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Changing Names in Online News Comments at the *New York Times*

Simranjit Singh Sachar
University of Maryland, College Park
College of Information Studies
ssachar@umd.edu

Nicholas Diakopoulos
University of Maryland, College Park
Philip Merrill College of Journalism
nad@umd.edu

Abstract

Online news comments are often confronted with issues of civility and inclusivity, which are sometimes pegged to the anonymity afforded to contributors in those spaces. In this work we study one form of anonymity in online comments that manifests as users changing their display name when they write a given comment. We undertake a predominantly quantitative analysis of how display names are changed across over 4 million comments on the New York Times site. We characterize the extent and nature of name changes on the site, explore the relationship of name changes to topicality and sentiment, and examine how name changes might be used to inform the moderation of online comments.

Keywords: online commenting, anonymity, news, journalism

Introduction

Comments are a widespread feature offered by U.S. news publishers on their websites. A survey in late 2013 found that 100% of top national news outlets and over 90% of local news outlets allowed for users to write comments that are published below a news article (Jomini Stroud et al. 2015). Comments provide an outlet for users to both share and receive additional information, develop opinions, be entertained, and form social bonds through interactions around the news they consume (Diakopoulos & Naaman 2011). Yet there are ongoing concerns over the at-times vitriolic and otherwise low-quality discourse in online comments, with several recent and high profile closures of news comments[1]. Other emerging concerns include the degree of inclusivity and gender composition of news comments[2], with recent research indicating a heavily male skew in the user population of news commenters (Martin 2015; Pierson 2015).

A crucial design dimension of online commenting systems is how the system affords the development and management of user identity, including what name is chosen to project a user's identity into the online space (Baym 2015). Different sites allow for various types of name choices from "real name" verification (e.g. Facebook, Twitter "verified"), to the use of pseudonyms, or even complete anonymity (e.g. 4chan). Anonymity can reduce normative pressure online (Kiesler et al. 2012), act as a motivator for users to contribute (Fredheim et al. 2015), and creates an opportunity to share information that users may be punished for or fear other retribution from if their true identity became public (Diakopoulos & Naaman 2011). But the disinhibition afforded by anonymity can also lead to crude and antisocial behaviors resulting in uncivil discussion (Santana 2014). In other words there are a variety of pros and cons for anonymity in online communication.

This paper explores one design option along this spectrum of anonymity: providing the end-user flexibility in the name they choose to use when they publish a given comment, despite a persistent underlying identity on the site. To understand the nature of name change events we considered various dimensions of exploration. Motivated by the research literature as well as our own observations during exploratory analysis we considered dimensions including article topics, personal stories, and comment sentiment. In particular we observe and investigate how users change their display names across a sample of over four million online comments on the New York Times (NYT) site. Thus we consider pseudo-anonymity and anonymity in the production of information as evidenced by the comments that people write and the names they choose to attach to each of their comments. We contribute findings that expound on the nature and prevalence of these name changes, their sensitivity to topicality and different types of articles, as well as what a name change event may signal to community moderators that could be useful for orienting their

[1] http://www.niemanlab.org/2015/09/what-happened-after-7-news-sites-got-rid-of-reader-comments/
[2] https://coralproject.net/raising-womens-voices/

attention. With an eye towards concerns of inclusivity and gender imbalances we further analyze name changes according to gender detection to examine name transitions that lose, change, or adopt gender. And we examine the relationship between sentiment and name change patterns to assess whether negative or angry comment threads are more likely to have name changes. Finally, we offer a discussion of how these findings relate back to previous results on anonymity and gendered communication and offer possibilities for how results can inform moderation strategies for news organizations that are geared towards inclusivity.

Related Work

Here we consider the growing corpus of research literature relevant to anonymity and gendered discourse in online communication.

Anonymity and Pseudonyms

Journalists often blame anonymity for comment quality problems like incivility (Santana 2014), and the potential for anonymous commenters to attack news sources (Diakopoulos & Naaman 2011). Anonymity in comments has bearing on reading behavior for users and reporting behavior for journalists. The disinhibition afforded by anonymity can lead to profanity and sexism (Bernstein et al. 2011) or, at the very least, less civil discourse (Santana 2014).

At the same time anonymity has been shown to promote commenting volume as many users reported they would not comment if made to use their real name (Diakopoulos & Naaman 2011). This finding was corroborated by (Fredheim et al. 2015) who analyzed comments collected both before and after Huffington Post implemented a rule requiring commenters to authenticate their accounts through Facebook (i.e. removing anonymity). After this change, the total number of comments dropped drastically, especially in articles tagged as crime, politics, and world issues. This relationship between topicality and anonymity has been found in other research as well (Correa et al. 2015) with users exhibiting more "anonymity sensitivity" (i.e. the extent to which the user thinks the post should be anonymous) in topics like "NSFW" and "LGBTQ". Findings from Zhang and Kizilcec (2014) also showed that users prefer to share more controversial content anonymously. In this work we build on these previous studies by examining a specific type of anonymity sensitivity expressed as a name change, similarly examining relationships to topicality.

Bernie Hogan (2013) recently observed the rise of real names and the decline of pseudonyms in comparison to the early years of online communication. Some large players, such as Facebook espouse the use of real names, whereas others see the use of pseudonyms and anonymity as more authentic. "Anonymity is a state implying the absence of personally identifying qualities. Pseudonyms are a practice, which is often meant to facilitate non identifiable content," writes Hogan. He notes that historically pseudonyms came into use to shield authors and artists from dismissal or rejection from having the "wrong" gender or ethnicity. In the current research we analyze types and use of pseudonyms whenever there is a name change. This offers the opportunity to better understand when and why users seek anonymity through the use of pseudonyms or differently gendered names.

Gendered Communication

Recent research has shown that online news commenting is dominated by men both internationally across 15 different news publications (Martin 2015), as well as on the New York Times (Pierson 2015). These findings mirror earlier results in mixed-sex public forums or chat rooms where there is also female under-participation (Herring & Stoerger 2013). On the New York Times specifically, Pierson found that there is less participation by women in online news commenting overall, though with more participation on certain sections of news, such as parenting, fashion, and health. This topical pattern is consistent with research showing male or female dominance in discussion when respective traditional gender stereotypes fit with the topic of discussion (Postmes & Spears 2002).

Early work in online communication considered textual chat in MUDs (Multi-User Dungeons) and how users could explore swapped gender identities (Bruckman 1993). That research points out, as does the more recent work from Martin that female interlocutors are often targets of negative attention including bullying, harassment, hateful language, or sexual advances. Martin suggests that further research is needed to understand why some women may adopt pseudonyms for online news comments and whether there is a relationship with abuse or discrimination they may face. In the current research we examine gender as expressed through display names and investigate the propensity to lose, change, or adopt a gendered name across different topical sections of the news. The potential is to be able to develop indicators of where additional attention needs to be paid to gender inclusivity by orienting moderator attention.

Studying Name Changes

In this paper we study name changing in online news comments by asking the following research questions: (1) what is the extent and characterization of this phenomenon as it relates to the overall community as well as to the indi-

vidual user?; (2) how does name changing behavior vary across different news topics or articles?; (3) do name change events provide an informational signal that can inform more delicate or conscientious moderation of online comments?; and (4) do name change patterns relate to the sentiment of an article's comments? To investigate these questions we chose the New York Times as the platform of study as it is an active community with a high volume of commenting activity. In the following sub-sections we provide more detail on the platform and the data we use in our analysis before reporting on the findings of our study.

Platform of Study

The New York Times commenting system allows users to comment on articles online provided that they are logged into the site. Logging in can be accomplished using a Google or Facebook sign-in, or by providing an email address and password to create an NYT account. Comments made by users go through a pre-moderation process before they are published on the website. Comment moderators screen out comments that are in violation of community guidelines and also mark comments that are insightful and thoughtful as "NYT Picks" (Diakopoulos, 2015b). Comments accumulate a "recommendation" score by users voting on comments they like. The NYT system functions such that users can change the display name shown each time they comment. A single user ID associated with an account can thus have different display names used across different comments. This feature is crucial for the current study as it allows us to track individual comments where users have deliberately changed the name portrayed publicly on the site.

Data Collection and Inference

We collected comment and article data using the NYT Community and Article Search APIs[3]. We collected all available metadata from the APIs including comment text, display name, creation date, user ID, article URL, recommendation count, and NYT Picks status for comments as well as section name and sub-section name for articles. We split the full display name based on white space and primarily analyze user's first name. The sample gathered consists of 21 months (Jan. 1, 2014 – Oct. 1, 2015) of comment and article data, including 4,172,286 comments and 35,970 articles. Since each comment has a user ID associated with it, we were able to identify all unique users from the set of comments. We used this complete sample (CS) for the bulk of our analysis. We also identified users having more than one name change in CS and gathered their complete comment history as far back as the API provided data (until 2007). We refer to this dataset as the user history sample (UHS).

For each comment in the dataset we were interested to know if the name had changed since the last comment made by the same user account, as well as whether there was a qualitative change in the type of name used, such as a change in the gender implied by the name. Thus we further processed the collected data by inferring the most likely gender based on the first name of the display name used. Following previously published work analyzing the gender of commenter names on the New York Times (Pierson 2015), we utilized a python library called Sex Machine to classify the gender of each comment's user display name[4]. Sex Machine classifies a name's gender into one of five categories: male, mostly male, female, mostly female and androgynous. Androgynous is the classification assigned for names that are not recognized as either male (or mostly male) or female (or mostly female). We simplified further by assigning "mostly male" to "male" and "mostly female" to "female" resulting in three categories: male, female and androgynous. We note that a limitation of this approach is that it does not account for users whose gender does not fit a simple binary classification scheme.

Pierson (2015) previously assessed the accuracy of the Sex Machine algorithm, noting that there was little bias in accurately detecting male versus female names (which might lead to skew in comparisons). We further assessed the accuracy of the classifier by manually classifying a random sample of 250 names drawn from our complete sample of comments (CS) and comparing to the Sex Machine output. Both authors independently classified each name and then discussed any discrepancies until consensus was reached. In this sample we were able to detect the gender of 51.6% of names (the other 48.4% were marked as androgynous), and the overall accuracy in comparison to the manually constructed ground truth was 91.2%.

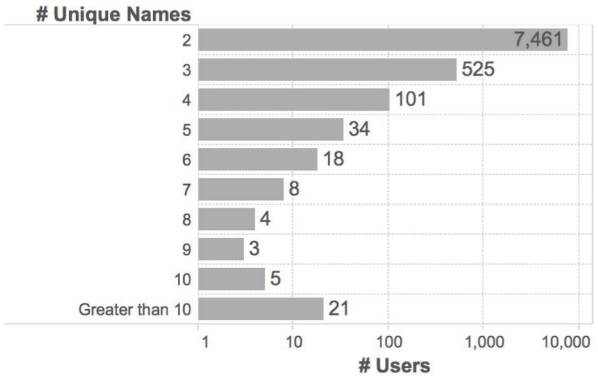

Figure 1. Frequency distribution of number of users using various numbers of unique names.

[3] http://developer.nytimes.com/docs

[4] https://github.com/ferhatelmas/sexmachine/

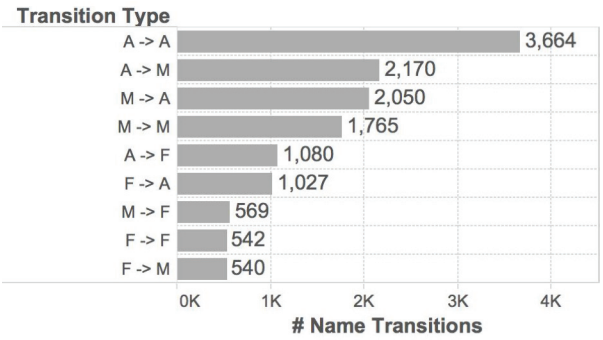

Figure 2. Frequency of name transitions between different name genders detected ("A" is short for "androgynous", "M" for "male", and "F" for "female").

Findings

Here we detail our findings corresponding to the four research questions outlined above.

Name Changing: Extent and Characterization

We first want to characterize the extent of the name change phenomenon across the entire NYT site, as well as provide more details concerning the types of name changes that occur. We define a name change as *the use of a different display name on the next comment made in time by a given user account*. We find that name changes are relatively rare events: the total number of comments in CS with name changes is 13,407 (0.32%). From a total of 358,585 users in CS (as determined via the unique user ID associated with each comment), we identified 171,495 who had two or more comments and 8,180 (4.8% of users who commented two or more times, or 2.3% of users overall) who had used more than one unique display name.

The distribution of the number of unique display names used across the 8,180 users accounts is shown in Figure 1. The majority (91.2%, or 7,461) of user accounts who changed names at all had just two unique names in their history. A very small number of user accounts (1.1%, or 93) used five or more unique names in CS. These results suggest that display name changes are not frequent or routine events for a majority of users. Figure 2 depicts the distribution of name changes based on the first name gender detected. More than half (55.2%) of name changes were either to or from male or female names, whereas the rest were to or from names detected as "androgynous".

To put a finer point on the composition of the relatively nebulous category of "androgynous" names we undertook a small qualitative analysis of those names. From the 8,180 user accounts that had changed names we manually inspected the names of a random sample of 300 accounts from UHS in order to better understand the diversity of names used across those accounts' history, including what

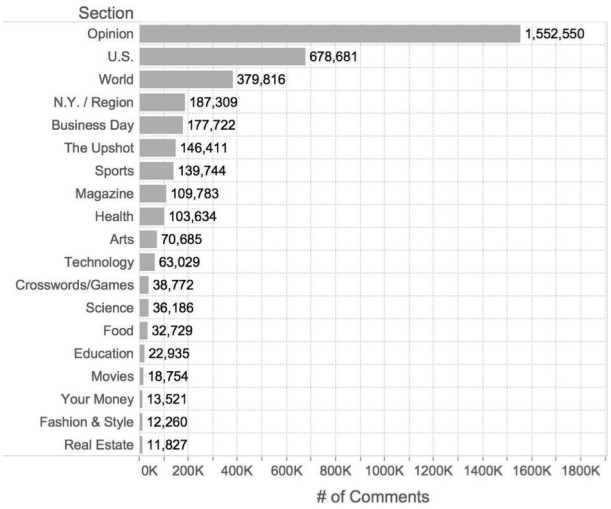

Figure 3. Count of number of comments in CS in each section having more than 10,000 comments.

types of names were likely to be detected by Sex Machine as "androgynous". It's worth noting that this observation process is highly subjective and there is substantial ambiguity in the interpretation of display names without additional context. Thus, we eschew trying to quantify name types and offer the following categories only to show the range and variability of the names observed. The types that we identified include:

- **Screenname**: These vary widely but may include thematic monikers, generic personas, historical figures, or descriptors (e.g., "DungeonMaster", "progressisgood", "humanspirit", "Diogenes", "enquiring").
- **Initial**: The user uses initials instead of an actual full name (e.g., "John Davis" switches to "jd", or "charles" to "c").
- **First name**: The user uses what appears to be a first name only (e.g., "marion", "richard").
- **Last Name**: The user uses what appears to be a last name only (e.g., "elwood").
- **Full Name**: A combination of a first and last name that run together (e.g., "julia" to "juliadinla").
- **Nickname**: A shortened or lengthened version of a user's name (e.g., "robert" to "rob", or "alexander" to "alex".
- **Typing error**: The user may have mistyped his/her name (e.g., "Richard" to "ridhard", "charles" to "chrls").
- **Non-Name**: The user uses a word or string of random characters that acts as a placeholder for the display name but is empty of information (e.g. "the" or "aldskf").

These categories are useful because they help characterize what types of names constituted the portion of the sample where the Sex Machine algorithm could not infer a gender. Display names that were screennames, initials, full names, typing errors, or non-names were detected by Sex Machine as "androgynous". Re-considering the data pre-

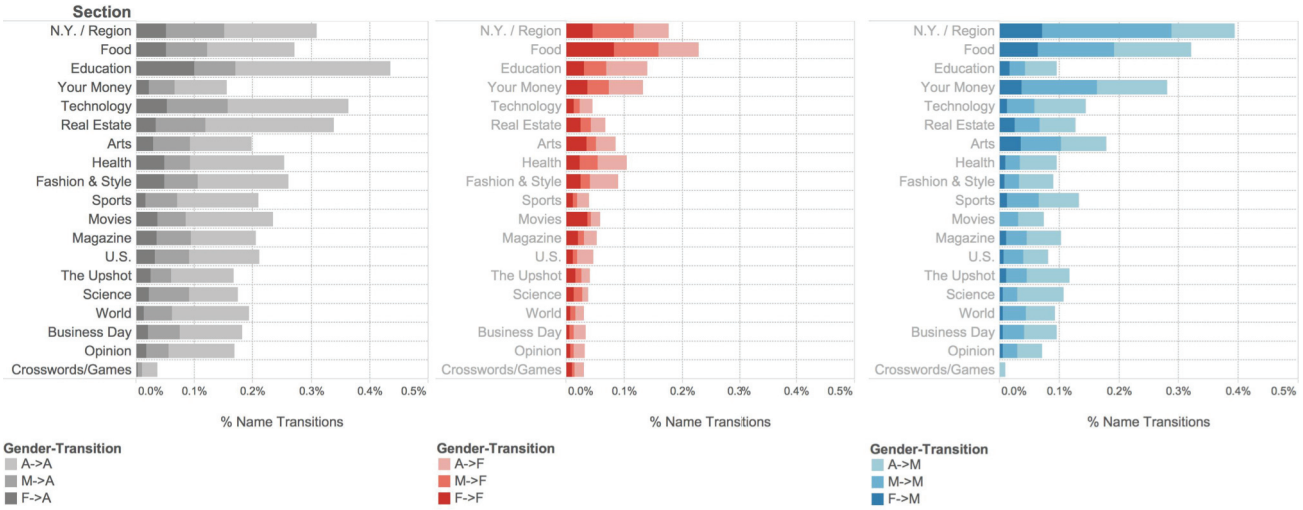

Figure 4. Percentage of name transitions across sections having more than 10,000 comments, rank ordered by rate of all transition types and broken down in panels by transitions to androgynous name (gray), to female name (red), and to male name (blue).

sented in Figure 2 in light of these various name categories we note that transitions in the M->A and F->A categories involve a user switching from a recognizable first name to a name that is perhaps less recognizable (e.g. initials, non-names) or recognizable as a different identity (e.g. screen-name). The number of user accounts with "Typing error" as a name change type turned out to be low in number (7, or 2.3% of the 300 we coded). We examine transition types in more detail in the next section.

Of interest in considering the user history data we collected (UHS) was whether users switched back to a previously used name, or whether name changes more often were to entirely new names. A transition back to a previous name (e.g., A->B->A) would signal that the interim name change was not arbitrary, but perhaps chosen for a specific limited time before switching back to the original name. We found that among users who made two or more name changes 60% of those (1,976 of 3,291) changed back to a previously used name. This provides some evidence that users are often not simply choosing a new name each time, but rather have a "home" identity or name that they use and go back to.

One possible explanation for name changes is that a family is using the same NYT account and thus if a husband, wife, and children type in different display names when commenting we may observe this as a name change, despite this in fact reflecting unique people commenting. To examine this possibility we tabulated the number of comments that exhibited a constant last name given a change in first name. We found this to be the case in only 524 comments (3.9% of 13,407), and in fact this likely over-represents family use of the same account since it also includes name changes due to first name changing to initials or shorter names. While some name changes appear to be due to account sharing, the majority are not.

Topical and Article Analysis

As previous research has suggested a relationship between anonymity and topicality (Correa et al. 2015; Fredheim et al. 2015) here we investigate a relationship between name transitions and topicality. Do users change names more frequently when commenting on certain topics or types of articles? We use the article metadata collected directly from the NYT API for "section" as the topical markers that we analyze.

There is a wide variance in the number of comments made on articles associated with different thematic sections (See Figure 3), ranging from the "Opinion" section with over 1.5M comments down to a section like "Science" with 36k, or "Fashion & Style" with 12k. This variance may have to do not only with the interest and popularity of various sections in attracting user comments, but also with editorial decisions made by the moderation staff at NYT. Every day the moderators decide on the fixed number of stories (25-27 per day in 2014[5]) that will be open to comment on that day. Thus, they may simply open more articles in the "Opinion" section for comments, resulting in the larger comment volumes there.

As a result of the volume variance across sections next we consider the relative rate (normalized by total comment volume in that section) of name changes across sections. These results are shown in Figure 4. Surprisingly, articles from the "Opinion" section have the second lowest rate of name changes, and of those most are to androgynous names. On the other hand, sections like "NY / Region",

[5]http://www.nytimes.com/times-insider/2014/04/17/a-comments-path-to-publication/

Loss of Gender (F->A, M->A)				Change of Gender (F->M, M->F)				Adopt Gender (A->F, A->M)			
Section	Chi-Sq	P-value	Mean	Section	Chi-Sq	P-value	Mean	Section	Chi-Sq	P-value	Mean
N.Y. / Region	139.23	3.93E-32	∧	N.Y. / Region	764.02	3.59E-168	∧	N.Y. / Region	170.64	5.37E-39	∧
Food	10.3	1.33E-03	∧	Food	153.61	2.82E-35	∧	Food	60.06	9.18E-15	∧
Education	28.5	9.38E-08	∧	Education	7.73	5.43E-03	∧	Education	5.7	1.69E-02	
Your Money	0.09	7.59E-01		Your Money	11.32	7.67E-04	∧	Your Money	17.11	3.53E-05	∧
Technology	57.53	3.33E-14	∧	Technology	0.18	6.70E-01		Technology	7.13	7.56E-03	∧
Real Estate	3.18	7.45E-02		Real Estate				Real Estate	0.07	7.96E-01	
Arts	3.11	7.76E-02		Arts	15.28	9.29E-05	∧	Arts	9.34	2.24E-03	∧
Health	4.86	2.74E-02		Health	6.34	1.18E-02		Health	14.89	1.14E-04	∧
Fashion & Style	1.73	1.89E-01		Fashion & Style				Fashion & Style	1.24	2.65E-01	
Sports	0.16	6.94E-01		Sports	1.74	1.87E-01		Sports	1.77	1.83E-01	
Movies	0.34	5.61E-01		Movies				Movies	0.89	3.46E-01	
Magazine	5.81	1.60E-02		Magazine	1.28	2.57E-01		Magazine	0.03	8.74E-01	
U.S.	23.37	1.34E-06	∧	U.S.	28.79	8.06E-08	∨	U.S.	6.71	9.58E-03	∨
The Upshot	3.24	7.17E-02		The Upshot	0.87	3.50E-01		The Upshot	1.01	3.14E-01	
Science	1.48	2.24E-01		Science	0.71	4.00E-01		Science	0.51	4.75E-01	
World	7.06	7.89E-03	∨	World	19.06	1.27E-05	∨	World	10.19	1.42E-03	∨
Business Day	0.06	8.02E-01		Business Day	10.24	1.37E-03	∨	Business Day	0.21	6.51E-01	
Opinion	56.69	5.10E-14	∨	Opinion	86.4	1.47E-20	∨	Opinion	42.39	7.48E-11	∨
Crosswords				Crosswords				Crosswords	13.48	2.41E-04	∨

Table 1: This table depicts the results of Chi-squared tests of proportion between the mean rate of the type of name changes in the given section and the overall rate of the name change in all sections. Sections with statistically significant differences from the mean are shown in black (non-significant in gray) and the "Mean" column indicates whether the mean rate in this section was greater or less than the overall rate. Empty cells indicate that there were not enough observations to satisfy the Chi-squared test assumptions.

"Food", "Education", and "Your Money" rank near the top in terms of overall rate of any type of name change. In the center panel of Figure 4 in red, the sections with fewer users switching to female names appear to be "Technology" and "Sports" whereas the section with the most proportion of users switching to female names is "Food". In the right panel of Figure 4 in blue a section with relatively few users switching to male names is "Education", whereas sections like "Food", "Your Money" and "Arts" have a comparatively higher rate of users switching to male names.

In order to better understand patterns of name changing across sections we consider three aggregations of name changes: (#1) loss of gender information, which includes F->A and M->A transitions, (#2) change of gender information, which includes F->M and M->F transitions, and finally (#3) adopt gender information, which includes A->F and A->M transitions. Loss of gender information (#1) is important because it signals that a user is switching away from a gendered self-presentation and perhaps towards a more anonymous self-presentation using a pseudonym. A change in gender information (#2) signals that the user has decided on a self-presentation as the opposite gender, per haps in an effort to avoid certain types of attention or feedback (e.g. bullying, threats, or abusive language) (Martin 2015), or to adapt to their imagined audience (Litt 2012). Adopting gender information (#3) signals that a user is switching towards a gendered self-presentation which could similarly be a strategy to make a comment "fit" better with an imagined audience.

To assess these three aggregations of name changes and whether there are some sections where they are more likely to take place we compared the rate of the specific types of name changes in each section to the average rate of those name changes across all sections. In Table 1 we report the Chi-squared test of proportions for each section and indicate if the rate of name changes is greater than or less than the average rate across all sections. For loss of gender (#1) we find that sections including "N.Y. / Region", "Food", "Education", "Technology" and "U.S." exhibited higher than average rates of those name changes, whereas "World" and "Opinion" had lower than average rates of those name changes. For change of gender information (#2) we see that additionally the "Your Money" and "Arts" sections are more likely to have higher rates of gendered name changes, and "Business Day" to have lower rates of those changes. Finally, for adoption of gender (#3) we see that "Health" is likely to have more of those name changes, and "Crosswords/games" to have less.

Across all three aggregations, we see that "N.Y. / Region" and "Food" have higher than average rates, and "World" and "Opinion" have lower than average rates. Both "Your Money" and "Arts" exhibit more transitions to gendered names, perhaps suggesting the importance of gendered presentations of identity in those sections. Particularly interesting is the "U.S." category that has higher

rates of #1, but lower rates of #2 and #3. Thus, the "U.S." section has a recognizable decrease in use of gendered names (both from people switching to androgynous names more often and not switching towards gendered names as often).

While section topics are useful for aggregate analysis we also wanted to better understand name changes at the individual article level. For this qualitative analysis we took articles having 15 or more name changes in their comments, which amounted to 21 articles. We observed a common pattern in 10 articles with multiple comments being made with different names from a single user account. For example the article with the highest number of comments with name changes (668) involved 17 unique users that each changed their names many times. We found that four of the top 21 articles with the highest number of name changes (668, 61, 30, and 28) were soliciting user comments in the form of a contest, opinion or question for expert view (besides the article with 30 name changes the other three were in the "N.Y. / Region" section which helps explain why this was the top ranked section in terms of name changes). For example the article "A Call for Haiku about New York City" (61 name changes) asked users to post a Haiku in the comments with the possibility that it might be republished. Several users on this article were observed submitting Haiku under different names, perhaps because it might seem unfair and violate a social norm if the same person submitted multiple entries (even though it was not explicitly banned).

Another common pattern that we observed was that commenters expressed many personal stories in their comments with name changes. For instance, on the article "Divorcing a Narcissist" with 15 name changes there were four users who switched from female to androgynously-recognized names, including initials or different screen names, including one very personal story about having been married to (and subsequently divorcing) a narcissist. We further explore the relationship between name changes and personal information more quantitatively in the next section.

Name Changes and Moderation Signals

Here we consider the type of information present in comments where a name change has occurred: are users sharing different types of information in comments where they change names in comparison to comments where they do not change names? If so this might be used to inform the design and development of new comment moderation tools (Park et al. 2016) that could incorporate knowledge of name change events and appropriately orient moderators' attention.

Following related work in this domain (Park et al. 2016; Diakopoulos 2015a; Diakopoulos 2015b), we examined three factors that are of potential interest to journalists interested in high quality comments. These included comments marked by editors as "NYT Picks" as reflecting "interesting and thoughtful" contributions; comments' recommendation count as a reflection of community interest in the comment; and a personal experience score reflecting rate of use of words in LIWC (Linguistic Inquiry and Word Count) categories "I", "We", "Family" and "Friends". The personal experience score has been shown to correlate with crowdsourced personal experience annotations of comments (Diakopoulos 2015a), as well as to NYT Picks comments (indicating it is selected for by moderators). The score has demonstrated utility to moderators looking for personal stories and anecdotes in a visual analytic moderation interface (Park et al. 2016).

Our results do not indicate any differences in the rate of NYT Picks or in median recommendation counts between comments that involved a name change (of any type) and those that did not. Thus comments that involve a name change are not more likely to be selected for highlight by the NYT moderators, nor are they more likely to receive more recommendations by other commenters.

However, we did find a relationship between the personal experience score and a name change event. The score is higher for comments having textual content talking more about individual personal stories. The average personal experience score for comments having any name transition is more than for comments that didn't have a name transition. We found a strong statistically significant difference between the distributions of personal experience scores ($t(4,105,466)=14.79$, $p=1.71e-49$). For comments with a name change, the mean personal experience score was 0.0328, an increase of 16.4% over the mean personal experience of 0.0282 for comments that didn't have a name change. This result indicates that users who change their name, and thus the identity that they portray, tend to talk more about their personal experiences.

We also compared each name transition type and found that the average personal experience score for comments having a Male to Androgynous (M->A) transition has a difference to comments with an Androgynous to Male (A->M) transition. The comments with M->A transition have higher personal experience score (M=0.032) than A->M transition (0.029), which is a statistically significant difference ($t(4,220)=3.18$, $p= 1.48e-3$). This suggests that men tend to talk about more personal stories when they transition to androgynous names (including e.g. screennames) in comparison to when they transition from androgynous names to male names. We tested but did not find statistically significant differences for mean personal experience score in any of the other name transitions shown in Figure 4.

Name Changes and Sentiment

Previous research (Martin 2015) has posed the question of why people adopt the use of pseudonyms. One possibility is that users are responding to the notion of an "imagined

audience" (Litt 2012), the audience they think they have. Signals from the active audience (i.e., other users on a thread) can influence the imagined audience. Here we examine whether sentiment cues relating to the negativity, positivity, anxiety, and anger on an article's comments may relate to users changing their name. Could users be responding to negative or abusive signals from the audience for a comment by changing their name?

Like previous work in the vein of comments and sentiment analysis (Cheng et al. 2015) we utilize the LIWC dictionaries for various constructs to measure the relative rate of use of words within comments, averaged in this case across articles. In particular we compute results using the "Positive Emotion", "Negative Emotion", "Anxiety", and "Anger" dictionaries. In order to reduce noise or spurious results we only calculate scores for articles with at least 10 comments, and for comments with at least 25 tokens.

The results indicate that articles that have name changes in comparison to articles that do not have name changes have a higher rate of use of negative emotion words (M=0.0155 vs. 0.0141, 9.5% increase, t(24,708)=12.77, p =3.34e-37), a lower rate of positive emotion words (M=0.0283 vs 0.0296, 4.6% decrease, t(24,708)=-9.64, p=5.81e-22), a higher rate of anxiety words (M=0.00212 vs. M=0.00196, 8.4% increase, t(24,708)=6.29, p=3.27e-10), and a higher rate of anger words (M=0.00622 vs 0.00532, 16.8% increase, t(24,708)=11.89, p=1.69e-32). These results lend support to the idea that users may change their names in order to avoid exposing themselves in negative or angry discussions.

Discussion and Future Work

By examining aspects of anonymity and gender sensitivity as exposed through name change events on the New York Times our results confirm several previous findings. Results showed that name changing is not a highly prevalent activity in online news comments, which is in line with previous work reporting that gender-switching is rather infrequent in online communication (Herring & Stoerger 2013). Our results also characterize the variety of different types of name changes, show that people often transitioned to an alternate name and then back again, and that family sharing of accounts is fairly minimal. These results support the idea that name changes are not routine but may result from situations or contexts that spur some users to temporarily alter the identity that they portray in the comments.

This contextual notion of name changing is further supported by our sentiment analysis results, which indicate that articles with name changes have slightly higher average rates of negativity, anxiety, and anger scores than other articles. Despite the pre-moderation used to screen the worst of the comments out before publication by the NYT we were still able to see this signal in the analysis. These findings generally contribute support to the idea that people may be changing names in order to buffer their identity from a negative or angry comment environment that could in turn lead to negative feedback or interactions.

Also in line with previous work showing a relationship between anonymity (Fredheim et al. 2015) or anonymity sensitivity (Correa et al. 2015) and topicality, our analysis showed variations in name change rates and types across various news sections of the New York Times. For instance, sections like "Your Money" and "Arts" and to some extent "Health" exhibit significantly more transitions to gender-detected names. "Technology" saw a large shift towards names detected as male. On the other hand we have a heavily commented on section like "U.S." which exhibited name transitions away from gendered names, and sections like "Opinion" and "World" which saw overall rates of name transitions to be lower. These results offer an opportunity for a news organization like NYT to reconsider how it is covering these various topics and whether a shift in presentation of e.g. a topic like technology may be warranted.

This research also contributes to the emerging literature on supporting comment moderation (Park et al. 2016; Diakopoulos & Naaman 2011; Diakopoulos 2015a; Cheng et al. 2015) by giving moderators a new dimension for identifying potentially interesting comments or threads in online news comments. Flagging comments with name changes, or flagging articles with rates of name changes compared to a baseline could help orient moderators to look at a commenter's behavior or the evolution of discussion on an article more closely. Some previous research indicates that women tend to participate less in online commenting as they are likely to face more harassment, bullying and abuse than men (Pierson 2015; Martin 2015). Thus a comment having a name change from a female to a male name on a male dominated forum could indicate that the comment or thread warrants moderator attention. Moreover, users commenting on online contests with different display names from the same account could be identified so that they're not unfairly privileged. We also found name changes to be related to the use of more personal experience oriented language which has been shown to be a useful cue to moderators (Park et al. 2016). An interesting avenue for future work would be to examine the relationship of name changes to other indicators of quality comments, such as article or conversation relevance (Diakopoulos 2015b), or criticality and argument quality (Diakopoulos 2015a).

Finally, it's worth mentioning various limitations to the current study. Although we study name changes we cannot assume that any name that's changed is any more or less authentic before or after the change. Display names on the

New York Times are not verified so we do not know the "true" identity of a commenter. All names are essentially anonymous at the level of the user interface, though internally the moderators would have access to an email address or possibly other information from a Google or Facebook login to the account. Most importantly, our analysis is observational and primarily quantitative: with the data we have collected we cannot answer the very important question of *why* people change their names in online news comments. An interesting avenue for future work would be to interview or survey commenters about their identity presentation work in online comments.

Conclusion

In this work we have investigated how online commenters change their display names, sometimes between differently gendered names or to other pseudonyms, on the New York Times site. We contribute insights about the extent and characterization of this activity, showing that it is a relatively rare and apparently context-oriented occurrence. Furthermore, we contribute an articulation of how name changing relates to section topic and type of article, which offers new opportunities for news organizations to re-think inclusivity in those sections. Finally, we contribute findings that can enable new forms of comment moderation: for instance, signaling name change events to moderators at the level of comments or articles could help identify interesting personal experiences or allow for early moderation intervention in threads.

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