NICE: Social translucence through UI intervention

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ABSTRACT

Social production systems such as Wikipedia rely on attracting and motivating volunteer contributions to be successful. One strong demotivating factor can be when an editor's work is discarded, or "reverted", by others. In this paper we demonstrate evidence of this effect and design a novel interface aimed at improving communication between the reverting and reverted editors. We deployed the interface in a controlled experiment on the live Wikipedia site, and report on changes in the behavior of 487 contributors who were reverted by editors using our interface. Our results suggest that simple interface modifications (such as informing Wikipedians that the editor they are reverting is a newcomer) can have substantial positive effects in protecting against contribution loss in newcomers and improving the quality of work done by more experienced contributors.

Categories and Subject Descriptors

H.5.m [**Information interfaces and presentation**]: Misc.

Keywords

Wikipedia, interface, experiment, revert, contribution

1. INTRODUCTION

Through the analysis of Wikipedia's periodic data dumps, the scientific community has been able to gain rich insights into how people behave in online communities. With a few exceptions, e.g., [2, 7], most of these contributions have been based on retrospective analysis of historical data. In this paper, we leverage Wikipedia's user-script[1] system to create slight but potentially important modifications to editors' interactions within Wikipedia. We then report on the effects of these interface modifications on editor behavior in the Wikipedia community.

Our interface modifications focus on a stressful, but necessary, editing activity, the revert[2]. Previous work by Halfaker et al. showed that editors were often reverted for reasons they could not reasonably predict and that had nothing to do with the quality of their work[4]. Zhang et al. showed that editors would often reduce their activity after articles they created were modified by other editors[9]. We hypothesized that being reverted would have a similar demotivating effect on editors. We tested this hypothesis through the application of a linear regression to a random sample of 10,000 edits from the January, 2008 dump of the English Wikipedia. The regression controlled for editor experience, tenure in Wikipedia, and the proportion of the editors' edits that were reverted. In our regression, being reverted had a significant, negative correlation on future contributions to Wikipedia (approximately one fewer edit per day, $p < 0.02$).

We borrow insights from Erickson et al.'s work on designing socially translucent systems[3] to create *NICE*, an interface modification that consists of two components: one which increases social translucence through increased awareness of newbie editors and another that reduces the effort necessary for the reverting editor to directly communicate with the editor they've reverted. We sought to increase awareness of "newbie" editors because of previous work that showed that Wikipedia's population of editors is dwindling due to a decreased conversion of new editors into substantial contributors [6, 8]. Furthermore, other research has shown that WikiProject groups perform better if they have a mixture of editors at different levels of experience, suggesting that an ongoing stream of new editors is important [1]. How-

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[1]User-script modifications in Wikipedia are javascript based programs that users install in their account to make changes to Wikipedia's interface.

[2]In Wikipedia, a revert is an edit to an article that restores that article to a previous state and removes the intervening changes.

ever, despite the Wikipedia policy against "biting the new-comers"[3], newbies are still leaving at an increasing pace [8].

We report the results of a 5 month randomized and controlled trial of NICE in the English Wikipedia, focusing on an analysis of the change in behavior among 487 reverted editors.

2. EXPERIMENTAL METHODS

We developed and released NICE, a user-script modification for the English language Wikipedia that registered editors could install in their accounts. NICE modified the interface that an editor saw when he used Wikipedia's "undo" interface to performed a revert. NICE has two key components: the *newbie warning*(warn) and *message box*(box).

Warn. This interface component, which can be seen in Figure 1, appears only when the editor to be reverted had previously completed fewer than 100 edits before the interface was loaded. Otherwise, no visual modification was made. To compare this interface to the windowed door example discussed by Erickson et al.[3], this modification is much like a warning light that is on when the user is interacting with a newbie and off otherwise. This means that, although no modification is made to the interface when the editor to be reverted is not a newbie, the user is made aware of this by the lack of a notification. It is our intention that this interface change increase reverting editors' perceptually based awareness of the editors whose contributions they discard and that this increased awareness would help them decide how best to act. Though increased perceptual awareness is only one of three social translucence improvements referenced in the windowed door example, we felt it was the most likely to have a positive effect on the revert experience.

Box. This interface component was designed to improve the functionality of the reverting interface by allowing the reverting editor to communicate directly with the reverted editor without having to leave the reverting screen. The modification, which can be seen in Figure 1, adds two text fields (for the header and message) and a short message explaining that, if text is added to the fields, a message will be sent to the reverted editor when the revert is completed.

To recruit research subjects we posted invitations on several discussion mechanisms used by Wikipedians, including the English Wikipedia mailing list and the Villiage Pump discussion forums. We initially randomly assigned individual interface modifications (between subjects). After the first two months of the experiment, all subjects were given the combined interface (within subjects) for three months, until we began analysis. For the entire period, a control group with a minor, insubstantial interface modification[4] was observed.

2.1 Measuring motivation and quality of work

Motivation. To measure motivation, we examined reverted editors' raw activity (edits) per day in Wikipedia. We analyzed edits separately in each namespace[5] separately to differentiate between types of activity.

Quality. To determine the quality of editors' work, we measured the proportion of edits an editor made in the main article namespace that were reverted by another editor, or reverted edits/revision. Our use of reverted edits/revision is based on the assumption that the higher quality an editors work, the less likely they are to have their edits reverted by other editors.

2.2 Measuring changes in motivation and quality of work

The most simplistic way to measure changes in motivation and quality is to compare the raw difference between timespans before and after an editor was reverted. However, this approach shows a strong bias towards editors who edit at high rates of activity since minor proportional variations in their activity can come out to raw changes in much higher edits/day than editors who edit with less frequency. Another possible way to detect changes is to control the raw difference by dividing by the recent mean to create a proportion difference. We found that this approach favored editors who were not highly active.

To control for these biases, we developed an analysis technique for measuring changes in individual editor behavior that we refer to as the *substantial change* metric. We define a substantial change as a significant difference between the mean of two samples, one taken from the available recent history of editor activity (up to one month) and the other taken from some timespan of future activity. For example, to determine if an editor changed substantially in activity after a revert, we compute the mean and standard deviation in edits/day of the recent activity before the revert and some future timespan. Then we perform Student's T Test to determine whether the difference in edits/day is statistically significant between the two samples. If the difference is significantly negative or positive, we conclude that there was a substantial decrease or increase, otherwise we conclude that no substantial change took place.

We looked for substantial changes between the timespans of up to one month before[6] and one month after the revert took place. We performed a sensitivity analysis using day and week as alternative timespans and the effects were robust to changes in timespan chosen so we report month since it demonstrates long term changes in editor behavior. To understand the effect that differences in substantial changes might have on the system as a whole, we multiply the substantial change proportion difference between the control and experimental conditions by the expected value to report expected net differences of edits/editor/day for activity and reverted edits/edit/editor/day for quality. These expected changes can, in principle, be scaled by the size of the group that uses the interface to predict the overall expected change in editing behavior.

3. RESULTS AND DISCUSSION

Of the 49 editors that installed a version of NICE, 26 editors continued using the interface for enough reverting

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[3]http://en.wikipedia.org/w/index.php?oldid=382874043

[4]The interface modification of the control attached a message to the reverting interface thanking the user for participating in the study.

[5]In Wikipedia, namespaces represent different information contexts with different functions of the system. For example, encyclopedia articles are in a different namespace than the

dicsussion of those articles, but all actions are wiki page edits.

[6]Reverted editors had to have been registered for at least three days to generate a comparison. All other reverted editors were not included in the analysis.
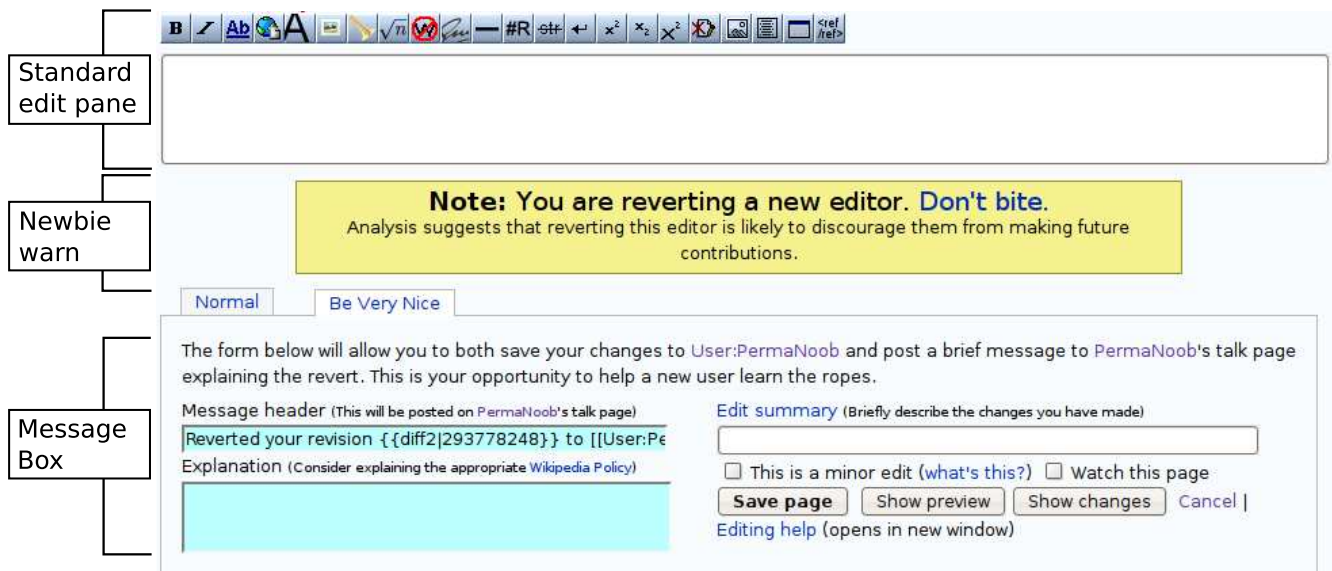
Figure 1: The experimental components of the NICE interface modification

edits[7] to be included in the analysis. Together, they reverted 743 edits in the main namespace. Since some editors were reverted more than once, we randomly selected a revert from our observations for each reverted editor to obtain 500 unique reverts, 36 (22 newbie) in the *box* condition, 55 (34 newbie) in the *warn* condition, 314 (210 newbie) in the *box and warn* condition and 95 (56 newbie) in the control. A longer period of data collection for the *box and warn* condition is responsible for the larger amount of observations.

3.1 Observed effects

A key question is the extent to which the new interfaces changed the behavior of the editors who were reverted. We use the substantial change metric to evaluate changes in editor behavior. We check for statistical significance by using a proportions test on the difference in the proportion of editors who exhibit substantial changes between the control and experimental conditions[8]. We analyzed the effects of the interface on newbie and non-newbie reverted editors separately because we expected the interface modification to have a different effect depending on the experience level of the reverted editor.

Box. Newbies reverted by subjects in the *box* condition were marginally significantly more likely to substantially increase their activity in the article talk (14.4%, $p<0.10$) and Wikipedia (14.4%, $p<0.10$) namespaces[9]. However, newbies reverted in this condition did not show significant changes to overall Wikipedia activity, suggesting that, although the

presence of the interface changed where in newbies did their work, it did not appear to change how much total work they completed. These newbies were also significantly more likely to substantially decrease the quality of their work (32.9%, $p<0.05$) for an expected net worsening of 0.173 more reverted edits/editor/edit/day.

Non-newbies showed no significant difference in activity levels from the control, but were significantly more likely to improve their quality (23.3%, $p<0.05$) and significantly less likely to decrease their quality (−21.6%, $p<0.03$) for an expected net improvement of 0.142 fewer reverted edits/edit/editor/day. Out of our three experimental conditions, this was the largest and most signficant change to editor quality observed.

Warn. Newbies reverted by subjects using the *warn* interface were significantly less likely to substantially decrease their activity in the main article namespace (−20.2%, $p<0.05$) resulting in a net gain of 1.24 edits/editor/day in the next month. This postive effect on newbie activity supports our intentions when designing this component of the interface modification.

Non-newbies reverted by subjects using the *warn* interface were significantly less likely to increase their activity in the Wikipedia namespaces (−24.9%, p<0.03) resulting in a net loss of 0.765 edits/editor/day. However, non-newbies did not show a significant change in overall Wikipedia activity. They were significantly more likely to improve their quality (23.4%, $p<0.03$) for a expected net improvement of 0.034 fewer reverted edits/edit/editor/day.

Box and warn. Newbies reverted by editors in the *box and warn* condition were marginally significantly less likely to substantially decrease their activity in the main namespace (−13.1%, $p<0.10$) resulting in a expected net increase in activity of 0.806 edits/editor/day respectively. Non-newbies who were reverted were significantly less likely to increase their activity overall (−19.2%, $p<0.03$) resulting in a net loss of activity of −6.85 edits/editor/day, but were significantly more likely (23.5%, $p<0.03$) to improve their quality for a net improvement of 0.074 fewer reverted

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[7]We limited our analysis to subjects who had performed more than three reverts with the interface to ensure that our results weren't biased towards subjects' initial reactions to the interface.

[8]The proportions test is based on a normal approximation to the binomial distribution. We use the *plus four* estimate to be more conservative in deciding significance with low numbers of observations.

[9]In reporting substantial changes we report both the p-values and the differences in likelihood between the experimental and control conditions throughout this section.

Table 1: Summary of significant differences between control and experimental conditions. Wikipedia namespaces (Wikipedia and Wikipedia_talk) are abbreviated as "WP".

Condition	Newbie?	Activity	Quality
Message Box	newbie	+WP +Talk	-
	non-newbie		+
Newbie Warn	newbie	+Main	
	non-newbie	-WP	+
Box and Warn	newbie	+Main	
	non-newbie	-Overall	+

edits/edit/editor/day That non-newbies were more likely to substantially decrease their editing activity could suggest that the combined *box and warn* condition produced a de-motivational effect. However, the significant increase in the probability of non-newbies to improve the quality of their encyclopedia article edits suggests that something more nuanced is taking place.

4. CONCLUSIONS

This research is motivated by the observation, documented in the introduction to this paper, that when Wikipedia editors are reverted, they reduce their future contributions. We designed and implemented NICE, an interface modification targeted at reducing this common demotivation. Our approach is to influence the reverting editor to communicate more effectively with the reverted editor. We sought to influence the reverting editor in two ways: (1) with a newbie warning, to encourage a "Please do not bite the newcomers" reaction; and (2) by reducing the effort of communicating with the reverted editor. We then examined the secondary effects of these interface modifications, not on the subjects who used the interface, but on the editors whose work they reverted. These interface modifications did indeed change the effect of reverts, generally leading to improved outcomes. The observed effects are summarized in Table 1.

The *warn* interface component of NICE was designed to increase awareness about the reverted editor through a simple application of social translucence [3]. The results of our analysis suggest the effects on activity were significantly positive for newbies. In general, newbies were less likely to decrease their activity after a revert if the reverting editor was using the newbie warn interface. This result suggests that unnecessary demotivation takes place in Wikipedia when newbie editors are reverted and that a very simple, pointed, reminder can significantly ameliorate that demotivation. This effect is potentially substantial when we reason about Wikipedia as a whole. The observed expected net increase of 1.24 edits/editor/day suggests that implementing this feature globally could affect the work done in Wikipedia on the scale of thousands of edits per day. Recent research has demonstrated that newbies are more likely than ever before to leave Wikipedia after only a small amount of contribution[8]. It is encouraging that such a simple interface modification has the ability to keep them involved and contributing. More informative interfaces may have even more powerful, beneficial effects on editor behavior.

In all three experimental conditions, non-newbie editors were more likely to substantially improve the quality of their work. It seems unlikely that this effect is due to any im-

proved social translucence since the message box doesn't tell the subject anything about the editor they are reverting. It is unclear whether the improvements observed in the message box condition are due to the implicit reminder that the editor whose edit is being reverted is another human being, or are due to providing direct support for communicating with the editor being reverted. In either case, the presence of the message box changed the interaction in such a way that the reverted editor improved their quality, though sometimes at the cost of decreased levels of activity. This exchange of quanitity for quality is not necessarily undesirable. Jimbo Wales, the founder and spokesperson for Wikipedia has stated that the encyclopedia should be focused more on quality than quantity[5], and it appears that the presence of these two simple interface modifications encouraged a change in that direction.

5. ACKNOWLEDGEMENTS

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