states in the case that this collective action is not seen to produce improvements.

Other models of collaborative authoring rely on a lead author, or small set of lead authors, to evolve a document, with collaborators providing feedback on ways to enhance it. Prior work in this space has explored a number of supporting technologies, including obtaining quick access to feedback and/or suggestions using paid crowd workers [1] and structuring collaborator comments to enable authors to process them more effectively and efficiently [36].

2.4. Annotation Systems for Other Educational Material

In this thesis, we use community-submitted annotations as our model for improving tutorials. Other work has also looked at annotating documents for different purposes. For example, researchers have created systems letting students annotate textbooks or other classroom material for themselves, their peers, or the instructor [6,34,35,37]. In these examples, students gained a greater appreciation of the material being taught and there were instances of students helping other students, mirroring our hope that tutorial readers will help other readers.

One difference between this thesis and this related work lies in the motivation of users. Like a Wiki model, our current system doesn't offer any material compensation for contributing, so contributors will have to find some other source of motivation, such as forming personal goals or applying personal standards to tutorials [2,33]. On the other hand, when annotating educational material, students were motivated to use the systems to do well in their course, and so they can receive a better grade. However, it is encouraging to note that researchers have observed the students using the systems voluntarily, even when not required [6,37].

2.5. Summary

Previous work has shown the importance of tutorials in learning and how users are able and willing to contribute their own knowledge in the improvement of documents. We have described prior systems which allow the user to submit additional content to documents. We extend this body of work by focusing specifically on an approach to *soliciting* tutorial enhancements, and evaluate its impact on user contributions. Additionally, we have seen that people are motivated to contribute to Wikis and other educational material, but unlike these documents, which often have the goal of being the most complete resource on a topic, we explore user contributions within a model of collaborative refinement where the objective is not to move towards a single "best" document but rather to elicit and make accessible a range of community enhancements.

Chapter 3

System Description

In this chapter, we describe how we approached the problem of eliciting structured tutorial enhancements and illustrate our solution through a prototype system called Antorial. When describing Antorial, we use the term *note* rather than *comment* to shift the emphasis from general tutorial-relevant discussions found in comments sections (e.g., words of appreciation for the tutorial author, and requests for help on other tasks with the software [22]) to contributions that pertain directly to the content of the tutorial in question.

We start this chapter by describing some of our initial paper prototypes and how they lead to our design goals. Briefly, our goals are to elicit content-specific enhancements from users, to guide users towards posting useful content and to integrate notes into the tutorial as first-class citizens. Using these design goals, we describe how they inspired us to create

Antorial. We conclude this chapter with a pilot study we used to confirm the direction of the design and to gain some initial insight into the usability of the system.

3.1. Initial Prototypes

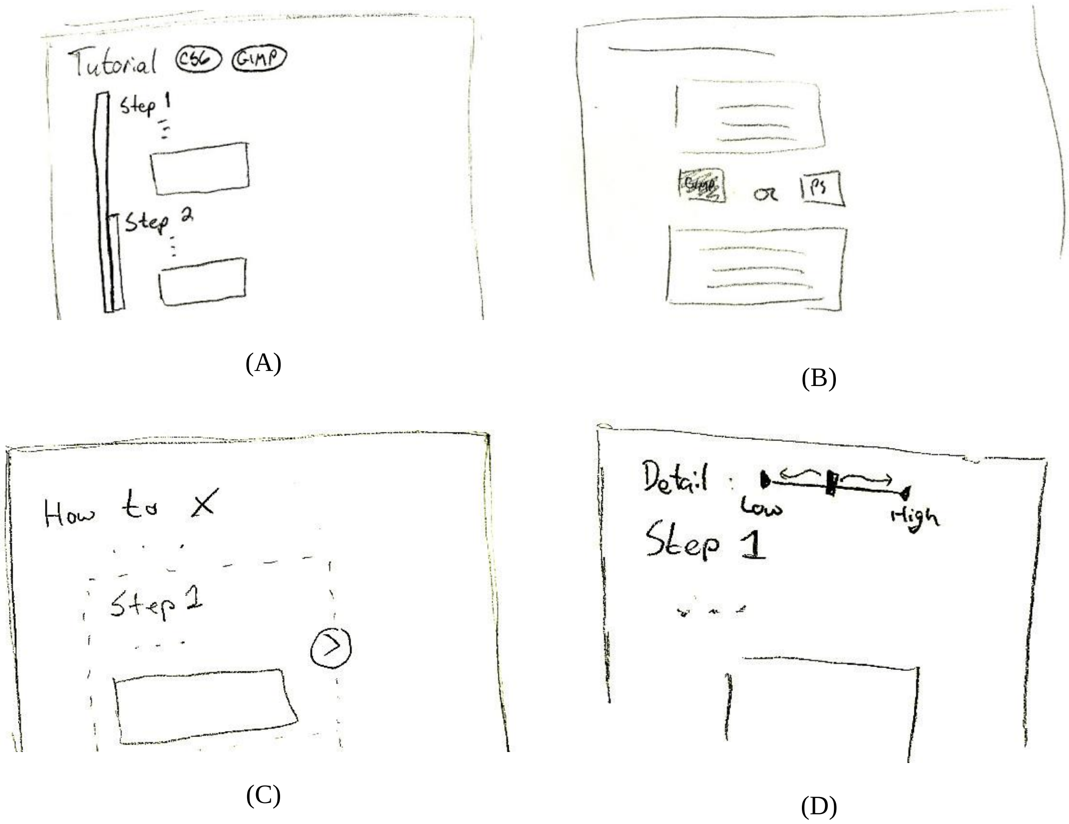
We explored many different alternatives using paper sketches. We describe some of our more developed prototypes here, with their sketches in Figure 1. In general, we wanted to somehow include tutorial improvements from the community, while keeping the original tutorial intact, allowing readers to learn from multiple perspectives.

One method we have considered is what we called *branching tutorials* (Figure 1 (A, B)). With branching tutorials, a contributor chooses where in the tutorial they want to make modifications, and creates a new branch. A reader will then be able to navigate between branches, and choose which path to follow. We have also looked at a simplified version of the branching tutorial approach, where only two versions of the tutorial are saved (Figure 1 (C)); the original tutorial as written by its author and an alternate tutorial, where the community has modified the original tutorial. Another approach we have considered is having different levels of detail available for a tutorial (Figure 1 (D)). A reader can then choose to see the tutorial or individual steps as they are streamlined or expanded by other tutorial followers.

A disadvantage with these approaches is their complexity. A reader might not have time to read all versions of a tutorial to find which one is most appropriate to their goal. We also felt that tutorial followers might assume that one version of the tutorial would be the best overall, something that might not be true. For example, there might be workflows of the same quality, but using different techniques; or tutorials differing in software version, so aren't directly comparable. In addition, conceptually, it might be difficult for contributors to map out how their improvements will relate to the existing content.

After sketching, we compared these alternatives and identified similar properties across interfaces. Inspired by these properties, we determined that our final system should support the following goals:

- Eliciting content-specific enhancements: Previous work has found that some submissions might be off-topic [22], so we focus on encouraging material relevant to the tutorial.



(A)

(B)

(C)

(D)

Figure 1. Sketches of alternatives that we have explored before implementing Antorial. (A) One possible implementation for branching tutorials. Bars to the left of the tutorial present alternate workflows for steps next to the bars. The user also has the option to change the tutorial version using buttons at the top. (B) An alternate implementation of branching tutorials. When a split occurs, the user can choose which branch to follow, in this case, selecting the GIMP path. (C) The user has the option to toggle between the original content, and alternate steps created by the community. (D) The user can choose the amount of detail to show in a tutorial using the detail slider.

- Guiding contributors towards posting beneficial notes: This goal focuses on the content quality of user contributions, as on-topic contributions might still be of poor usefulness. We can possibly use the interface to guide users towards posting potentially beneficial content.

- Integrating notes as first-class citizens: Finally, we want to emphasize the importance of contributions. This might encourage readers to use these improvements in their own workflows, or to provide their own.

3.2. Antorial

After analyzing the different alternatives and gathering informal feedback on our sketches from human-computer interaction specialists, we narrowed down our design to Antorial – a system which allows users to categorize their notes, and associate them to a step within a tutorial. In addition, users are able to select which notes to view on a category and tutorial step basis, hiding the rest. Below we describe Antorial with respect to our design goals.

3.2.1. Eliciting Content-Specific Enhancements

Our first goal is to elicit enhancements from users specific to tutorial content. In particular, we want to help contributors submit content that might be beneficial to other readers. As we previously described, past work has found that there are a variety of comment types being submitted to feature-rich software tutorials [22]. For example, we can find comments that show appreciation, ask for help, offer suggestions to improve the tutorial, and that offer alternate workflows. We make the assumption that not all of these comment types are useful when improving tutorials and want our design to increase the overall utility of comments. The first step we take towards this end is to encourage users to post content specific to the tutorial.

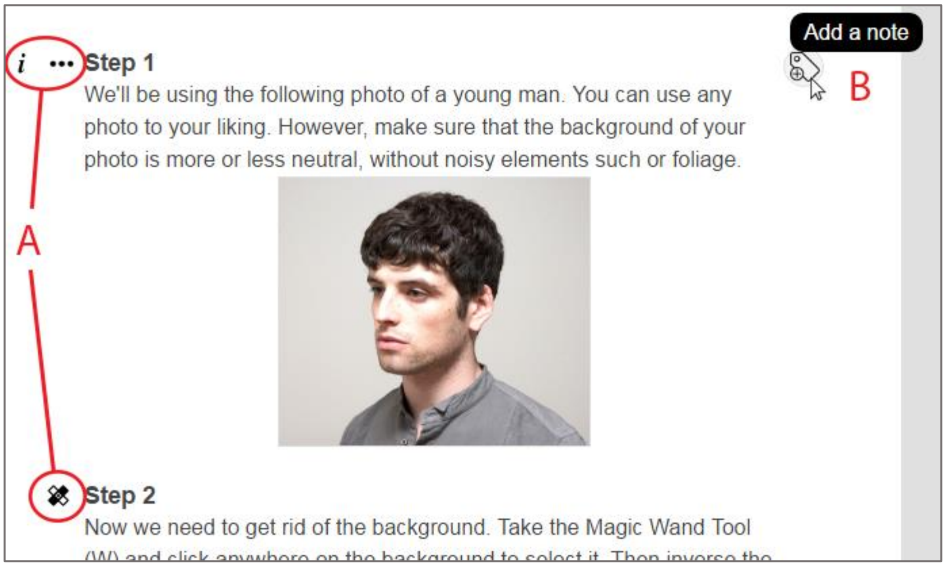
We selected a tutorial step as the scope for a note based on prior work indicating that the vast majority of text-and-image tutorials are step-based, most of which have clearly labelled steps [27], typically containing a single instruction or related series of small instructions that produce a single effect. Prior work has also explored ways to segment tutorials according to steps, for example, using crowd workers [20]. Collectively, this suggests that a step is both a conceptually meaningful unit within the tutorial community and that a tutorial could be segmented into steps either programmatically or via crowd annotation. Second, when prototyping more flexible models, as described in the previous section, we found that our note elicitation and display interfaces were more complicated. Furthermore, work in annotation systems for educational material [37] has found that annotations with a greater scope were not as useful. Therefore, we focus on an individual step-based model and leave the exploration of more flexible models for future work, as described in Chapter 5.

Figure 2 shows the mechanism of contributing a note for a particular step using Antorial. When the user hovers over the step they would like to contribute to, a “submit note” icon appears (Figure 2 (B)). Clicking this icon will then automatically select this step for the note, and start the note submission process. Steps that have notes tied to them will show icons indicating as such (Figure 2 (A)), and a user can click on these icons to view the notes below the step. The note submission process and how the visibility of notes are toggled are described in greater detail in 3.2.2 and 3.2.3.

3.2.2. Guiding Contributors Towards Posting Beneficial Notes

Through the posting process, we can potentially guide contributors so that they submit content aimed at improving the tutorial. In the previous goal, we described how we could possibly motivate users to post material relevant to the tutorial’s content. With this goal, we request some extra pieces of information tied to notes to further guide posters in submitting higher-quality content: we decided to ask users to categorize notes using predefined categories.

Creating our categories was an iterative process. We started with software tutorial comment categories identified in previous work [3,22]. However, we found that these categories reflected existing commenting behaviour (in free-form systems) and were not intended to guide contributors towards enhancing the tutorial’s content. With this different perspective in mind, we reviewed comments from over 200 Photoshop tutorials, for a sense of content enhancements that were both common and potentially useful. We then grouped these comments and formed a hierarchy of comment labels from which we drew our categories.



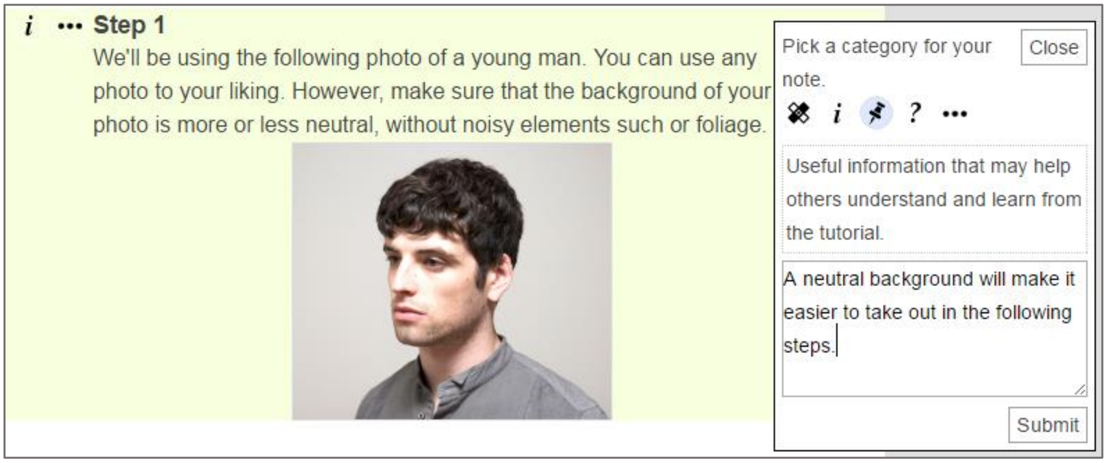
Step 1
We'll be using the following photo of a young man. You can use any photo to your liking. However, make sure that the background of your photo is more or less neutral, without noisy elements such or foliage.

Step 2
Now we need to get rid of the background. Take the Magic Wand Tool (W) and click anywhere on the background to select it. Then inverse the

Figure 2. Step-based notes. An icon (B) starting the note submission process appears to the right of a step when the user hovers over it. Once notes are submitted, different icons appear to the left (A); clicking them displays notes for that step.

We then created a set of icons for the categories, and refined both the icons and categories through the pilot study described in Chapter 3.3 as well as through informal feedback (see Appendix A for details). The categories are presented after the user has chosen a step on which to comment, and once a category is chosen, its description is shown, as illustrated by Figure 3. The following are the categories we have used in the evaluation described in Chapter 4, and the descriptions that were available to users, while the icons can be found in Figure 4:

- *Tell me more!*: Information that is not crucial for completing the tutorial, but may help someone learn something new.
- *What is this?*: Clarification for something that is crucial in completing the tutorial.
- *Corrections*: Point out an error in the tutorial, or provide a correction.
- *Questions*: Asking a question for the tutorial. Other users may provide a reply.



Step 1

We'll be using the following photo of a young man. You can use any photo to your liking. However, make sure that the background of your photo is more or less neutral, without noisy elements such or foliage.

Pick a category for your note.

Useful information that may help others understand and learn from the tutorial.

A neutral background will make it easier to take out in the following steps.

Figure 3. The user has selected the *Tell me more!* category, and is entering their note's content.

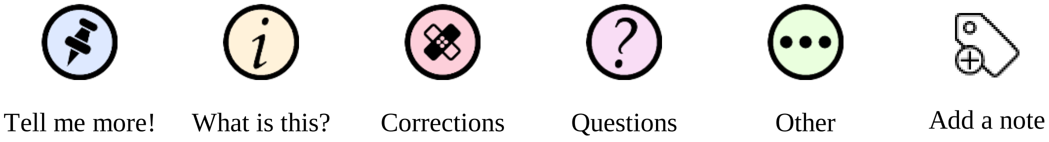


Figure 4. The set of icons we used is our evaluation. The *Add a note* icon is used to start the note submission process, while the others are used for our note categories.

- *Other*: Label your note with your own category.

We emphasize that our current set of categories and icons is a starting point for investigating the utility of this general approach to note elicitation. Developing a fully robust set will likely require a more complete iterative design and evaluation cycle.

As part of guiding readers towards content refinement, some categories require users to provide further detail about their notes. For example, the *What is this?* note category tries to guide the poster towards notes specific to software (as opposed to the workflow), and, therefore, contributors are encouraged to provide the software or software version to which the note applies. The *Other* category asks users to provide a label for their note. In future iterations, other fields could be added, but it is important to consider the tradeoffs: more information could be useful to readers, but how many fields are contributors willing to fill before losing patience?

3.2.3. Integrating Notes as First-Class Citizens

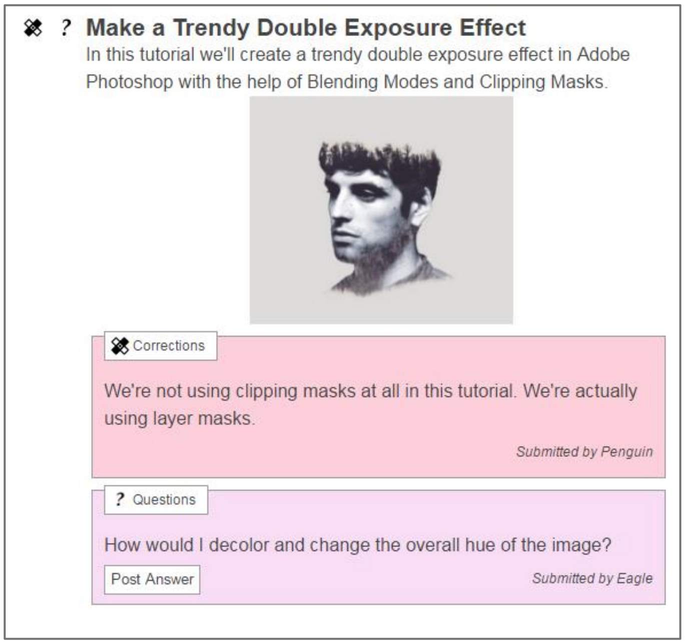
The concept of community notes being first-class citizens within a tutorial refers to the idea of promoting notes, as they could potentially be just as important as the tutorial. In many existing commenting systems, comment sections are often relegated to a part of the page that is of secondary importance, such as below the tutorial, possibly de-emphasizing their role. We explored different note display options, which could help promote their importance.

In displaying the notes, we faced a tension between our goal of promoting notes as first-class citizens and the possibility of introducing too much clutter in the event of high note volume. We could potentially show all notes at once either below or to the side of steps to emphasize their importance, however, we consider the following issues. If the notes are placed below the step, the flow of the tutorial is broken, as the user needs to scroll through all notes tied to the step to get to the next step. When placed to the side of the tutorial, it can become difficult to associate notes to specific steps as there may be too many notes to display next to individual steps.

We ultimately decided on a relatively conservative solution for this initial prototype that indicates the presence of notes by display the icons for their categories next to the tutorial step (e.g., see Figure 2 (A)), but keeps their content hidden until requested. Clicking on the category icons displays the notes directly below the step, as in Figure 5. By displaying notes immediately after a step, upon demand, Antorial aims to reinforce the importance of contributor notes as complements to the originally authored steps.

3.2.4. Implementation

Antorial is implemented as a standalone web application built with the AngularJS JavaScript library. The tutorials and user notes are stored within a SQLite database,



? **Make a Trendy Double Exposure Effect**

In this tutorial we'll create a trendy double exposure effect in Adobe Photoshop with the help of Blending Modes and Clipping Masks.

Corrections

We're not using clipping masks at all in this tutorial. We're actually using layer masks.

Submitted by Penguin

? Questions

How would I decolor and change the overall hue of the image?

Post Answer

Submitted by Eagle

Figure 5. By clicking on the icons on the left of the step, the user can see notes submitted to that step.

managed via an admin interface implemented in Python, using the Django framework. Antorial assumes its tutorials have a step-by-step structure, which, as described above, is true for most text-and-image tutorials found online.

3.3. Pilot Study

To get some initial feedback prior to conducting a more thorough evaluation, we conducted a small in-lab pilot study with five experts in the target software (in this case Photoshop). The goal of the pilot study was to gain initial insight into Antorial's usability and to help refine its interface. The five participants (three female, two male) were 21 to 25 years old and received $15 CAD as compensation.

3.3.1. Method

During the study we asked participants to read through two Photoshop tutorials. For each tutorial, we then asked participants to make notes to address three specific issues with the tutorial (e.g., to provide further explanation on a specific instruction, to provide information on where to find a command, and to make a correction) as well as to make a fourth note of their choice. We chose to guide the participants' contributions in this manner to both ensure that all participants would submit something and to exercise a range of our prototype's functionality.

3.3.2. Results

In general, Antorial's approach to note elicitation was well received. Participants did not object to the overhead associated with entering notes and saw the potential value in the way Antorial organizes the notes for other tutorial followers:

> *I think it's very easy to use. I would personally love this if I was doing a tutorial. (P2)*

> *I find that very helpful actually. I like that there's a way to read up notes at each step itself. It's different than going up and down into the comments and going back up to the step again. I find that it is also very helpful that there are many categories that you can add comments in with. I find that it also makes it more useful, like I feel comments you can skip – the comments that are like "yeah, thanks for the tutorial" or there are tons of people thanking for it. You don't want to read those comments, you can skip through those but here, you know that when you open these comments, you're going to mostly find something useful. (P3)*

The pilot study also pointed out issues with icons that we used to represent the categories, as well as the categories themselves, which we subsequently refined to our current set. The details of these changes can be found in Appendix A.

3.4. Summary

In this chapter, we presented some of our initial paper prototypes, which we used to create design goals, the system we implemented – Antorial, and a pilot study. We described how Antorial fulfills our design goals, as well as how our initial users appreciated the approach we have chosen. Following our pilot study, we then proceeded to conduct a multi-session evaluation using Antorial, described in the next chapter.

Chapter 4

System Evaluation

We have previously described the Antorial system and an initial pilot study validating our design. We followed this by conducting a more in-depth, multi-session evaluation to investigate how Antorial's model of collaborative tutorial refinement impacts contributions as well as to gather subjective impressions of the strengths and weaknesses of the general approach. For our tutorials, we chose Photoshop as our target application owing to its popularity and to provide us with a wide enough pool of knowledgeable contributors. The study was approved by the university's research ethics board (see Appendix B and Appendix C for certificates).

4.1. Participants

To increase the probability that our participants would be capable of contributing content to tutorials, we chose to recruit expert Photoshop users. In total, fourteen experienced

Photoshop users participated in our study, recruited from a local university (see Appendix D for the poster advertising the project), from online discussion forums (Reddit), as well as through word-of-mouth. We pre-screened participants to ensure that they had enough knowledge of Photoshop to contribute to tutorials. Given some of the challenges of eliciting self-assessments of expertise with a complex and diverse application like Photoshop (e.g., see [3]), we asked participants to either share some of their prior work, and/or answer specific questions about some of Photoshop's features that are used in our chosen tutorials. Although evaluating the system with participants with more diverse levels of experience is important, we leave this for future work.

Our call for participation also sought individuals who liked contributing their software knowledge, as our goal was to test the impact of Antorial on users who are likely to be contributors in the first place. Participants were 18 to 40 years old, and four were female. Participants received a $100 CAD gift card of their choice for their participation.

4.2. Conditions

Our study had a within-subjects design with two conditions; participants were asked to complete and improve two tutorials with each of the following two interfaces:

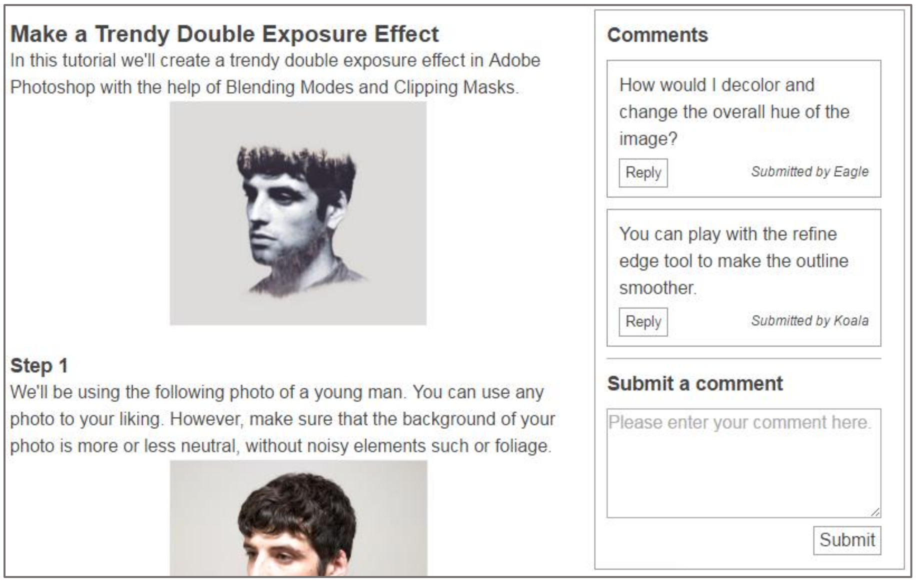
1. **Antorial**: In the Antorial condition, participants used the prototype as described in Chapter 3 to enhance tutorials.
2. **Baseline**: The baseline condition represented a conventional threaded tutorial commenting interface, where users are able to enter free-form contributions. As shown in Figure 6, we made one modification to the status quo by placing their comments beside the tutorial rather than buried below the tutorial. We did so in an

attempt to avoid unfairly biasing the results against a baseline with contributions completely deemphasized.

4.3. Tutorials

As mentioned above, participants completed and worked on improving four Photoshop tutorials (two per condition).

A professional Photoshop user (a designer) assisted us in hand-picking four tutorials from publicly available online sources. To have some variety and to cover a range of Photoshop skills, we selected two tutorials that use parameterized commands, such as layer styles (the filter tutorials in Table 1), and two that use free-form tools, such as the paintbrush (the free-



Make a Trendy Double Exposure Effect

In this tutorial we'll create a trendy double exposure effect in Adobe Photoshop with the help of Blending Modes and Clipping Masks.

Step 1

We'll be using the following photo of a young man. You can use any photo to your liking. However, make sure that the background of your photo is more or less neutral, without noisy elements such as foliage.

Comments

How would I decolor and change the overall hue of the image?

Submitted by Eagle

You can play with the refine edge tool to make the outline smoother.

Submitted by Koala

Submit a comment

Figure 6. The baseline interface: submitted comments are to the right of the tutorial, are always visible and scroll independently from the tutorial.

Tutorial Title	Steps	Type
How to Create a Futuristic Metal Text Effect in Adobe Photoshop	16	Filter
Add a Rain Effect to a Photo in Photoshop	14	Filter
Make a Trendy Double Exposure Effect in Adobe Photoshop	10	Free-Form
How to Create a Layered Floral Typography Effect in Adobe Photoshop	7	Free-From

Table 1. The four tutorials that participants completed and contributed to in the study. Each participant completed one Filter tutorial and one Free-Form tutorial per condition.

form tutorials in Table 1). Being mindful of participant time, we compressed the tutorials by removing some extraneous steps; in the end, each of the tutorials had a single goal described by its title. The tutorials we have used and their original sources can be found in Appendix E.

We paired the tutorials so that participants completed one filter tutorial and one free-form tutorial per condition. Our Photoshop expert judged the filter tutorials to be easier, so participants always started each pair with a filter tutorial to enable a logical progression of difficulty.

We pre-seeded each tutorial with three comments to give participants some initial sense of potential contributions. One of the pre-seeded notes on each tutorial was a question, while the other two were either elaborations on a part of the tutorial (*Tell me more!*) or some explanation for a missing detail (*What is this?*). These notes can be found in Appendix F. To ensure that all participants, regardless of when they entered the study, had the same opportunities to enhance the tutorials, notes from other participants were not visible during the study.

4.4. Procedure

We began by asking participants to sign a consent form (Appendix G) and to fill in a demographics questionnaire (Appendix H). We then explained our study scenario. To motivate participants to contribute, we introduced a small amount of deception (approved by the university’s research ethics board). Specifically, we told participants that we were considering using four tutorials as part of a course and requested their help in improving them. We also indicated that we were experimenting with different interfaces for their contributions.

Participants were asked to complete the four tutorials remotely, two per condition. To provide participants with sufficient time and flexibility to complete and improve each tutorial as their schedules dictated, they were allotted three days per tutorial. As a rough guideline for expectations, we told participants not to spend more than two hours in total on each tutorial. When participants were finished with a tutorial, they contacted the researcher to receive access to the next tutorial. To account for potential order effects, we counterbalanced the order of conditions across the participants. We assigned tutorial pairs to condition in a round-robin fashion. At the end of this first session, we sent a document to each participant summarizing the study procedure (Appendix I).

Prior to each condition, participants received a short document summarizing the main features of the system in lieu of a live interface demonstration – see Appendix J for both documents. After completing the condition, participants completed a Likert-scale questionnaire (Table 3).

To conclude the study, participants took part in a semi-structured interview (see Appendix K for the sample questions) and debriefing session, where we explained the nature of the deception.

For each participant, the study lasted from 2 to 22 days depending on how quickly they completed each tutorial, with an average length of 11 days. We estimate the total time commitment per participant to be 7-8 hours.

4.5. Data Collection and Analysis

Our study data consisted of participants' contributions, their responses to the post-condition questionnaires (see Table 3) and their perspectives on the strengths and weaknesses of Antorial's general approach collected via the semi-structured exit interviews.

When analyzing the data, we coded participant contributions using an open coding scheme that we refined iteratively. We analyzed the interviews – which were transcribed in full – thematically through joint sessions among Human-Computer Interaction Lab members, with continual revisits to the raw transcripts to help ensure the validity of our identified themes. We compared quantitative means using an RM-ANOVA with Interface Type (Antorial vs. Baseline) as the within-subjects factor. We also included Interface Order (Antorial First vs. Baseline First) as a between-subjects factor to check for potential order effects. Finally, we compared distributions for categorical variables using Pearson's CHI-squared test. We report results as significant if $p < 0.05$.

The post-session interviews revealed that one participant became frustrated by the study's workload in the first condition (the baseline condition), and decided not to keep contributing. We removed this participant's data from our analysis since they did not experience both conditions.

4.6. Contribution Volume and Content

We begin our results with the amount and content of participants' contributions. Over the course of the study, the 13 participants that we included in our analysis made 319 contributions: 192 with Antorial compared to 127 with Baseline. Figure 7 (Left) depicts the results on a per-participant basis. On average, participants made 14.9 contributions with

Antorial (*SE* = 3.4) compared to 10.0 with Baseline (*SE* = 2,8), a difference found to be significant ($F_{1,11}$ = 7.32, *p* = 0.02, η^2 = 0.4). This represents an average increase of 49% when contributing with Antorial over Baseline. The Interface Type × Interface Order interaction effect was not significant ($F_{1,11}$ = 0.59, *p* = 0.48, η^2 = 0.05).

To get a sense of whether or not Interface Type impacted how verbose participants' contributions were, we also analyzed the average number of words per contribution. Figure 7 (Right) shows that participants did write slightly less with Antorial on a per-contribution basis (*M* = 26.53, *SE* = 3.43) than with Baseline (*M* = 30.59, *SE* = 2.7), but this difference did not reach significance ($F_{1,11}$ = 2.61, *p* = 0.14, η^2 = 0.192). The Interface Type × Interface Order interaction effect was also not significant ($F_{1,11}$ = 1.48, *p* = 0.29, η^2 = 0.119).

In examining contributions, we found that one source of additional verbosity in the baseline (where, on average, participants wrote four extra words per contribution) was that participants often had to add extra context. For example, 47% of Baseline contributions identified some step number, as the following note illustrates:

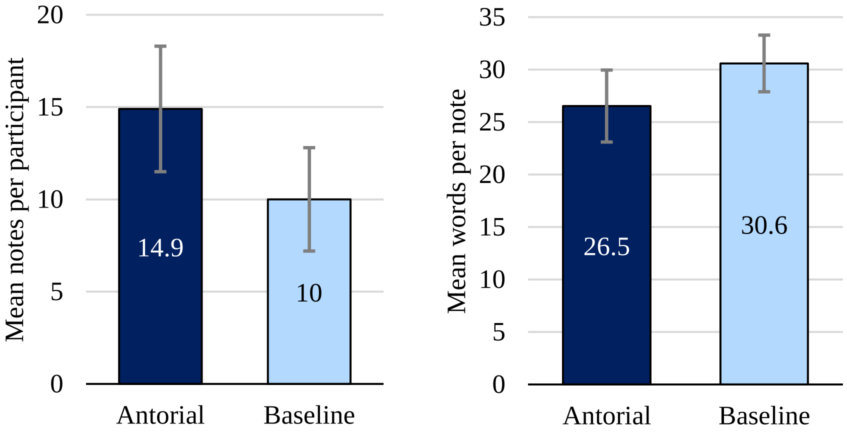


Figure 7. (Left) mean number of notes per participant; (Right) mean number of words per note. Error bars represent standard error.

> *Step 3 - If you want to hide the duplicate layers, you can click on the eye icons (on the left side of each layer) to hide them. (P6)*

Step information, on the other hand is built into the notes with Antorial.

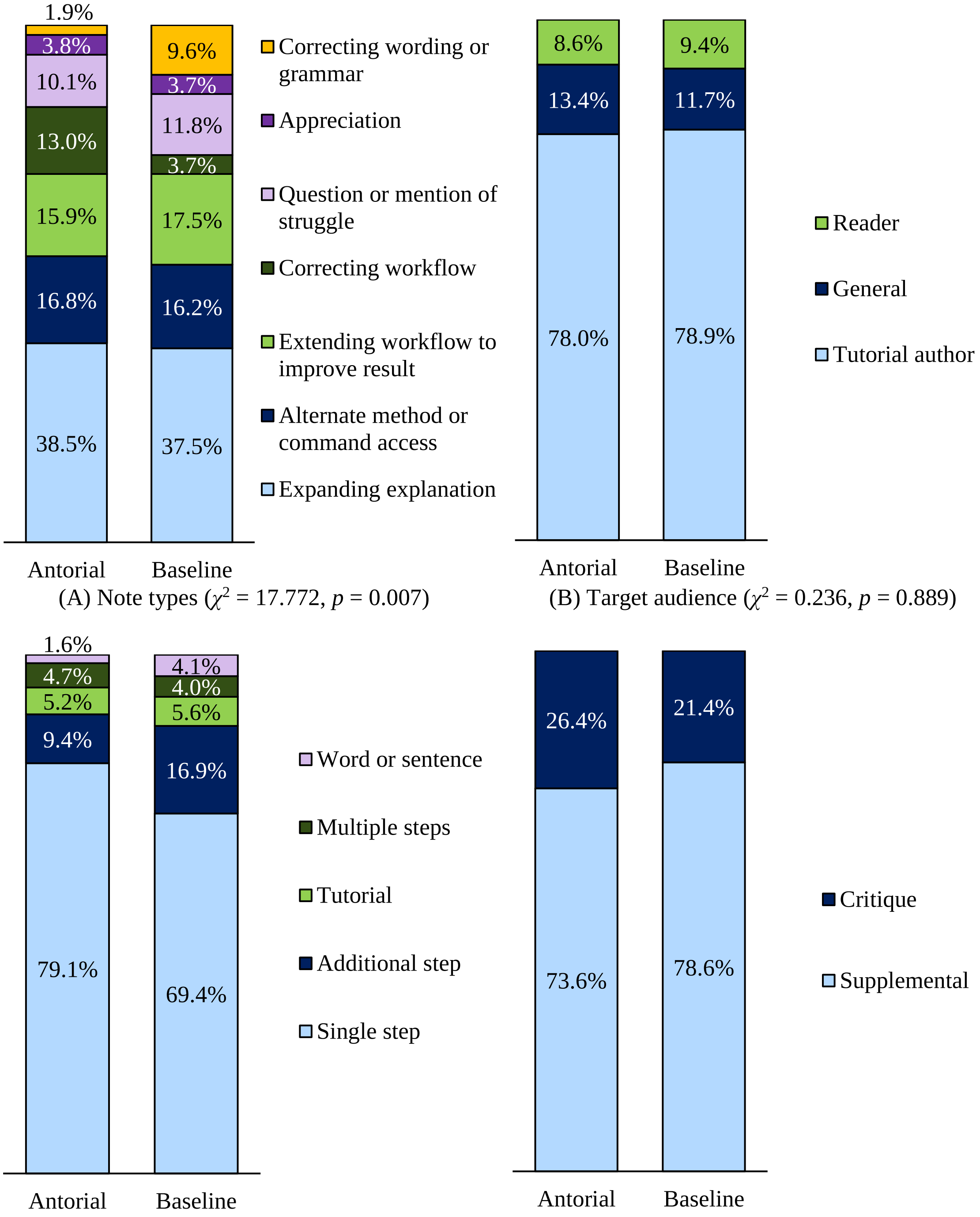
In further analyzing the content of participant contributions, we found that they differed along the following primary dimensions: type, intended audience, scope, and whether the contribution attempted to provide potentially helpful supplemental information or simply critiqued the tutorial. We discuss each dimension in turn below.

4.6.1. Contribution Type

We identified seven types of contributions that participants aimed to make: to present an alternate workflow or method of command access, to express appreciation, to pose a question or mention a difficulty, to correct a portion of the workflow, to correct the wording or grammar, to expand an explanation, and to extend the workflow to improve the final result. Figure 8 (A) illustrates the distribution of contribution type across the two conditions, which were significantly different according to a Pearson's Chi-Square test ($\chi^2 = 17.772$, $p = 0.007$).

The most common contribution type was to expand upon the explanation provided in the tutorial, which accounted for just over a third of the contributions in each condition. In examining differences in Antorial's and Baseline's distributions for contribution type, there appeared to be a tradeoff between workflow corrections – suggestions related to tutorial content (e.g. incorrect tool usage), and grammar/wording corrections. Specifically, more of Antorial's contributions offered corrections to the workflow (Antorial: 13%, Baseline: 3.7%), while Baseline's corrections were more focused on the writing quality

(Antorial: 1.9%, Baseline: 9.6%). The remaining contribution types were roughly equally represented across the two conditions.



(A) Note types (χ^2 = 17.772, *p* = 0.007)

(B) Target audience (χ^2 = 0.236, *p* = 0.889)

(C) Note scopes (χ^2 = 6.263, *p* = 0.180)

(D) Note content (χ^2 = 1.023, *p* = 0.312)

Figure 8. Graphs illustrating the distribution of comments using different categorization methods, along with the results from the Pearson's Chi-squared tests.

4.6.2. Target Audience

We also found that contributions differed in their intended target audience. Some were clearly directed at the tutorial author, whereas others were more directed at potential tutorial followers. For example, the note below appears to be addressed to the author. It suggests an area within the tutorial where the author can expand, and goes on to describe some specific suggestions (omitted for space reasons).

> *Maybe add some pointers afterwards to what can be done to take the effect further? For those who want to keep experimenting. […] (P8)*

This note, on the other hand, addresses potential readers directly, and even qualifies the level of expertise targeted:

> *For advanced users: If you convert your layer to a Smart Object before adding your filters they become "Smart Filters" that you at any time can double-click to adjust the settings. (P8)*

Figure 8 (B) shows that most of the contributions in both interfaces were aimed at the tutorial author (Antorial: 78%, Baseline: 78.9%). This is perhaps not surprising considering the scenario we described to participants: that we were considering using these tutorials in a course and wanted their help to improve them. Additionally, there was no interaction between contributors, which may have reduced the incentive to offer advice to other tutorial followers. Despite these aspects of the study scenario, some participants did continue to view their contributions as a way to communicate with other tutorials followers (roughly 9% of contributions in each condition), or worded their contributions in a way that they could target either audience (e.g.,13% in Antorial). Overall, Interface Type did not appear to impact the distribution of comments across target audience ($\chi^2 = 0.236$, $p = 0.889$).

4.6.3. Contribution Scope

We found the participants' contributions had the following scopes: the entire tutorial, multiple steps, a single step, a specific word(s), or a new step (Figure 8 (C)). Despite Antorial's explicit step-based elicitation method, the difference in scope distribution across the two conditions did not reach significance ($\chi^2 = 6.263$, $p = 0.180$), with the most common scope in both conditions being a single step (79% with Antorial and 69% with Baseline). This reflects findings with other annotation systems, which found that most notes had smaller scopes [37]. Interestingly, participants did write notes with wider scope even with Antorial. For example, to address multiple steps, participants would list additional affected steps, as they would in Baseline. To recommend an additional step, they would submit a note on the step following the location they would place the new step. We return to the possibility of explicitly supporting these additional scopes in section 4.8.

4.6.4. Supplement vs. Critique

We found that contributions differed in the degree to which they simply pointed out issues or actually helped to work towards solutions. A supplemental note provided specific directions on ways to improve or correct the workflow, or the tutorial's explanations. For example:

> *It is better to explain at this point why you are making some colour and focus adjustments to the photo. In this case, the photo has warm tones which is associated to bright and sunny, therefore colour adjustment is necessary. (P10)*

The second type, a critique, did not specify exact ways to enhance the tutorial, but pointed out places where the improvement could/should take place:

> *You might want to clarify in greater detail how you masked out the dark beige portions. It's a crucial component of the tutorial. (P12)*

Figure 8 (D) shows that most contributions were in fact supplemental (74% with Antorial and 79% with Baseline). The difference in distribution across the two conditions, however, was not significant ($\chi^2 = 1.023$, $p = 0.312$).

When examining these contributions according to their target audience we found that all those targeted at tutorial readers offered potential advice as opposed to simply critiquing. We return to the potential role of audience and how systems might further promote reader-centric enhancements in section 4.8.

4.6.5. Antorial Categories

Antorial supplies its own note types (i.e., its categories) in an attempt to guide the tutorial notes. Using a strict definition of correctness, we coded an Antorial note as correctly categorized if and only if the participant selected the most appropriate category given our definitions in Chapter 3.2.2. Using this criteria, we found that most notes (55% – see Table 2) where not, in fact, categorized as we would have envisioned. As we describe in our next

Category	**Correct**	**Incorrect**
Corrections	17	34
What is this?	17	4
Tell me more!	38	39
Questions	9	1
Other	5	28
Total	86	106

Table 2. Number of times participants used Antorial's categories according to their original definitions.

section, some participants found the categories straightforward. Others found them confusing and/or did not want to expend the effort to categorize their notes. For example, one participant (P6) only used the *Tell me more!* category for all of his 10 notes.

4.7. Subjective Response

The post-condition questionnaires showed that participants were generally comfortable and motivated to post comments with both interfaces (Table 3), with little difference between the two conditions.

In terms of overall preference, participants' responses were split: five preferred Antorial, five preferred Baseline, and three participants were neutral. In what follows, we discuss some important considerations that participants raised during the interviews for systems that aim to support collaborative tutorial enhancement. We also describe how these considerations influenced participants' preferences for the two systems investigated.

4.7.1. Supporting Specificity and Context through Step-Based Notes

Most participants felt that Antorial's per-step commenting model was more tailored towards eliciting enhancements than the free-form comments in the baseline system. They found that the model helped them focus on specific enhancements and reduced the amount

Statement	**Antorial Mean (*SE*)**	**Baseline Mean (*SE*)**	$F_{1,11}$	p	η^2
I felt encouraged or motivated to post comments	4.45 (0.19)	4.38 (0.26)	0.31	0.59	0.027
I felt like it took a lot of work to post a new comment	2.16 (0.33)	1.83 (0.33)	1.19	0.30	0.098
I felt comfortable posting comments	4.93 (0.08)	4.85 (0.11)	1.19	0.30	0.097
I felt confident that the comments I posted will be useful	4.79 (0.11)	4.85 (0.11)	0.22	0.65	0.020

Table 3. Post-condition Likert-scale questionnaire results (1 = Strongly Disagree, 5 = Strongly Agree)

of additional context they had to provide, supporting our first design goal. The following two quotes are representative of these sentiments:

> *Then I can focus on the step I'm talking about, if you noticed for the [baseline] whenever I made a comment I would say something like "In Step 7, this this this." But for [Antorial] I don't have to do that. Everyone knows this is the step we're talking about. (P3)*

> *[Antorial] is more specific than [the baseline] […] The [baseline] is just for regular stuff, [Antorial] is much more specific. (P1)*

4.7.2. Guiding Contributions through Categories

Participants' views on structuring tutorial contributions with pre-defined categories diverged. Some participants did not mind specifying categories, as long as it makes it more convenient for other people, particularly other contributors:

> *For the [contributor], it keeps suggestions and information [more] organized […] In the eyes of the reader, […] it will be easier for the people answering [comments and questions]. People have asked and you'll see if they have been answered already. You won't have to answer twice because you can find things. (P10)*

Several participants also said that specifying a category actually helped them craft their notes and understand which contributions would be considered valuable, which was our second design goal:

> *[The] icon guided me to make my comments. […] I would go here and say ‘maybe I need to look for something I don't understand, or something to correct.’ (P3)*

Four out of the five participants who preferred the baseline system, however, specifically complained about the overhead that the categories introduced. These participants felt that the categories were not completely clear, that selecting one required too much thought, and/or that they restricted contributions in a way that was not beneficial:

> *I knew what my comment was but I really had a hard time figuring out what the category should be. I actually looked at the other comments to see what other people were saying. Maybe if I could get an idea [from the comments] maybe I'd learn, but that wasn't the case. (P11)*

> *I prefer it when something is more open because it doesn't make a person feel like they're restricted by what they should or shouldn't put down [...] sometimes those [categories] would be in the same comment I was trying to make and I think "ok, should I split this up into three?" and I really didn't like doing that and would [rather just] put everything there. (P2)*

In relation to P11’s quote above, our study made it difficult for participants to leverage community categorization practices, in that we pre-seeded each tutorial with only three notes. It’s possible that more notes would help contributors better establish and understand norms.

Out of the people who saw benefit in specifying categories, not all of them felt that they understood the categories provided in Antorial, but were content with their workarounds, such as selecting *Other* when they did not feel that their note fit into a particular category.

Overall, our sense from the interviews is that the categories could certainly be refined to reduce confusion, but the extent to which this would alleviate all of participants' concerns is an open question. Some participants who preferred free-form note entry, simply wanted to express their tutorial input and move on.

4.7.3. Sense of Community vs. Social Cost

Our interviews also revealed some potentially interesting tradeoffs with having contributions permanently visible. In the baseline system, comments were always displayed to the right of the tutorial (see Figure 6). With Antorial, users had to click the category icons to reveal the notes below a step (see Figure 2). On the one hand, several participants indicated that the always-visible comments in the baseline system provided them with a better sense of the community. For example, one participant indicated that the baseline system suggests an active discussion with other artists:

> *More discussion with [the baseline]. It feels more like the commenting section - it feels like you'd have more discussion with the other artists than on [Antorial]. Um, the replies back and forth with the artists that you'd normally get with Reddit, with the tossup of ideas (P9)*

Another participant said that this sense of community gives them confidence that their questions might get answered quickly:

> *If I'm going to be asking questions, and I have people respond also, most tutorials, you watch them or follow them without having the community to support you if you don't understand something. I would feel very happy to have such [support]. (P3)*

This notion of promoted user comments providing a sense of community surrounding a tutorial has also been identified in prior work [3].

On the other hand, the visibility of contributions also seemed to make a couple of participants concerned with the social cost associated with contributing. For example, one participant indicated that they were more conscious of their posting volume in the baseline system (where they posted only 5 notes) than in Antorial (where they posted 22 notes). With the baseline system, the participant said:

> *I didn't want to annoy other people and post a lot. So I combined all the things I had to say step by step into one tutorial, by the end of it. (P11)*

This is supported by this participant's contributions in the baseline, which tended to group together multiple brief points, as opposed to in Antorial, where they were more descriptive.

Exploring how properties of the systems (in addition to contribution visibility) might impact these more social aspects of tutorial contributions is an interesting avenue of future research.

4.7.4. Providing Multiple Perspectives as a Motivation to Contribute

A motivation for Antorial's model of collaborative tutorial enhancement is that there is often no "correct" version of a given workflow. In our interviews, two participants said that a desire to provide an alternative perspective motivated them to contribute:

> *… there is not a right or wrong way to paint the sunset, you know, you see it, you make your visual translation, and that's your interpretation. And just like Photoshop, if you want to achieve an objective there are hundreds of ways to do it, so one is not necessarily the right way. There are more efficient ways, but nothing is really right or wrong. (P6)*

> *[The tutorial] may be doing it one way but there might be another way. So I don't like giving one method and saying that is the only way, there [are] thousand different ways to do something. (P9)*

These quotes lend some initial support for Antorial’s approach to enabling a community of tutorial users to contribute multiple perspectives.

4.7.5. Enabling General Discussions

Participants suggested that future iterations of Antorial should also explore general discussions as a complement to scoped notes. For example, one participant indicated that general comments might be more review-style, giving an overview of the tutorial’s approach:

> *I did notice other individuals who are commenting just commented about the tutorial overall, which I thought was interesting. I thought they were commenting almost as a review, like “oh this is an interesting way to put rain on the photo.” (P11)*

Given that each tutorial was pre-seeded with the same style of note (regardless of condition), the fact that this participant viewed some notes in the baseline system as more review-oriented is interesting. This is perhaps reflective of the view that commenting sections are generally for expressing opinions. Further investigation, however, on how users might perceive comments posted in different areas is needed, as well as how providing multiple scopes might influence contribution types and volume.

4.8. Discussion

Our evaluation's results indicate that participants made close to 50% more contributions with Antorial's structured approach than with a baseline commenting system. There is also some evidence that Antorial impacted the types of contribution, with a shift in emphasis from wording corrections to workflow corrections. The latter type of contribution is arguably more beneficial for tutorial readers – adapting to grammar issues is likely easier than adapting to errors in the workflow. From the standpoint of community tutorial enhancement, it is encouraging that most contributions (both with Antorial and the baseline) were aimed at enhancing the tutorial as opposed to merely critiquing without suggesting a path forward. Some participants also expressed an explicit interest in contributing multiple perspectives.

4.8.1. Exploring More Flexible Postings Models

While Antorial's extra posting overhead did not appear to have a negative impact on either contribution rates or contribution content, participants' preferences for Antorial vs. the baseline system were mixed. A central issue appeared to be with Antorial's categories. Some participants felt that the categories served their intended purpose, which was to guide contributions. Others, however, found them confusing, unnecessary, and the majority of notes were not categorized as we would have envisioned. At a minimum, Antorial's categories need refinement to make them clearer to a wider range of potential contributors. Our findings also suggest, however, that it would be worthwhile exploring more flexible contribution models. For example, there may be value in an approach that lets contributors easily “opt out” of providing additional structure for their notes. It might also be possible to shift the cost vs. benefit tradeoff by incentivizing the process in some way, where only categorized notes are integrated into the tutorial as a “reward”, with uncategorized notes relegated to a less prominent “general” pool. Moving forward, it will be important to understand how differing types and levels of contribution structure impact both contributions and the consumption of these contributions by tutorial readers.

Antorial uses a tutorial’s step as the scope for a note, and our results lend support for this design decision: the most common scope across both Antorial and the baseline system was an individual step. This is also supported by previous work [37], which found that the majority of annotations were anchored to specific content, rather than placed in a general discussion area.

For larger scopes, users found reasonable workarounds in Antorial when submitting notes. The range of scopes that we saw in participants’ notes, however, indicates that further exploration of more flexible scopes is also warranted. The challenge will be to balance the expressive power of such flexibility with the extra overhead and complexity that it might introduce. For example, permitting varying degrees of note scope would likely lead to contributors having more decisions to make at posting time, and conveying varying levels of note scopes within the tutorial might also introduce more visual complexity for those seeking to complete the tutorial.

4.8.2. Considering the Learner and Author Perspectives

Ideally community tutorial enhancement mechanisms should provide a way for contributors to communicate with both the tutorial author and other learners. Our results indicate a mix in intended audience within our participants' notes. Our results also indicate that when contributors addressed other learners they always provided concrete attempts at tutorial enhancement rather than critiques. The question then becomes how to reinforce this notion of other learners as a potential audience for the contributions. One approach could be to acknowledge the roles of contributors, making it clear that learners play a part in this acknowledgement. For example, tutorials could include a contributor recognition section where learners mark enhancements that they found useful. This could also be addressed through the category descriptions, with categories explained in a way that emphasizes posting notes to tutorial readers.

A second, and related, important concern is how a tutorial author might respond to a community of users contributing directly to their tutorial, particularly if their contributions are prominently recognized. There might be tensions between incorporating these enhancements, thereby creating this sense of community, and maintaining control and recognition for the final product. We would be interested exploring how different points in the design space impact this tension.

4.9. Summary

In this chapter, we described a multi-session evaluation comparing Antorial and a baseline system. We found that there were more notes submitted using Antorial, and that the primary difference in content was in the target of corrections: Antorial's corrections focused on workflow, rather than the baseline's grammar corrections. We also found that Antorial's features helped users submit focussed content and, that there were different perceived social costs between the two interfaces. Furthermore, our participants felt that our model was fairly rigid, in terms of categories and scope and so further research in relaxing these constraints could be beneficial.

Chapter 5

Conclusion

Online text-and-image-based tutorials continue to be a source of knowledge for software users. Readers often supplement the tutorial's content using commenting sections [22] and prior work has shown that enhancing these sections improves the perception users have of the available content [3]. In addition, commenting sections have the benefit of leaving the original content intact, providing readers with multiple perspectives of a workflow and allowing tutorial authors to maintain ownership [30]. Our goal was to investigate how we can elicit such enhancements, while maintaining the aforementioned benefits, and to see how the quality and quantity of contributions are affected.

In this thesis, we described the development and evaluation of Antorial, a system that integrated contributions into a tutorial. We conclude by summarizing our contributions, and by discussing some limitations and directions for follow-up investigations.

5.1. Contributions

This thesis makes three contributions. The first contribution is a model for community tutorial enhancement using structured scoped notes, as illustrated by Antorial. Antorial requires users to categorize their notes using one of five pre-defined categories, and to select a tutorial step to associate to their note. Notes can then be filtered by future readers by selecting the category and steps to see notes of interest.

We also contribute results from a multi-session evaluation. Our results show a positive impact to contributions when participants used Antorial. For example, the average number of notes per participant was higher, and participants made more corrections to workflow-related issues rather than grammar-related, something that is potentially more useful for tutorial readers.

Finally, we contribute some design considerations that can be used in the development of further systems supporting community-driven tutorial enhancement. For example, some users suggested that having all notes in one place, like with the baseline, promotes a sense of community. This might have the effect of encouraging further contributions and discussion. However, users expressed concern that they were monopolizing the discussion when using the baseline's single thread of discussion, but not when using Antorial's multiple threads.

5.2. Limitations and Future Work

This thesis is a step towards furthering our knowledge on soliciting community contributions for online software tutorials. There are many potential avenues for exploration through both study design and system improvements that could lead us to additional insight.

First, there is the issue of the number and representativeness of our participants. Our findings are based on 13 participants, all of them expert Photoshop users. Following suggestions that the human-computer interaction community should consider resources as a factor in assessing the suitability of a sample size [5], we note that this was a resource intensive study and the time commitment required from participants – about 7 to 8 hours over two weeks – made recruiting difficult. That said, future studies should explore the generalizability of the approach to a broader sample of contributors.

The scenario we introduced in our study may have implicitly limited the types of notes submitted by our participants. We told them that we wanted help for improving potential course material; this could have influenced our participants to only post notes that they thought enhanced the tutorials. Without this requirement, users might feel greater freedom to post any type of note they want, and we might see more differences in note content. For example, since our participants were all Photoshop experts, we might not have seen as many questions as we might in a more realistic setting. An alternative study set up would be to release the system to a community of users, and ask them to use it.

Furthermore, we did not allow participants to have discussions with each other during our evaluation, something that other evaluations of annotation systems have emphasized [35,37]. Interestingly, some of our study participants were interested in interacting and collaborating with each other (as described in Chapter 4.7.3), despite the fact that our study design was not conducive to discussions. It appears that this format for user contributions does not discourage discussions, but further work is needed to see if there are benefits to encouraging this interaction on software tutorials, and what kinds of discussions would occur. In addition, as we increase the number of users and contributions, appropriate moderation strategies, both author-centric and community-centric ones, may also need to be investigated and included.

In this thesis, we focused on soliciting enhancements to text-and-image-based software tutorials. There remain questions in how to generalize our work to other tutorial formats and domains. For example, video tutorials are also a popular tutorial format. There has been some work on eliciting corrections to learning videos [9], but as far we know, not on soliciting other types of content. Soliciting community enhancements that could be readily integrated within a video represents an interesting design challenge for future work; steps within a video tutorial may not be as clearly defined as in text-and-image tutorials, and note placement and visibility may be more challenging.

There is also the question of the type of tutorial. While our study targeted Photoshop tutorials, there is hope that the approach would generalize well to a range of other types of step-based tutorials. Extending this work to different software could be relatively straightforward, but generalizing to non-software tutorials could pose a more difficult challenge. For example, our categories were decided upon based on comments submitted to software tutorials, and may not fit other domains. It is also possible that other tutorial topics might not have clear steps to annotate, like we assume for this thesis.

Another area of future work is the notes' content and format, such as submitting videos instead of text notes. For example, there exists work that augment video tutorials by integrating user-submitted videos [23]. Closer to annotation systems, there are other examples such as allowing users to submit notes to course material stored as gestures or voice recordings [35]. Simpler media types such as image or rich text formats are also possibilities for exploration. How all of these can easily be submitted by contributors and how readers can benefit from them are open questions.

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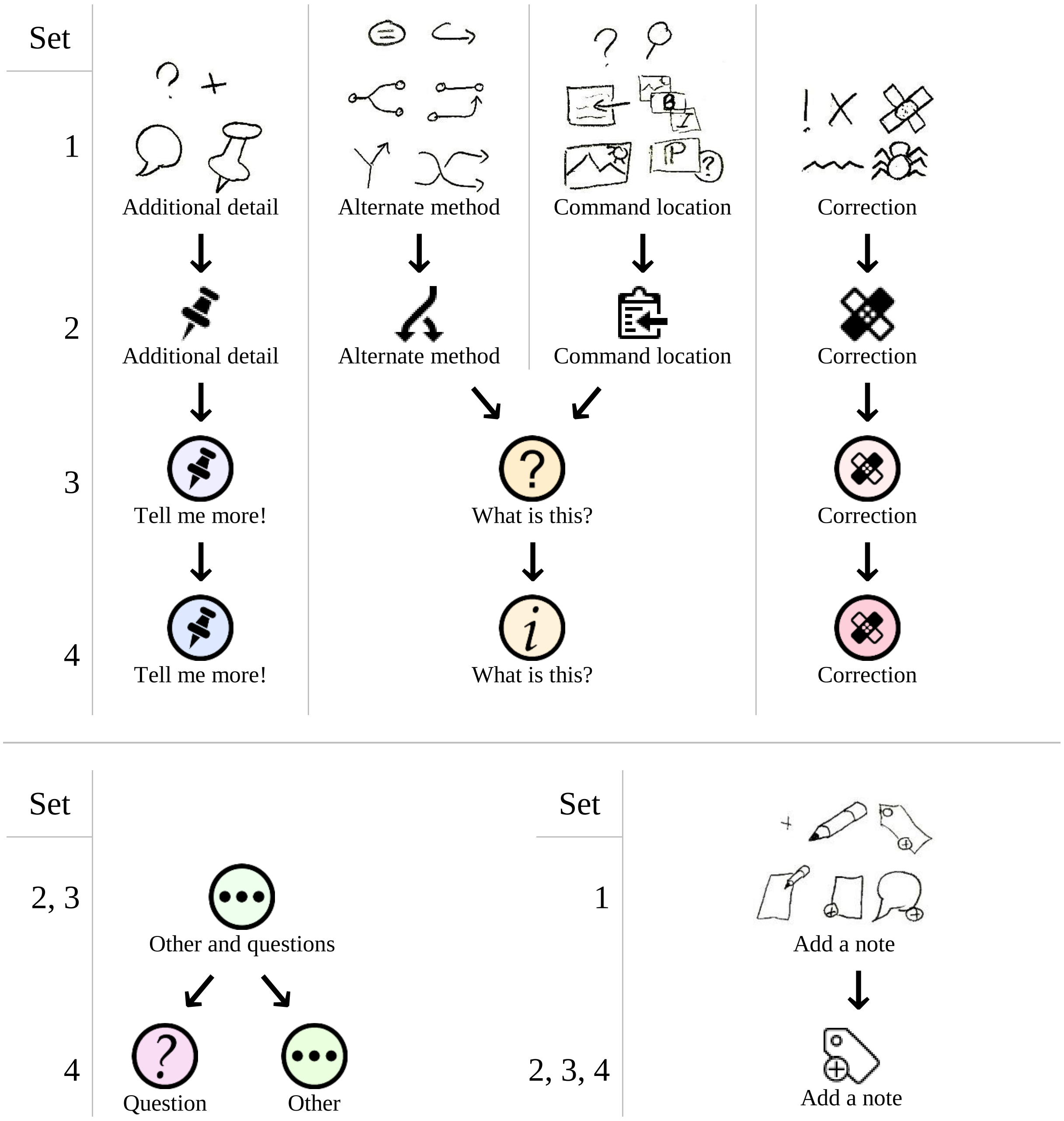
Appendix A

Evolution of Note Categories and Icons



Set 1: We started by sketching icons inspired by those available through icon libraries (icomoon.io, thenounproject.com). Informally, we asked Human-Computer Interaction Lab members to vote for the icons that they felt best represented their function to get set 2. Note that for *Other and questions,* we did not have sketches, and that this category came later. Here is how we defined the categories that have since been modified:

- *Additional detail*: Any information that might help someone appreciate the tutorial, that does not fit in other categories.
- *Alternate method*: Any alternate methods to accomplish the same result.
- *Command location*: Information on how to access or execute commands.

Set 2: We implemented our first prototype, and used these icons and categories for our pilot study.

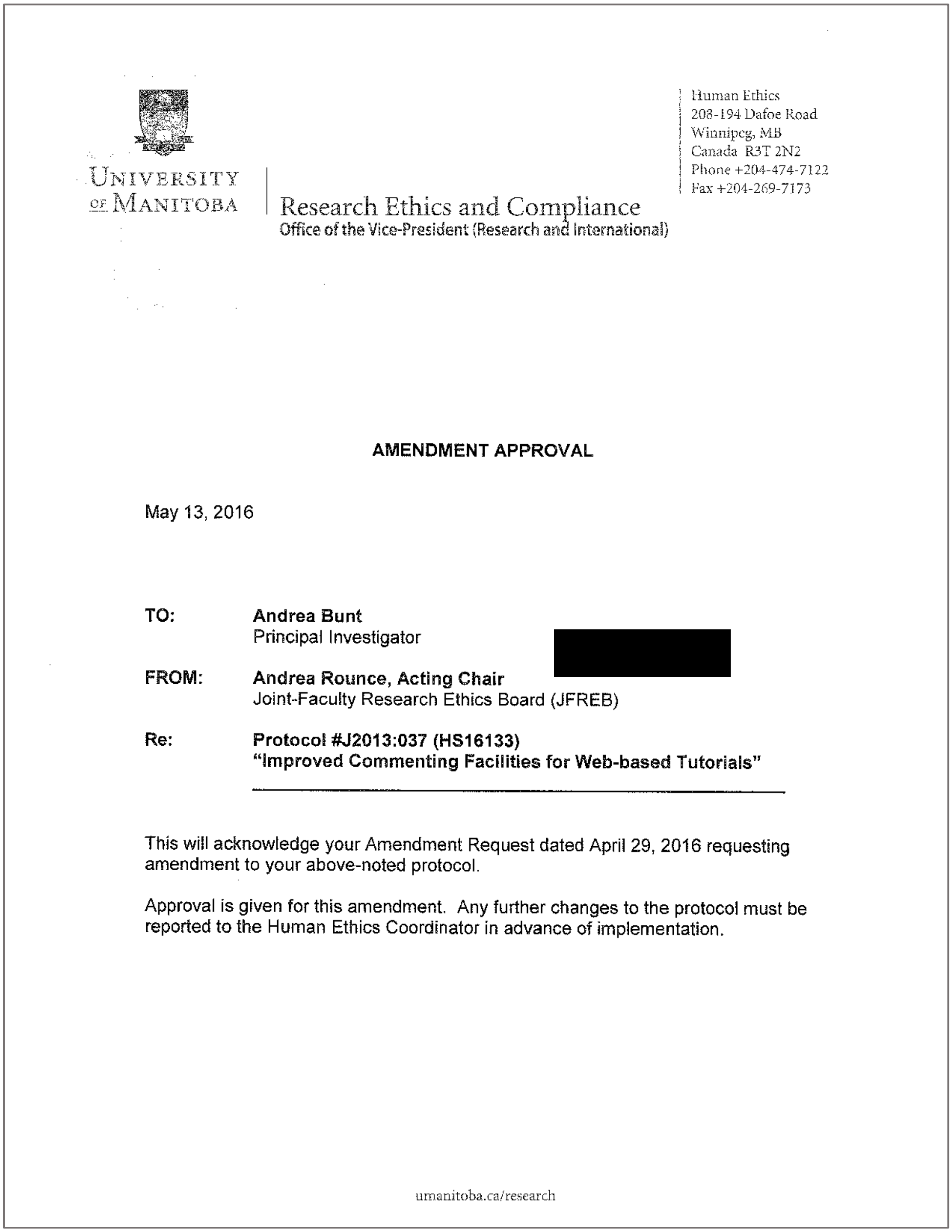
Set 3: We gathered feedback from our participants from our pilot study and made the following changes:

- *Additional detail* was renamed to *Tell me more!*, as the former was seen to be too general. We also narrowed the scope to this category.
- The *Alternate method* and *Command location* categories were merged into the *What is this?* category. Our participants thought that you would automatically have command locations when describing alternate methods, and that describing how to access commands using different parts of the interface (e.g. keyboard shortcuts, menus) was one example of alternate methods.

Set 4: We decided to split the *Other and questions* category into the *Questions* and *Other* categories. As the *What is this?* icon was more appropriate for *Questions*, we found a new icon for *What is this?*. This was the set we used in our evaluation and that we refer to in Chapter 3.

Appendix B

Research Ethics Board Approval



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AMENDMENT APPROVAL

May 13, 2016

TO: **Andrea Bunt**
Principal Investigator

[redacted]

FROM: **Andrea Rounce, Acting Chair**
Joint-Faculty Research Ethics Board (JFREB)

Re: **Protocol #J2013:037 (HS16133)**
"Improved Commenting Facilities for Web-based Tutorials"

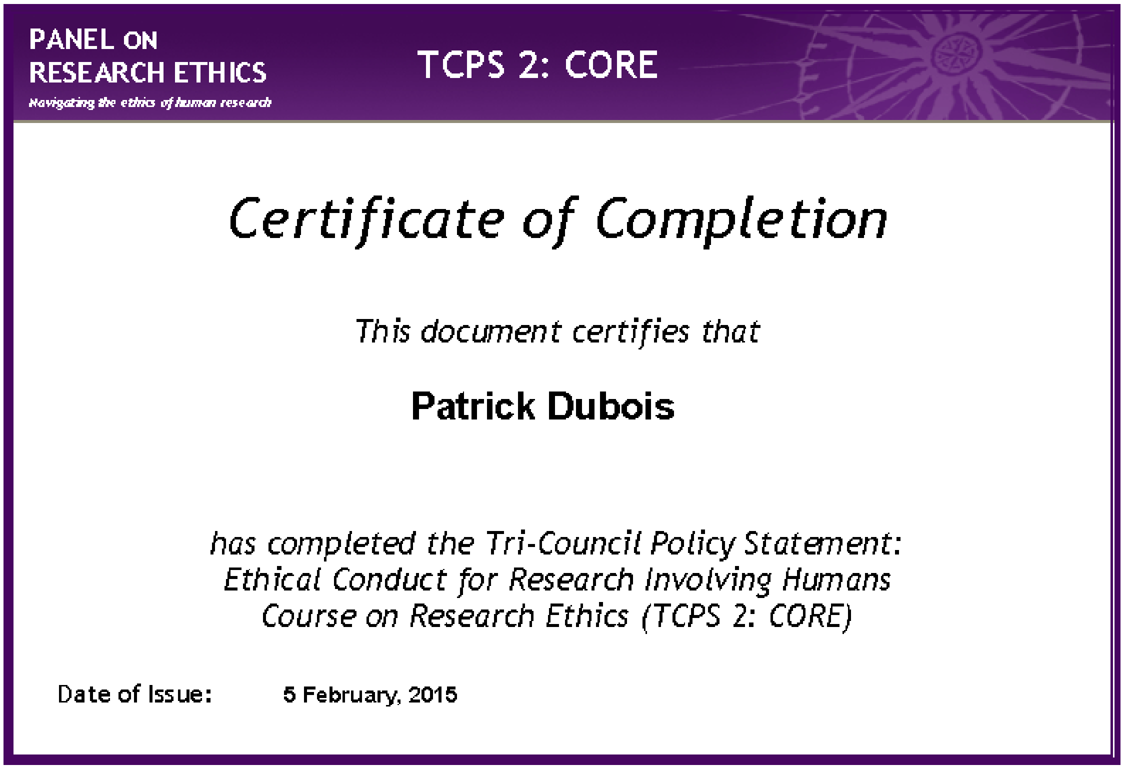
This will acknowledge your Amendment Request dated April 29, 2016 requesting amendment to your above-noted protocol.

Approval is given for this amendment. Any further changes to the protocol must be reported to the Human Ethics Coordinator in advance of implementation.

umanitoba.ca/research

Appendix C

TCPS 2: CORE Certificate



PANEL ON
RESEARCH ETHICS
Navigating the ethics of human research

TCPS 2: CORE

Certificate of Completion

This document certifies that

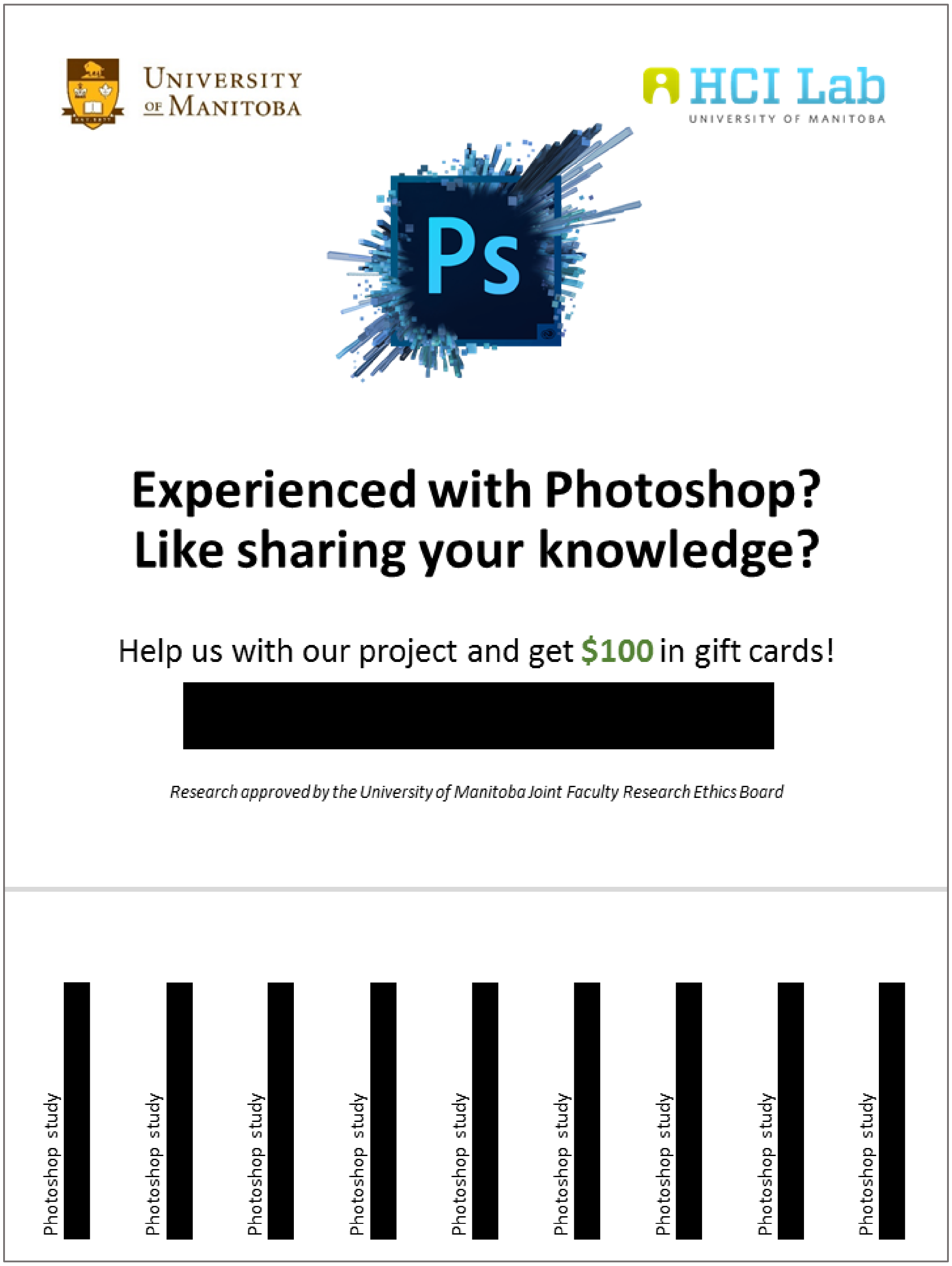
Patrick Dubois

has completed the Tri-Council Policy Statement:
Ethical Conduct for Research Involving Humans
Course on Research Ethics (TCPS 2: CORE)

Date of Issue: 5 February, 2015

Appendix D

Poster Advertising the Study



University of Manitoba

HCI Lab
University of Manitoba

Experienced with Photoshop?
Like sharing your knowledge?

Help us with our project and get **$100** in gift cards!

[redacted]

Research approved by the University of Manitoba Joint Faculty Research Ethics Board

Photoshop study [redacted]

Photoshop study [redacted]

Photoshop study [redacted]

Photoshop study [redacted]

Photoshop study [redacted]

Photoshop study [redacted]

Photoshop study [redacted]

Photoshop study [redacted]

Photoshop study [redacted]

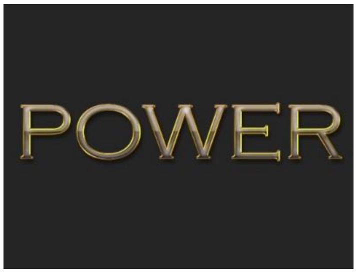
Appendix E

Tutorials used in Evaluation with Sources to Originals

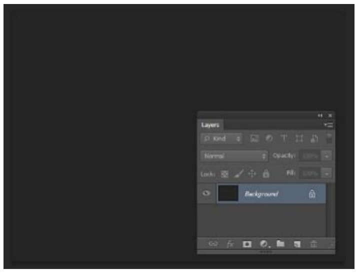
How to Create a Futuristic Metal Text Effect in Adobe Photoshop

(EnvatoTuts+: https://design.tutsplus.com/tutorials/cms-25829)

In this quick tutorial, we are going to create a simple Layer Style text effect. So you'll be just a couple of layer styles to create a bright, futuristic-themed text effect. Let's get started!

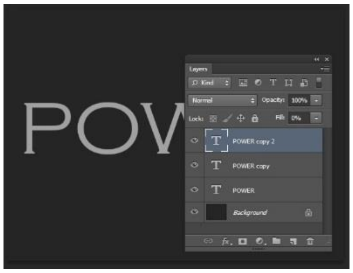


Step 1
Create a new 800 x 600px document, fill the Background layer with the color #252525.



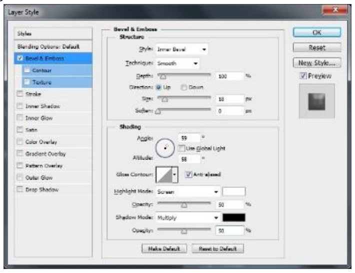
Step 2
Create the text. The Color is #a2a2a2. I used the font Copperplate Gothic Light with Size 180pt, but this can be up to you.

Step 3
Duplicate the text layer, change the copy's Fill value to 0, and then duplicate the copy.



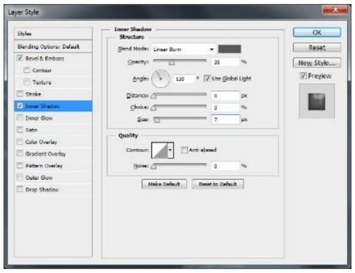
Layers: Normal, Opacity: 100%, Fill: 0%
- POWER copy 2
- POWER copy
- POWER
- Background

Step 4
Double click the original text layer to apply the following layer style. Add a Bevel and Emboss with these settings: Size: 18, Uncheck the Use Global Light box, Angle: 59, Altitude: 58, Check the Anti-aliased box.



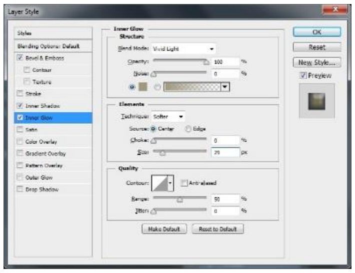
☑ Bevel & Emboss
Bevel & Emboss
Structure
Style: Inner Bevel
Technique: Smooth
Depth: 100 %
Direction: ● Up ○ Down
Size: 18 px
Soften: 0 px
Shading
Angle: 59 °
□ Use Global Light
Altitude: 58 °
Gloss Contour: ☑ Anti-aliased
Highlight Mode: Screen
Opacity: 50 %
Shadow Mode: Multiply
Opacity: 50 %
☑ Preview

Step 5
Add an Inner Shadow with these settings: Blend Mode: Linear Burn, Color: #585858, Opacity: 35%, Distance: 0, Size: 7



☑ Bevel & Emboss
☑ Inner Shadow
Inner Shadow
Structure
Blend Mode: Linear Burn
Opacity: 35 %
Angle: 120 ° ☑ Use Global Light
Distance: 0 px
Choke: 0 %
Size: 7 px
Quality
Contour: □ Anti-aliased
Noise: 0 %
☑ Preview

Step 6
Add an Inner Glow with these settings: Blend Mode: Vivid Light, Opacity: 100%, Color: #a39a7b, Source: Center, Size: 29



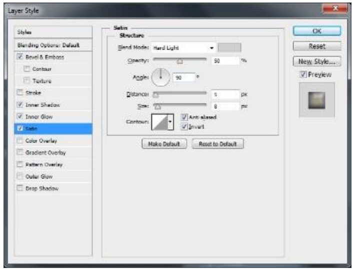
Layer Style

Styles: Blending Options: Default; ☑ Bevel & Emboss; ☐ Contour; ☐ Texture; ☐ Stroke; ☑ Inner Shadow; ☑ Inner Glow; ☐ Satin; ☐ Color Overlay; ☐ Gradient Overlay; ☐ Pattern Overlay; ☐ Outer Glow; ☐ Drop Shadow

Inner Glow — Structure: Blend Mode: Vivid Light; Opacity: 100 %; Noise: 0 %
Elements: Technique: Softer; Source: ● Center ○ Edge; Choke: 0 %; Size: 29 px
Quality: Contour: ☐ Anti-aliased; Range: 50 %; Jitter: 0 %

Step 7

Add a Satin style with these settings: Blend Mode: Hard Light, Color: #d0d0d0, Distance: 5, Size: 8, Check the Anti-aliased box, Check the Invert box



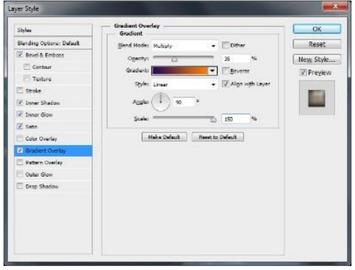
Layer Style

Styles: Blending Options: Default; ☑ Bevel & Emboss; ☐ Contour; ☐ Texture; ☐ Stroke; ☑ Inner Shadow; ☑ Inner Glow; ☑ Satin; ☐ Color Overlay; ☐ Gradient Overlay; ☐ Pattern Overlay; ☐ Outer Glow; ☐ Drop Shadow

Satin — Structure: Blend Mode: Hard Light; Opacity: 50 %; Angle: 90 °; Distance: 5 px; Size: 8 px; Contour: ☑ Anti-aliased ☑ Invert

Step 8

Add a Gradient Overlay with these settings: Blend Mode: Multiply, Opacity: 35%, Scale: 150%. Use the default Violet, Orange gradient fill.



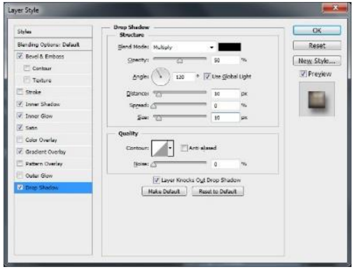
Layer Style

Styles: Blending Options: Default; ☑ Bevel & Emboss; ☐ Contour; ☐ Texture; ☐ Stroke; ☑ Inner Shadow; ☑ Inner Glow; ☑ Satin; ☐ Color Overlay; ☑ Gradient Overlay; ☐ Pattern Overlay; ☐ Outer Glow; ☐ Drop Shadow

Gradient Overlay — Gradient: Blend Mode: Multiply ☐ Dither; Opacity: 35 %; Gradient: ☐ Reverse; Style: Linear ☑ Align with Layer; Angle: 90 °; Scale: 150 %

Step 9

Add a Drop Shadow with these settings: Opacity: 50%, Distance: 10, Size: 10



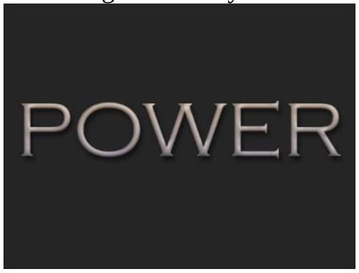
Layer Style

Styles: Blending Options: Default; ☑ Bevel & Emboss; ☐ Contour; ☐ Texture; ☐ Stroke; ☑ Inner Shadow; ☑ Inner Glow; ☑ Satin; ☐ Color Overlay; ☑ Gradient Overlay; ☐ Pattern Overlay; ☐ Outer Glow; ☑ Drop Shadow

Drop Shadow — Structure: Blend Mode: Multiply; Opacity: 50 %; Angle: 120 ° ☑ Use Global Light; Distance: 10 px; Spread: 0 %; Size: 10 px
Quality: Contour: ☐ Anti-aliased; Noise: 0 %
☑ Layer Knocks Out Drop Shadow

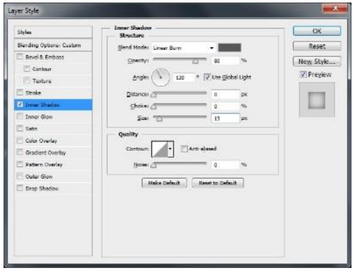
Step 10

This will style the original text layer.



Step 11

Double click the first copy text layer to apply the following layer style. Add an Inner Shadow with these settings: Blend Mode: Linear Burn, Color: #585858, Opacity: 80%, Distance: 0, Size: 13



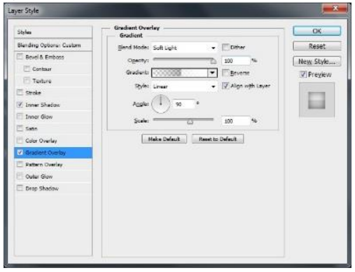
Layer Style

Styles: Blending Options: Custom; ☐ Bevel & Emboss; ☐ Contour; ☐ Texture; ☐ Stroke; ☑ Inner Shadow; ☐ Inner Glow; ☐ Satin; ☐ Color Overlay; ☐ Gradient Overlay; ☐ Pattern Overlay; ☐ Outer Glow; ☐ Drop Shadow

Inner Shadow — Structure: Blend Mode: Linear Burn; Opacity: 80 %; Angle: 120 ° ☑ Use Global Light; Distance: 0 px; Choke: 0 %; Size: 13 px
Quality: Contour: ☐ Anti-aliased; Noise: 0 %

Step 12

Add a Gradient Overlay with these settings: Blend Mode: Soft Light. Use the following gradient fill: 0% opacity at location 0%, 100% opacity at location 100%, black at location 51%, white at location 52%.



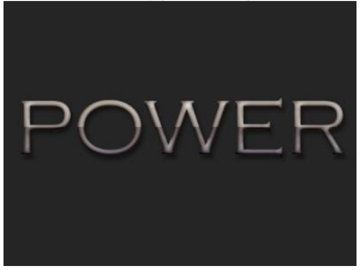
Layer Style

Styles: Blending Options: Custom; ☐ Bevel & Emboss; ☐ Contour; ☐ Texture; ☐ Stroke; ☑ Inner Shadow; ☐ Inner Glow; ☐ Satin; ☐ Color Overlay; ☑ Gradient Overlay; ☐ Pattern Overlay; ☐ Outer Glow; ☐ Drop Shadow

Gradient Overlay — Gradient: Blend Mode: Soft Light ☐ Dither; Opacity: 100 %; Gradient: ☐ Reverse; Style: Linear ☑ Align with Layer; Angle: 90 °; Scale: 100 %

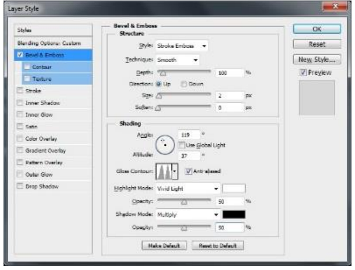
Step 13

This will style the first copy text layer.



Step 14

Double click the second copy text layer to apply the following layer style. Add a Bevel and Emboss with these settings: Style: Stroke Emboss, Size: 2, Uncheck the Use Global Light box, Angle: 119, Altitude: 37, Gloss Contour: Ring - Double, Check the Anti-aliased box, Highlight Mode: vivid Light



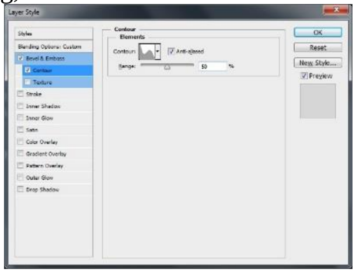
Layer Style

Styles: Blending Options: Custom; ☑ Bevel & Emboss; ☐ Contour; ☐ Texture; ☐ Stroke; ☐ Inner Shadow; ☐ Inner Glow; ☐ Satin; ☐ Color Overlay; ☐ Gradient Overlay; ☐ Pattern Overlay; ☐ Outer Glow; ☐ Drop Shadow

Bevel & Emboss — Structure: Style: Stroke Emboss; Technique: Smooth; Depth: 100 %; Direction: ● Up ○ Down; Size: 2 px; Soften: 0 px
Shading: Angle: 119 °; ☐ Use Global Light; Altitude: 37 °; Gloss Contour: ☑ Anti-aliased; Highlight Mode: Vivid Light; Opacity: 50 %; Shadow Mode: Multiply; Opacity: 50 %

Step 15

Add a Contour with these settings: Contour: Rolling Slope - Descending, Check the Anti-aliased box



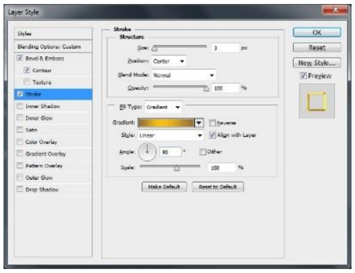
Layer Style

Styles
Blending Options: Custom
☑ Bevel & Emboss
☑ Contour
☐ Texture
☐ Stroke
☐ Inner Shadow
☐ Inner Glow
☐ Satin
☐ Color Overlay
☐ Gradient Overlay
☐ Pattern Overlay
☐ Outer Glow
☐ Drop Shadow

Contour
Elements
Contour: ☑ Anti-aliased
Range: 50 %

Step 16

Add a Stroke with these settings: Size: 3, Position: Center, Fill Type: Gradient. Use the following gradient fill: color #96723b at positions 0% and 100% and color #fbc110 at position 40%.



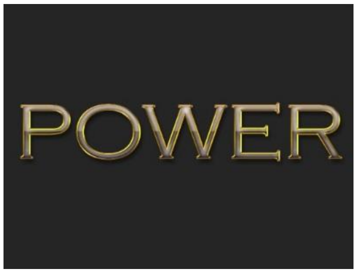
Layer Style

Styles
Blending Options: Custom
☑ Bevel & Emboss
☑ Contour
☐ Texture
☑ Stroke
☐ Inner Shadow
☐ Inner Glow
☐ Satin
☐ Color Overlay
☐ Gradient Overlay
☐ Pattern Overlay
☐ Outer Glow
☐ Drop Shadow

Stroke
Structure
Size: 3 px
Position: Center
Blend Mode: Normal
Opacity: 100 %
Fill Type: Gradient
Gradient: ☐ Reverse
Style: Linear ☑ Align with Layer
Angle: 90 ° ☐ Dither
Scale: 100 %

Congratulations! You're Done!

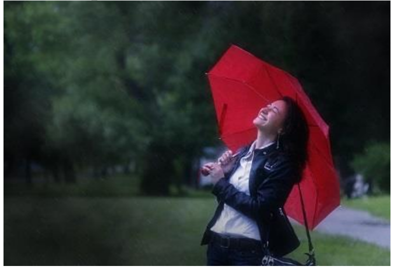
In this tutorial, we created three text layers, and styled each one of them to create the text effect and the stroke.



Add a Rain Effect to a Photo in Photoshop

(PhotoshopStar: http://www.photoshopstar.com/photo-effects/rain-effect-photo-photoshop/)

In this Photoshop tutorial you will learn how to add a rain effect to a photo. We'll use blending modes and a couple of native Photoshop filters.

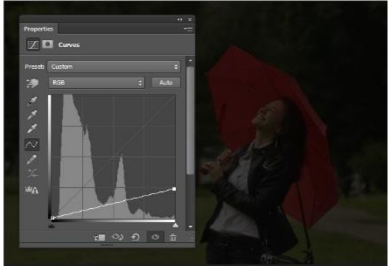


Step 1

Open the file "Girl". We're going to be adding rain to this photo but first we'll make some color adjustments and add some focus.

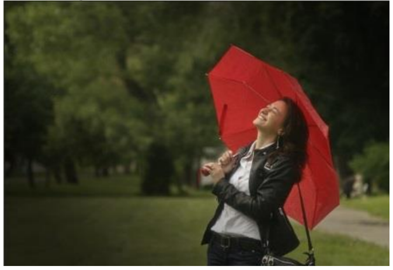
Step 2

Let's bring back the bright tones in this photo. Create a Curves Adjustment Layer (Layer >New Adjustment Layer > Curves) and drag the curve down as shown below. You'll notice a strong darkening effect.



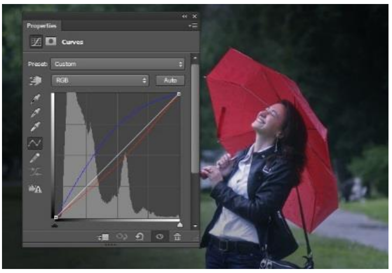
Step 3

Now let's hide this darkening effect in the middle of the photo. Choose the standard round soft brush and paint with 50% opacity over the middle of the photo to partially hide the darkening effect there.



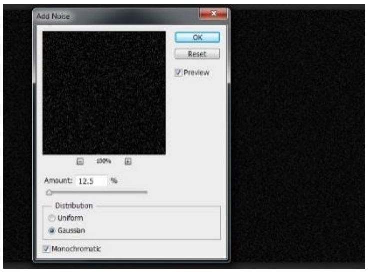
Step 4

We tend to associate rainy or cold days with cold tones – however our photo has warm tones. Let's adjust this by creating a Curves Adjustment Layer. Drag the blue curve up to boost the blues and drag the red curve down just a little bit to get rid of some of those reds. You should have something like the results below.



Step 5

Let’s create the rain drops. Create a new layer (Ctrl + Shift + Alt +N) and fill it with black (press D then press Alt + Backspace). Now apply some noise by going to Filter > Noise > Add Noise. From the options choose Gaussian and Monochromatic.



☑ Preview

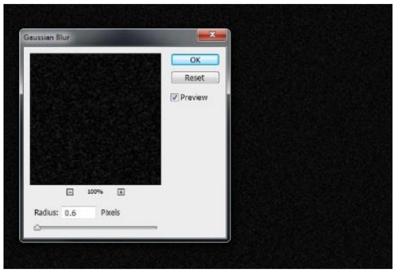
Amount: 12.5 %

Distribution
○ Uniform
● Gaussian

☑ Monochromatic

Step 6

The noise is way too detailed and pixelated for our purpose of creating rain drops. Let’s soften it up a bit by applying some Gaussian Blur.

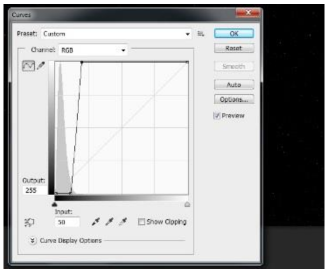


☑ Preview

Radius: 0.6 Pixels

Step 7

Our potential rain drops are just too many and their contrast compared to the background is too low. Let’s fix this by applying a curves adjustment to the noise layer (Image > Adjustments > Curves) with the settings shown below. By dragging the arrows towards the middle we will boost the existing white drops and get rid of the small ones.



Preset: Custom

Channel: RGB

☑ Preview

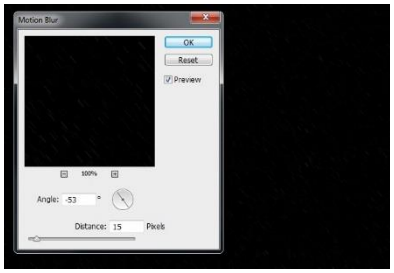
Output: 255

Input: 50

□ Show Clipping

Step 8

And now let’s create the actual falling rain drops. In order to do that let’s apply a Motion Blur to our noise layer by going to Filter > Blur > Motion Blur. Use the settings shown below and make sure to choose an oblique angle – rain drops don’t just drop vertically from the sky, they come at a certain angle depending on the wind.



☑ Preview

Angle: -53 °

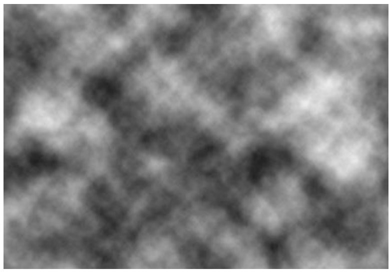
Distance: 15 Pixels

Step 9

Well, we have our rain but as far as we can see there are just white rain drops on a black background with no trace of our previous scene. How shall we correct that? With the help of the blending mode, of course. Simply change the blending mode of the rain drops layer from Normal To Screen and you’ll see that the black background simply disappears leaving only the rain drops visible.

Step 10

We have added rain drops but the atmosphere looks way too clear for a rainy day. Let’s add a bit of fog. Create a new layer (Ctrl + Shift + Alt + N) and create some clouds by going to Filter > Render > Clouds.



Step 11

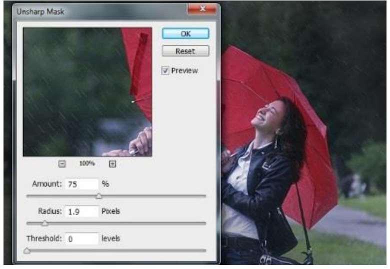
We do have both black clouds and white clouds but we don’t need the black ones. How are we going to hide them, huh? Well, if you remember in Step 9 we used the Screen blending mode to hide the black background from the rain drops layer. Will it work for the clouds too? Try it for yourself. Change the blending mode of the clouds layer to Screen and watch the black clouds vanishing. Because the cloud effect is too strong lower the opacity of the layer to 19%.

Step 12

The clouds are looking good but let’s prevent them from covering our main character – the girl with the umbrella. Add a layer mask to the clouds layer by going to Layer > New Layer Mask > Reveal All. You will see a white thumbnail appearing next to the preview thumbnail in the layer palette. Click on it to make it active and paint with the standard soft brush with black over the center of the image.

Step 13

We’re almost there. Let’s sharpen our image a bit. Create a new layer from all the visible layers by pressing Ctrl + Shift + Alt + E. Add a sharpen effect by going to Filter > Sharpen > Unsharp Mask and using the settings shown below to slightly sharpen our scene.



Unsharp Mask

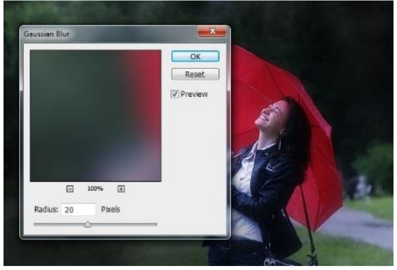
Amount: 75 %

Radius: 1.9 Pixels

Threshold: 0 levels

Step 14

Let’s add some contrast and rich tones to our scene. Create a new layer from all the visible layers again by pressing Ctrl + Shift + Alt + E and change the blending mode to Soft Light. Apply a 20px Gaussian Blur (Filter > Blur > Gaussian Blur) and press Ok.



Gaussian Blur

Radius: 20 Pixels

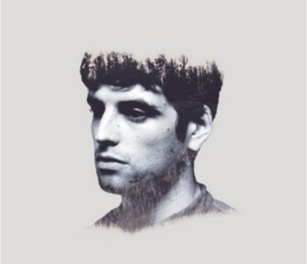
And We're Done!

In this tutorial, we used blending modes and a couple of filters to add a rain effect to a photo.

Make a Trendy Double Exposure Effect in Adobe Photoshop

(EnvatoTuts+: https://design.tutsplus.com/tutorials/cms-23774)

You’ve probably seen this interesting effect of two or more overlapping photos on the covers of music albums, in modern magazines and in advertisements. In this tutorial we’ll create a trendy double exposure effect in Adobe Photoshop with the help of Blending Modes and Clipping Masks in a few steps.

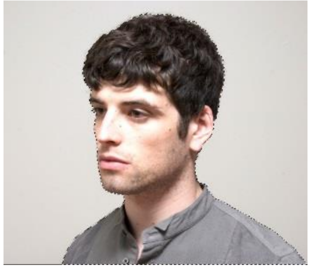


Step 1

For the base of our image, we’ll be using the following photo of a young man. You can use any photo to your liking, for example, from your personal archive. However, make sure that the background of your photo is more or less neutral, without noisy elements such as grass or foliage, to make it easier to work with.

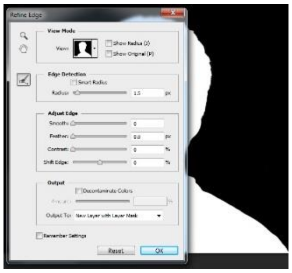
Step 2

Now we need to get rid of the background. This is a piece of cake, as we’re using a photo with a clean background. Take the Magic Wand Tool (W) and click anywhere on the background to select it. Then go to Select > Inverse in order to make the man selected.



Step 3

While you are still armed with the Magic Wand Tool (W), find the Refine Edge button in the control panel above to reveal the Refine Edge options window. Slightly increase the Radius value in the Edge Detection, setting it to 1.5, making the edges less rigid and thus revealing minor details, such as separate hairs. Set the Output To in the Output section of the options window to New Layer with Layer Mask.



Refine Edge

View Mode

View:

□ Show Radius (J)

□ Show Original (P)

Edge Detection

□ Smart Radius

Radius: 1.5 px

Adjust Edge

Smooth: 0

Feather: 0.0 px

Contrast: 0 %

Shift Edge: 0 %

Output

□ Decontaminate Colors

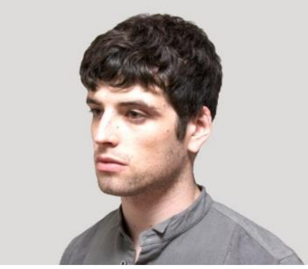
Amount:

Output To: New Layer with Layer Mask

□ Remember Settings

Step 4

Create a New Layer below the cut-out portrait and fill it with neutral greyish color (#dcdbd9) using the Paint Bucket Tool (G).

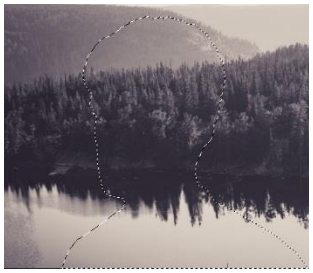


Step 5

Let's select the second photo for our composition. This can be some nice flower shot or cityscape, or anything abstract and intricate. For this tutorial, we'll use this monochromatic nature scene of a forest.

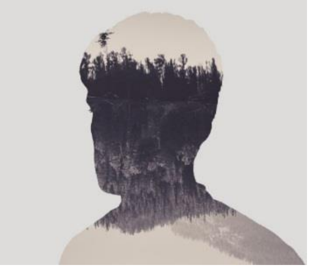
Step 6

Place the image of the forest above the man's portrait. Keeping the forest layer selected, press the Control key and click on the Layer Clipping Mask of the layer below (the one with the portrait). You will see the marching ants selection of the man's silhouette on the forest layer.



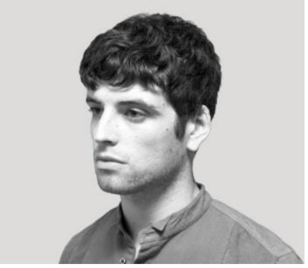
Step 7

Press the Add vector mask button in the bottom of the Layers panel to hide the unneeded parts of the forest image. Click on the chain icon between the image thumbnail and the mask thumbnail in the Layers panel. Let's put the forest image upside down, so that the dark reflection of the trees is placed in the head area of the silhouette, as shown in the screenshot below.



Step 8

Select the layer which contains the cutout portrait with Clipping mask. Make a copy and drag and drop it above the forest layer. Let's make the portrait monochromatic to fit the forest image color palette. Keeping the portrait layer selected, move to Image > Adjustments > Desaturate, converting our image to grayscale.

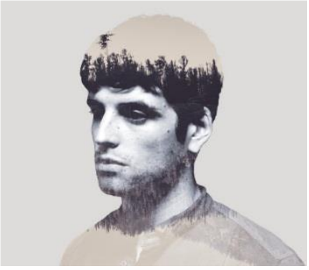


Step 9

Open the Levels (Control-L) options window and make the image much darker by moving the black slider to the right side or manually setting its value to 117. Apply the effect and go to Image > Adjustments > Hue/Saturation. Tick the Colorize checkbox in the bottom right corner of the options window to change the whole range of colors of our image. Set the Hue value to 212, moving the slider to the right, thus adding tints of blue. Set the Saturation level to 10, decreasing the vividness of the photo, and click OK to apply the created effect.

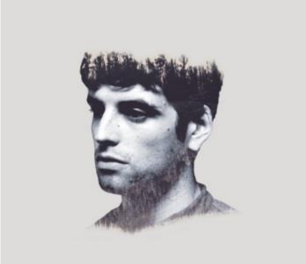
Step 10

Right-click on the portrait layer mask and we can Apply Layer Mask in the dropdown menu. Change the Blending Mode of the portrait layer to Screen in the Layers panel. We see that the desired double exposure effect appears!



Great Job! Our Trendy Portrait Is Finished!

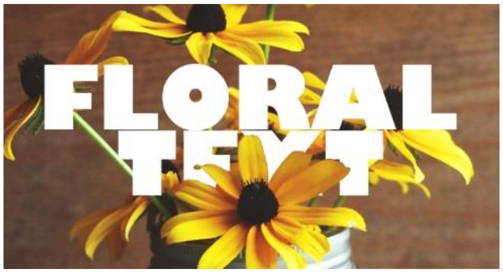
Congratulations! These simple steps helped us to create a stylish double exposure portrait by combining two images and creating an interesting surrealistic effect. You can then clean up your portrait. Here, I painted some black on the landscape mask to hide some of the sky, and painted some dark blue on a new layer below the monochrome picture to clean the guy's face. From here, it's up to you!



How to Create a Layered Floral Typography Text Effect in Adobe Photoshop

(EnvatoTuts+: https://design.tutsplus.com/tutorials/cms-26315)

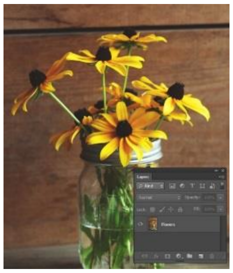
Floral typography is a design trend that combines nice floral elements with bold typography, to create some elegant designs. This tutorial will show you how to use a flower stock image, with a simple text, to create a starting point for your own floral typography design. Let's get started!



The following image was used during the production of this tutorial. The cool thing about the technique used in this tutorial is that it can work for almost any image you use. High-quality images with slightly large details, however, can create better and neater results.

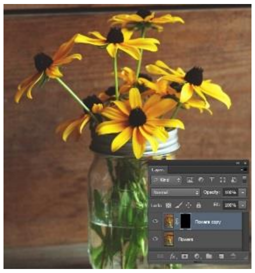
Step 1

Open the image of the flowers and rename its layer Flowers.



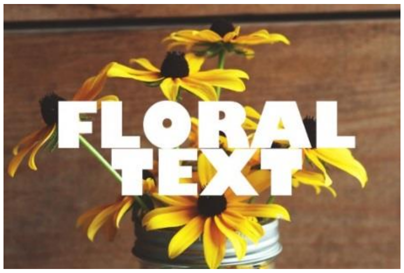
Step 2

Duplicate the Flowers layer, and then click the Add layer mask icon at the bottom of the Layers panel. Make sure that the layer mask thumbnail is selected, and fill it with Black.



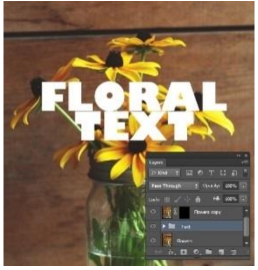
Step 3

Create the text in White. You can actually use any font and font size you like, but bigger sizes and bolder fonts look better. The Font used here is Gill Sans Ultra Bold and the Size is 500pt. If you want to place the letters separately, create each of them in a separate layer, and position them all over the flowers image you have.



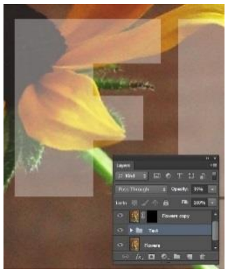
Step 4

Group the text layers you have, and call the group Text. Then place that group between the two Flowers layers.



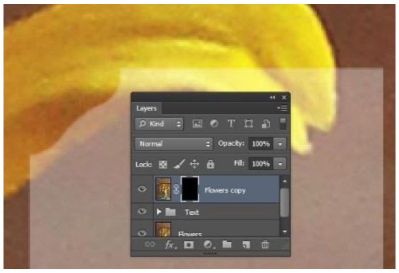
Step 5

Lower the Opacity of the Text group to a value that enables you to see both the text and the background image details clearly.



Step 6

Pick the Brush Tool (B), set the Foreground Color to White, and pick a hard round brush tip. Click the Flowers copy layer mask's thumbnail to select it, and then start painting over the parts you want to have in front of the text. You can use the [and] keys to increase or decrease the brush tip size. Just take your time to paint those parts as precisely as possible.

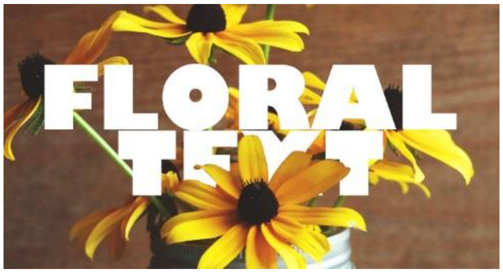


Step 7

If there are any parts that you want to unpaint, you just need to set the Foreground Color to Black and unpaint those areas. Use the X key to switch between the Foreground and Background (Black and White) colors. You can also use selection tools to select the parts you want to paint in and out if you like.

Congratulations! You're Done

Once you're done, set the Text group's Opacity to 100% again, and check how everything looks to see if you like it. Zoom in to fix any areas that need more work. It is a slightly time-consuming process, but it is important to get a polished final result.



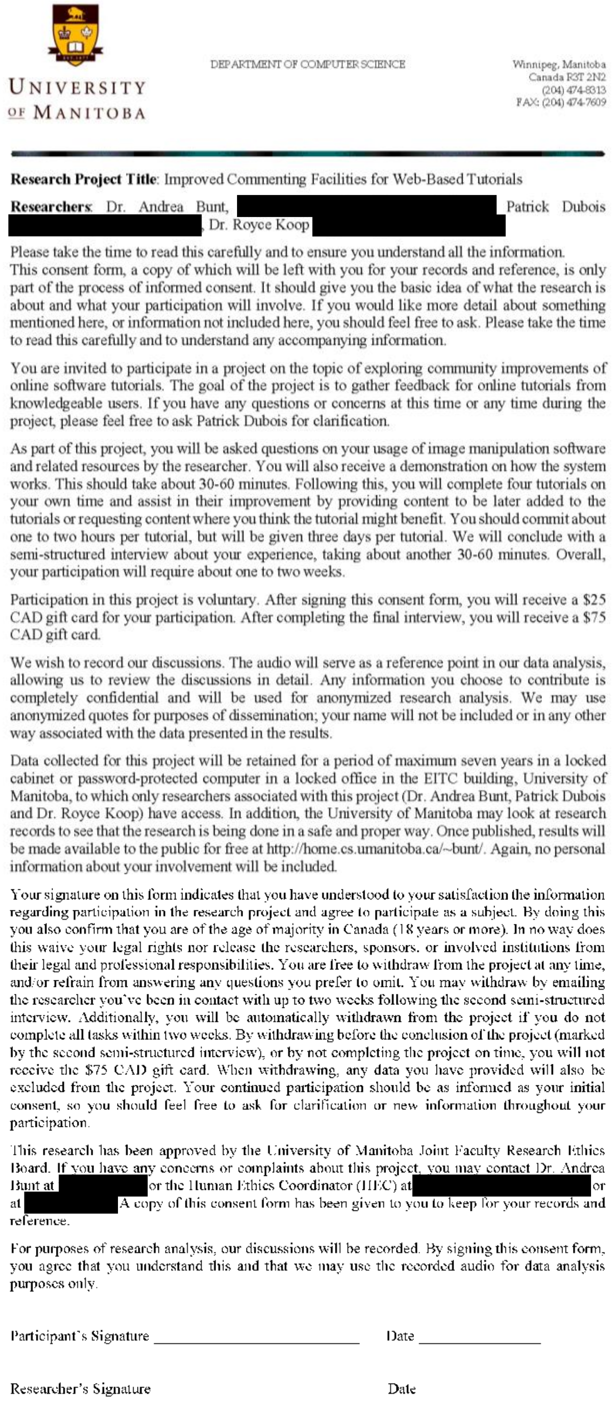
Appendix F

Pre-Seeded Notes

Tutorial	Order	Step Selected	Category	Author	Content
Add a Rain Effect to a Photo in Photoshop	1	Step 12	Tell me more!	Assiniboine	What part of the fog you erase will change every time. A good place to clean up is the foreground, in this case, the person.
	2	Step 11	Question	Winnipeg	The clouds don't look nice at all, what can I do to make them look nice?
	3	Step 8	Tell me more!	Assiniboine	The rain might be hard to see at this point, but it will look nice towards the end of the tutorial.
How to Create a Futuristic Metal Text Effect in Adobe Photoshop	1	Step 8	Tell me more!	Assiniboine	I didn't realize how big of an impact having a gradient makes for helping it look like metal.
	2	Step 10	Question	Winnipeg	What makes the text look like it's above the background?
	3 Reply to note 2	Step 10	What is this?	Assiniboine	The shadow (layers>layer style>drop shadow) makes the text stand above the background and the gradients give it the 3D look.
How to Create a Layered Floral Typography Effect in Adobe Photoshop	1	Step 3	Tell me more!	Assiniboine	This looks better with a thicker font.
	2	Step 6	What is this?	Assiniboine	If you want to unpaint a petal change your brush color to black and paint over it.
	3	Step 7	Question	Winnipeg	Is there a tool that might make selecting the flowers more efficient?
Make a Trendy Double Exposure Effect in Adobe Photoshop	1	Introduction	Question	Winnipeg	How would I decolor and change the overall hue of the image?
	2	Step 3	What is this?	Assiniboine	You can play with the refine edge tool to make the outline smoother.
	3	Conclusion	Tell me more!	Assiniboine	To expand on what the author's done, add a layer between the landscape and the face. Then, paint some blue (use the eyedropper on the trees) to hide some of the landscape.

Appendix G

Consent Form



UNIVERSITY OF MANITOBA

DEPARTMENT OF COMPUTER SCIENCE

Winnipeg, Manitoba
Canada R3T 2N2
(204) 474-8313
FAX: (204) 474-7609

Research Project Title: Improved Commenting Facilities for Web-Based Tutorials

Researchers: Dr. Andrea Bunt, [redacted] Patrick Dubois [redacted], Dr. Royce Koop [redacted]

Please take the time to read this carefully and to ensure you understand all the information. This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

You are invited to participate in a project on the topic of exploring community improvements of online software tutorials. The goal of the project is to gather feedback for online tutorials from knowledgeable users. If you have any questions or concerns at this time or any time during the project, please feel free to ask Patrick Dubois for clarification.

As part of this project, you will be asked questions on your usage of image manipulation software and related resources by the researcher. You will also receive a demonstration on how the system works. This should take about 30-60 minutes. Following this, you will complete four tutorials on your own time and assist in their improvement by providing content to be later added to the tutorials or requesting content where you think the tutorial might benefit. You should commit about one to two hours per tutorial, but will be given three days per tutorial. We will conclude with a semi-structured interview about your experience, taking about another 30-60 minutes. Overall, your participation will require about one to two weeks.

Participation in this project is voluntary. After signing this consent form, you will receive a $25 CAD gift card for your participation. After completing the final interview, you will receive a $75 CAD gift card.

We wish to record our discussions. The audio will serve as a reference point in our data analysis, allowing us to review the discussions in detail. Any information you choose to contribute is completely confidential and will be used for anonymized research analysis. We may use anonymized quotes for purposes of dissemination; your name will not be included or in any other way associated with the data presented in the results.

Data collected for this project will be retained for a period of maximum seven years in a locked cabinet or password-protected computer in a locked office in the EITC building, University of Manitoba, to which only researchers associated with this project (Dr. Andrea Bunt, Patrick Dubois and Dr. Royce Koop) have access. In addition, the University of Manitoba may look at research records to see that the research is being done in a safe and proper way. Once published, results will be made available to the public for free at http://home.cs.umanitoba.ca/~bunt/. Again, no personal information about your involvement will be included.

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. By doing this you also confirm that you are of the age of majority in Canada (18 years or more). In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the project at any time, and/or refrain from answering any questions you prefer to omit. You may withdraw by emailing the researcher you've been in contact with up to two weeks following the second semi-structured interview. Additionally, you will be automatically withdrawn from the project if you do not complete all tasks within two weeks. By withdrawing before the conclusion of the project (marked by the second semi-structured interview), or by not completing the project on time, you will not receive the $75 CAD gift card. When withdrawing, any data you have provided will also be excluded from the project. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

This research has been approved by the University of Manitoba Joint Faculty Research Ethics Board. If you have any concerns or complaints about this project, you may contact Dr. Andrea Bunt at [redacted] or the Human Ethics Coordinator (HEC) at [redacted] or at [redacted] A copy of this consent form has been given to you to keep for your records and reference.

For purposes of research analysis, our discussions will be recorded. By signing this consent form, you agree that you understand this and that we may use the recorded audio for data analysis purposes only.

Participant's Signature ____________________________ Date ________________

Researcher's Signature Date

Appendix H

Demographics Questionnaire

1. What is your pseudonym? This is the name the researcher gave you to use for this study.

   ____

2. What is your age group?

   ○ 18-20 ○ 21-25 ○ 26-35 ○ 36-40 ○ 41-50 ○ >50

3. What is your gender?

   ○ Male ○ Female ○ Non-binary

4. What is your occupation and/or area of study?

   ____

   ____

5. Approximately how often do you use Photoshop? E.g. everyday, once a week

   ____

6. For what kind of tasks do you use Photoshop? E.g. website mockups, retouching photos, graphic design

   ____

   ____

7. How did you learn of this project (E.g. received email from researcher, saw poster on a board, heard from a friend)?

   ____

   ____

Appendix I

Study Summary Given to Participants

Pseudonym: Assiniboine

URL: [redacted]

Patrick's email address: [redacted]

Instructions

1. Go to the above URL.
2. Put in your pseudonym, exactly as given to you.
    a. If the page is then blank, then something went wrong. Try refreshing, and make sure the pseudonym is spelled properly.
3. You will be shown a tutorial.
4. Take your time to contribute to the tutorial.
5. Email Patrick when you think you are done with a tutorial.
6. Wait for Patrick to reply and restart at step 1.

Tutorial Information

- There will be 4 tutorials.
- It should take 15-30 minutes for a student learning Photoshop to complete a tutorial.
- Put in 1-2 hours of effort per tutorial to improve them.
- You will have 3 days for each tutorial. Email Patrick if you think this will be an issue.
- Email Patrick when you think you are done with a tutorial.
- You only see one tutorial at a time, and won't be able to go back to a previous tutorial.

Known Issues

The system is new and has some issues. Here are those that we are aware of and solutions. If you notice anything else, please let Patrick know.

- The system was tested in Chrome and may not work properly in other browsers.
- When replying to someone else, your text might not be shown properly. It is only a visual bug. It should fix itself when you refresh the page. Please do so to make sure it has been submitted properly.

Appendix J

System Instructions

Interface with Inline Notes

When you log into the system, you will only see the tutorial. If notes have been submitted, they will be visible as little icons to the left of each step of the tutorial. Each icon represents a category. Click on it to see notes for that step. When you hover over a step, you will see a button for submitting your own notes.

There are 5 categories.

- Correction: Point out an error in the tutorial, or provide a correction.
- What is this: Clarification for something that is crucial in completing the tutorial.
- Tell me more: Information that is not crucial for completing the tutorial, but may help someone learn something new.
- Question: Asking a question for the tutorial. Other users may provide a reply.
- Other: Label your note with your own category.

Note: When submitting notes to the very first part of the tutorial, they might not be visible until you refresh the page.

Interface with Sidebar

When you log into the system, you will see the tutorial with a bar on the side, containing comments. The comments submission area is at the bottom of this bar. This bar moves independently from the tutorial, so you will have to be aware of where you are scrolling.

Appendix K

Semi-Structured Interview Sample Questions

1. Which interface did you prefer?

2. What did you like/dislike about the interfaces?

3. How did you feel about the categories?

4. How did you feel about placing notes at specific part of the tutorials?

5. What do you think is missing? (sketch on paper)

6. Imagine you are someone learning Photoshop. How do you think you would feel if you were using the interface?