

Utilizing Usernames for Sex Categorization in Computer-Mediated Communication: Examining Perceptions and Accuracy

KAREN M. CORNETTO, Ph.D. and KRISTINE L. NOWAK, Ph.D.

ABSTRACT

As more interpersonal interactions move online, people increasingly get to know and recognize one another by their self-selected identifiers called usernames. Early research predicted that the lack of available cues in text based computer-mediated communication (CMC) would make primitive categories such as biological sex irrelevant in online interactions. Little is known about the types of perceptions people make about one another based on this information, but some limited research has shown that questions about gender are the first to be asked in online interactions and sex categorization has maintained salience. The current project was designed to examine the extent to which individuals might include obvious gender information in their usernames, as well as how easily gender could be attributed from usernames. Seventy-five coders were asked whether or not they could assign 298 people to a sex category based only on their username, and then to rate how confident they were in making the attribution. Results indicated that coders were fairly inaccurate in making these attributions, but moderately confident. Additionally, the results indicated that neither women nor men were more accurate in attributing gender from usernames, and that neither women nor men tended to use more obvious gender markers in their usernames. Additionally, those who did use obvious gender markers in their username tended to have less experience with computer chat. The results are discussed in conjunction with the limitations of the present investigation, and possibilities for future research.

INTRODUCTION

SIXTY-THREE PERCENT, or 126 million, American adults use the Internet according to August, 2003 estimates by the Pew Internet and American Life Project.¹ Of those users, nearly all use the Internet to send and receive email (92%) and about half (47%) use some form of instant messaging software to interact with others, making communication one of the primary activities that users engage in on the Internet. As the use of text based computer-mediated communication (CMC) technology be-

comes more widespread, it becomes increasingly important to understand the implications of utilizing these systems for interpersonal communication, and in particular, the consequences that the use of such technology may have on the person perception process.

Much of the research to date investigating the content and consequences of interactions in CMC has focused on how people utilize the available features of CMC to interact with and get to know strangers.²⁻⁷ A key part of research in this area has been tied to investigating how interaction partners

come to know one another in CMC, and what categories and information are important to them, particularly in light of the fact that this kind of interaction may be markedly different than what they are accustomed to in face-to-face (FTF) interactions. Of particular interest is the way that individuals assign meaning to the information, or lack thereof, provided during the interaction and how that information impacts the person perception process.

Some early research predicted that the absence of visible indicators of the primitive categories of race, sex social status would make them irrelevant, or less salient, in text based interactions.^{4,9,10} Despite these early predictions, research has indicated that in some instances and for some people these categories, particularly gender, have maintained salience, meaning, and importance even in the leanest of media.^{11,12}

Clark suggested that as individuals attempt to negotiate interactions that are mediated by computer technologies, it is likely that they will utilize categories that are familiar and have been perceived to be useful in making attributions of others in FTF interactions.¹⁰ Arguably, this could be construed as one indicator that the categories themselves remain salient and important even when there are no obviously observable indicators.^{13,14}

In the same way, individuals are likely to rely on their past experiences, which are predominantly face to face, when making decisions about self presentation in online interactions. Therefore, just as there are likely to be individual differences that predict the extent to which people *read* gender markers, these same differences may distinguish individuals who *provide* gender markers within computer-mediated interactions and more importantly, determine who is likely to place emphasis on gender designation.

The current project examines demographic predictors of the salience and perceived importance of gender in text-based interactions. Because the most common personal identifier in a text-based interaction is one's username, the use of gender markers embedded in usernames is the focus of this study. Therefore, in this project, we (a) explore the extent to which individuals infer gender from usernames, and their confidence in making gender assignments, as well as the accuracy with which they are able to infer gender and, (b) examine the predictors that differentiate individuals who provide obvious gender information in their usernames from those who do not. The following section explores impression-development in text based CMC, followed by a discussion of past research examining sex categorization and then an explanation of the method and results of the present investigation.

ization and then an explanation of the method and results of the present investigation.

Presenting self and perceiving others in computer-mediated communication

The presentation of the self online has been the topic of both philosophical and empirical interest,¹⁵⁻¹⁹ as has the process of person perception online.^{11,20-25} The primary question driving much of this research has focused on the extent to which the features of the medium hinder or enhances one's ability to self-present, perceive others, and have satisfying interpersonal interactions. Historically there are several competing perspectives on this issue.

Proponents of the "cues-filtered-out" perspective argued that there is an important distinction between lean and rich media. Lean media are defined as media that lack social cues such as non-verbal information and information related to the physical body, such as text-based interactions. Richer media include more of this information. This perspective argues that lean media restrict a user's ability to present a clear picture of himself/herself, or to receive a true picture of an interaction partner.^{9,10} Additionally, it was often predicted that interactions would be less satisfying when mediated by lean media as compared to those mediated by rich media.^{9,26,27} In contrast, later research demonstrated that not only impressions, but also meaningful personal relationships could be successfully formed and maintained using even the leanest media.^{2,5-7,20,28} Research supporting the contrary perspective indicated that individuals are able to adapt their communication behavior to utilize the features of any medium to facilitate their need to express the messages desired,^{9,29-31} consequently providing a foundation for meaningful personal interaction in spite of technological limitations.

In any interaction, whether mediated or not, people make both conscious and non conscious choices about how to present themselves to others. At the same time, they must make attributions about others and they also must make choices about the meaning behind the information that is presented to them by others. And, they have to utilize whatever information is available to make these attributions. The absence of traditional indicators of social/demographic clues in CMC may influence impression formation, forcing individuals to adapt their perceptions around the contextual limitations. For example, Walther explained that receivers have a tendency to overemphasize the information that

is available, and use it to formulate an idealized impression of their partner, something he calls, "hyperpersonal" communication.²⁴

The ability of the medium to support meaningful interpersonal interaction may depend on the user's ability to adapt their communication behaviors to the available features of the medium. Walther's social information processing perspective (SIP) presumes that online interactions are complicated because of contextual limitations, but that individuals will (a) use some alternative cues, or (b) alter their behavior in some way, to add back in the information that is missing.²⁴ Some support has been found for both possibilities.³² Likewise, then, it is important to examine the particular ways that users adapt their communication behavior when trying to get to know one another in a cue lean environment. In the next section, we explore one way that individuals may adapt the way that they provide information online: through their usernames.

Usernames and self-presentation

In CMC, one piece of information that is often used both for self-presentation and person perception is the username. Usernames, also referred to as "handles," "screen names," or "nicks" (short for nickname), serve several important functions for CMC users. A username's central function is establishing one's online identity and allowing others to recognize them. Many online services (e.g., ISPs, chat servers) identify individuals based solely on their username, and restrict usage of a particular username to one person, thus allowing the username to be unique to that person. In this respect, the online identity becomes legitimized as a "true" identity that is represented by the username. Additionally, users often keep their username for long periods of time, even feeling a sense of identity "theft" if another person uses their username.¹⁵

Chat participants in particular seem to place great emphasis on the importance of one's username.¹⁷ Barnes suggests that chat participants consider the username to be an extension of self.¹⁵ In an examination of 260 usernames, Bechar-Israeli found that most usernames could be categorized into six types (examples of each in parentheses): real names (<Katie22>), names relating to self (<shydude>), technology-oriented names (<Pentium>), names of objects, flora, and fauna (<cheese>), word play and sounds (<whathell>), famous people and media characters (<elvis>), and sexually oriented or provocative names (<sexsee>). Interestingly, nearly half of the screen names were coded as "names relating to self," sug-

gesting that the majority of users in the sample chose names that were a reflection, in some way, of their personality or some physical or personal attribute.³³ This, in part, supports Barnes' contention that the username is more than an identifier, but a conscious reflection of the self.¹⁵

The results of this study also suggest that choosing a username is not an arbitrary process, but part of a user's strategic self-presentation. Choosing a username may be as important to establishing a sense of self online (and creating impressions for others) as editing a message, using emoticons, or even using different kinds of language. At the same time, unlike these other self-presentation devices, the username may be seen as a more obvious and conscious representation of the self. Literally, the username is a visual representation of the individual. For example, when one is "present" in a chat room, or available for Instant Messaging, it is one's username that appears on the screen for others to see. The choice of username, then, should be conceptualized as a conscious choice to influence the judgments that others make about an individual. As such, the content of these usernames, and the subsequent impressions formed from them, are likely to be utilized in the person perception process. However, the message or impression one intends to convey may or may not be 'correctly' perceived by one's interaction partners. One cue in particular that may have perceived importance for some users is gender, or sex categorization, as discussed in the following section.

Sex categorization in computer-mediated communication

Experience with communication in the natural world is very likely to influence the way people interact with one another in computer-mediated worlds. Given that biological sex is thought to be the first thing noticed during a FTF social interaction,³⁴ it is unlikely that the importance or salience of this would disappear in any type of interaction, including those that take place in computer-mediated communication. In fact, research has revealed that the first questions that users ask during online interactions with strangers are still about gender and geographical location.^{16,18,22} People have been shown to apply socially defined identifiers to categorize an individual as male or female,³⁵ and this category assignment is perceived by many to provide meaningful information about them.³⁶⁻³⁸ And more often than not, gender stereotypes are used to make a determination about the category to which a person should be assigned.³⁸

The lack of visible physical information in CMC means that sex category assignment cannot be related to biological functions, or indicators, as it is easy to manipulate the physical codes of sex and gender in computer mediated environments.^{20,21} Instead, this distinction is actually an assignment of sex category, or the application of the socially agreed upon behaviors that identify one's membership in one of the two categories instead of biological sex.³⁵ In CMC, there may be distinct types of behaviors that are consistent with gender stereotypes, but these are not necessarily related to biological sex. The process, and limitations, of sex categorization has implications for both person perception and self-presentation in CMC.

The reliance on, and importance of, sex category in FTF interactions is likely to maintain its salience during other interactions; merely mediating an interaction with technology is unlikely to invalidate the importance that people assign to classifying others based on sex.^{39,40} Consistent with this prediction, there are a number of what are considered to be gender markers present in CMC, despite the lack of either physical or traditional social context cues. Some have suggested that this indicates that the stereotypes associated with gender have survived in even the newest of media.^{11,12} For example, some have pointed to usernames, phrasing choices or signatures at the end of email messages^{12,25,41,42} as well as a person's speaking style and the topics they have chosen to discuss as gender markers in CMC.²⁵ Research has revealed that interaction traits and personality variables are also important gender markers, and that people have continued to make attributions of sex category based on behaviors in CMC. For example, dominating conversations, interrupting others, and/or using a more adversarial style are behaviors leading one to be categorized as male,^{12,41} and the use of passive language, discussing thoughts or feelings, and/or using "emoticons" are behaviors leading one to be categorized as female.^{12,25,41} Perhaps more importantly, sex category assignment has continued to carry the attributions of status and social meaning they have carried in non-mediated interactions. Those categorized as masculine have been perceived to have higher status, to be more competent and make more valuable contributions, while those categorized as feminine were perceived as more cooperative,⁴³ warmer, and not as credible.^{44,45}

Not all users in all contexts have continued to make attributions of sex category. For example, Nowak found that more than one third of participants engaged with another individual in a desert

survival task reported being "unable to tell" the sex category of their interaction partners.²¹ Interestingly, those who did not make a sex category assignment reported the interaction to be more satisfying and felt their partner was more credible and likeable. Similarly, Collins-Jarvis found that people could rarely tell whether others are female or male during text interactions.⁴⁵ In fact, some of her participants reported that it did not matter that they could not identify the gender of their interaction partner. Although gender information seems to have maintained some relevance in online interactive environments, it remains to be seen if and how individuals deliberately.

Usernames as gender markers

If the choice of username does, in fact, represent an active attempt to influence the impressions that one is conveying, then any specific social category information that one perceives to be present in the username may be considered deliberate. For example, choosing "batgirl" as one's username instead of "batlover" or "batfan" seems to represent a deliberate attempt to gender one's online persona. What, in particular, motivates individuals to gender themselves online? Why do some individuals include gender information in their usernames, while others do not? In an effort to begin to explore this question, we offer the following research question:

Research question 1. What demographic predictors differentiate those who include obvious gender information in their username and those who do not?

Additionally, individuals may make choices about what to include in their username based on previous experiences. For example, some research has found that in chat rooms, individuals who self-presented as females received more private messages, and more attention in general than did those who self-presented as males.^{15,16} In contrast, research has found that individuals who were believed to be male were perceived as more credible and interesting than those who were perceived to be female.^{44,45} The lack of clear evidence to suggest a specific relationship between experience or other individual differences and the use of obvious sex categorization "clues" leads to the following research question.

Research question 2. How does experience with CMC influence the use of obvious gender information in usernames?

In the absence of traditional social cue information such as physical indicators related to the natural body, CMC users make attributions and form perceptions of others based on whatever information is present. As discussed previously, usernames are likely to be one important source of information about the individual interacting online. Just as users may actively “encode” their usernames by choosing names that speak to some personal attribute, they may also “decode” information about interaction partners based on the usernames that they have chosen and what they perceive to be important or meaningful information. In an effort to provide insight into some of the fundamental elements of this process, we offer the following research questions:

Research question 3. What demographic characteristics differentiate individuals who make attributions of gender from usernames and those who do not?

Research question 4. How does experience influence the tendency to assign gender?

Although there are some data to suggest that individuals do form meaningful relationships and lasting impressions of one another online, and that they do so in fairly predictable ways, there is little evidence to suggest that the impressions that they form are representative of what their interaction partner is really like or who they are in the natural world. The question, then is, to what extent are individuals able to form accurate impressions from a text based interaction? Limited empirical evidence makes answering this question difficult at this time. Maguire, for example, in her investigation of sex categorization in online interaction found that users were able to accurately assign gender to their partner 62% of the time,⁴⁶ and Matheson found that users were more likely to presume that the interaction partner was male.⁴³

In the above investigations, individuals made judgments of sex based on behaviors and other features of the interaction, but were technically unable to provide (or subsequently derive) any sex category information. Presumably, in interactive CMC environments, participants utilize whatever cues are available to make determinations of sex, including the information encoded in the username. Additionally, it is yet unclear the extent to which individuals were merely guessing at sex categorization, or were confident in their perceptions. In order to better understand the extent to which individuals may make accurate sex category assignments based on the information contained in a

username, and also the extent to which users may feel confident in these judgments, the following research questions are posed:

Research question 5. How accurate are individuals when assigning sex category based on username?

Research question 6. How confident are individuals when assigning sex category based on username?

METHODS

Participants

Participants in this study were recruited from undergraduate communication courses at a large northeastern university. Participation was voluntary, and all participants signed consent forms that included an assurance of confidentiality. Seventy-five participants took part in the username coding; 65.3% were female. Age ranged from 18 to 26, with a mean age of 20.3 (SD = 1.20). Eighty-four percent of the participants were Caucasian, 6.7% were Asian/Asian American, 4% were Hispanic, and 4% were African/African-American. Two participants did not report their race. Participants reported that they used computer chat or instant messaging systems for an average of 22.45 (SD = 20.46) minutes per session, about 4.91 times per week (SD = 9.79) for an average of 50.62 (SD = 22.48) months.

Procedure

The procedure had two steps: The first step was to generate usernames and the second was to get a different group of participants to evaluate these usernames. These two steps are detailed below.

Generating usernames. Two hundred ninety-six experienced CMC users located at a large southwestern university were asked to choose a name that approximated a username that they typically use when interacting online, and the username represented them during a text based online interaction with a stranger. Participants were 70.3% female ($n = 208$) and 27.7% male ($n = 82$), with two persons not reporting gender. Ages ranged from 18 to 56, with an average age of 21.2 (SD = 4.54). Seventy-six percent of the participants were Caucasian ($n = 225$), 18% were Asian/Asian-American ($n = 53$), 5% were Hispanic ($n = 14$), and less than 1% were African/African-American ($n = 2$). Two

participants did not report their race. In addition, these individuals reported that they used computer chat or instant messaging systems for an average of 28.91 (SD = 28.42) minutes per session, about 4.08 times per week (SD = 2.40) for an average of 40.28 (SD = 12.18) months. These usernames served as the stimulus material for the present investigation.

Evaluating usernames. The 296 usernames were divided into three lists, each containing approximately 98 names. Each of the 75 participants was given one of three lists, and approximately 25 participants coded each list. Regardless of version, participants were asked to read each name on the list and then to answer a series of questions about their perceptions of the individual that the username represented. Instructions for this section were: "When people interact online, they frequently choose a 'username' to represent themselves. (These are also referred to as 'handles' or 'screennames'.) We are interested in how accurately people make judgments about each other based on their usernames. On the following pages, you will find a list of usernames and a series of questions that follow each name. Please read each name, and then answer the questions to the right."

Participants were asked (a) to designate this person as "male," "female," or "can't tell," (b) How confident are you of this person's sex (ranging from 1 to 5, with 1 = strongly disagree, and 5 = strongly agree), and, (c) What else can you tell about the person from their username (open-ended)?

Additionally, all participants completed two sections measuring demographic information (age, sex, ethnicity) and computer chat experience. The computer chat experience items were (a) Have you ever used a chat room? (b) If yes, how long have you been using chat rooms? (c) How frequently do you use chat rooms? (d) How long does your typical chat session last? And, (e) what kind of chat rooms do you most frequently use (e.g., sports, politics, general)?

RESULTS

Preliminary analyses

In order to address the research questions, several preliminary calculations and analyses were performed. First, overall rating accuracy scores were calculated, by first matching each coder's response to the gender question with the self-reported, actual biological sex of the individual who created the username. The mean number correct was 39.00 (SD = 8.2), incorrect was 14.75 (SD =

7.49), and participants chose not to assign gender, indicating "cannot tell" for an average of 39.79 (SD = 15.31) cases. Put in terms of hit rates, participants opted not to guess 42.44% (SD = 15.81) of the time, and of the 53.69% (SD = 14.64) of the time when they did opt to guess, they guessed correctly 73.81% (SD = 7.28) of the time, and guessed incorrectly 26.19% (SD = 7.28) of the time. (Note that percentages do not total zero due to approximately 4% blank responses.)

Second, in order to determine which usernames were perceived as having the most "obvious" indicators of gender, percent agreement was calculated as the total percent correct for each username. In other words, names that were coded correctly at least 80% of the time were coded as having more "obvious" gender cues. Sixty-five of the usernames were coded as "obvious," representing approximately 22% of the usernames.

Third, confidence in gender ratings was determined by calculating the mean confidence score for each individual across usernames. The mean confidence score overall was 3.04/5 (SD = 0.56).

Research questions

Research questions 1 and 2. What demographic predictors differentiate those who include obvious gender information in their username and those who do not? And how does experience with CMC influence the use of obvious gender information in usernames? Chi square analysis was used to address research question one, particularly to address the extent to which sex and/or race might be significant predictors of the use of more obviously gendered usernames, however results indicated that neither sex ($\phi = -0.059$, $p = ns$) nor race ($\phi = 0.021$, $p = ns$) yielded significant differences.

Then, a *t*-test was used to examine potential differences in the use of gender information based on experience with computer chat. Experience had a significant effect on the use of gender information with users with more obvious gender information in their usernames having significantly less experience ($M = 2.50$, $SD = 1.99$) than those who did not ($M = 3.15$, $SD = 2.47$; $t = 1.89$, $p < 0.05$).

Research question 3. What demographic characteristics differentiate individuals who make attributions of gender from usernames and those who do not? To address these research questions, attribution of gender was operationalized by examining the number of a respondent's "can't tell" responses. GLM was used to test for sex differences, and differences by race, and differences based on experience, in the extent to

which individuals “couldn’t tell” gender. Biological sex (for females, $M = 40.21$, $SD = 15.59$; for males $M = 39.00$, $SD = 15.04$) did not have an effect on a person’s likelihood of making attributions of gender ($F = 0.15$, $p = 0.70$), nor did race ($F = 0.41$, $p = 0.80$). Means with standard deviations in parentheses for the race categories were white/Caucasian 40.33 (15.92), African/African-American 49.00 (6.93), Asian/Asian-American 33.40(13.28), and Hispanic/Latino/Latina 35.33 (8.02). Experience was also not a significant covariate in the model ($F = 0.01$, $p = 0.94$).

Research question 5 and 6. How accurate and confident are individuals when assigning sex category based on username? In terms of general accuracy, a one-sample t -test indicates that participants were more likely to guess (53.69%, $SD = 14.64$) than to indicate that they couldn’t tell (42.44%, $SD = 15.81$) ($t = 3.14$, $p = 0.02$). When they did opt to guess, participants assigned a sex category to the usernames correctly an overwhelming (73.81%, $SD = 7.28$) amount of the time.

In terms of confidence in assigning sex category, the mean confidence score was 3.05/5 ($SD = 0.57$), representing a moderate amount of confidence overall in the attribution of gender from usernames. Differences in confidence as well as accuracy of sex category assignment between men and women were examined using a t -test. Means with standard deviations in parentheses for men’s confidence and women’s confidence were 3.05 (0.59) and 3.04 (0.55) respectively. Means with standard deviations in parentheses for men’s accuracy and women’s accuracy were 53.62 (2.15) and 53.83 (2.98), respectively. Not surprisingly, the means were not statistically different either, for confidence ($t = -0.03$, $p = 0.98$) nor accuracy ($t = -0.02$, $p = 0.98$).

Finally, in an effort to explore the relationships among these variables zero-order correlations between experience, sex category assignment, accuracy and confidence were calculated. Results indicate that experience was not significantly correlated with sex category assignment ($r = 0.03$, $p = 0.81$), or with accuracy ($r = -0.05$, $p = 0.67$), but there was a small but significant correlation between experience and confidence ($r = 0.27$, $p = 0.05$). Thus, more experienced users were more confident, but not more accurate.

DISCUSSION

Interaction via text based CMC has become a common interpersonal communication tool. And as suggested by the SIP model, despite contextual limitations, users of these technologies will find ways

to adapt their communication strategies to make the interaction as meaningful and personal as possible regardless of medium. This project investigated some fundamental questions in CMC research including: for whom is gender a salient category, and to what extent are attributions of gender made with confidence with little information, and what is the level of accuracy? Although these data are preliminary, they provide insight into the process and can be used to guide future research in this area.

Researchers who study interaction in CMC, particularly interaction in chat rooms, have provided evidence that basic demographic information (like age/sex/location) is important for users.^{7,11,12,16,18,22} Presumably, people have continued to rely on these familiar categories because they perceive them to provide useful information and reduce uncertainty about the interaction partner, making the interaction more satisfying. In the same way that users might ask for or offer information interactively through chat responses, they may also offer pieces of information about themselves in their usernames, thereby potentially reducing some of their partner’s uncertainty from the outset.

The first set of questions in the current study addressed the presentation of gender information in CMC by examining the characteristics of individuals who included easily discernable gender “clues” in their usernames. The results indicated that neither sex nor race predicted the use of obvious gender information in the username, but that experience did. Less experienced users were more likely to include more obvious gender information in their usernames than were more experienced users. This may be due to the fact that a less experienced user would feel less confident or comfortable in the interaction and would be more likely to want information familiar to them in their FTF interactions. As Clark argued, they may want to turn to these familiar categories as they attempt to negotiate the new and unfamiliar worlds and interactions.¹¹ The fact that experienced users were less likely to provide obvious sex category information lend support, if limited, to the notion that this category may lose importance and salience as people gain experience in computer mediated environments. And the question of which cues will still be meaningful in CMC in the future is as yet unanswered.

In addition to examining the way that gender was presented in the username, a second set of Research Questions was presented to address the way in which individuals make attributions of sex from usernames. In particular, experience with computer chat, race, and sex were examined as poten-

tial predictors of tendency to assign individuals to a sex category based on the information contained in the username. The results indicated that neither women nor men have a greater tendency to make an attribution of gender, and that race was also not a significant predictor. Likewise, the amount of chat room experience that participants had was also not a significant predictor of whether or not someone would engage in sex category assignment. However, generally speaking, participants in this study were more likely to make an attribution of sex category than not. Participants made a guess roughly 55% of the time, and indicated that they could not tell about 45% of the time. In some ways, this hints at the fact that interactants still want to know, or at least have some idea of their partner's sex category, even in a reduced cues context. Put another way, relying only on a username, they preferred to guess sex rather than not. Indirectly, this also supports the SIP notion that the cues that are present in restricted cue environments may be of heightened importance. In this case, the username, though limited in scope in its ability to provide meaningful information, was valued as a source of gender category information.

As addressed earlier, limited empirical evidence has suggested that the likelihood of "guessing" sex accurately without the aid of visual cues is low.^{21,48} The current data are somewhat inconsistent with these previous findings; when these participants made a guess, they were accurate nearly 74% of the time. Interestingly, approximately 20% of the 296 usernames were coded as "obvious," suggesting even further that despite a few overwhelmingly evident usernames, coders were generally able to make accurate guesses. One important distinction is that in the present investigation participants were permitted to opt out of guessing. It is unclear whether previous investigations permitted this option, although the distinction certainly would impact comparison levels. It is also noteworthy that the correlation between confidence and "correct" scores is approaching significance ($r = 0.21$, $p < 0.07$), this suggests that people are unlikely to make an attribution of sex without feeling somewhat sure of their guess. It is important to acknowledge, however, that guesses about partner gender are often accompanied by information beyond usernames during interaction, and perhaps guesses made based solely on usernames represent how individuals may formulate initial impressions, but not necessarily comprehensive evaluations. In addition, certainly there are factors beyond the scope

of the data available in this investigation that likely contribute to the presentation and perception of personal characteristics in CMC. Several of these factors are addressed below.

Limitations and future directions

One limitation in this investigation was the lack of information available about the original username creators. Although basic demographic information was available, and certain relationships could be examined based on that information, the conclusions that could be drawn from the information available were incomplete. In particular, it was regrettable that we did not have access to the intention of the user; it was impossible to ascertain the extent to which the person behind the username was making a deliberate, conscious choice to include sex information or not. For example, "spiceman23" might have earned the nickname somewhere, and translated into a username without deliberately setting out to provide information about his biological sex to others that he might encounter online. Or, "golfgirl" might have wanted to differentiate herself from the males that she encounters in the golf-related chat sites, and therefore made a very conscious choice to include sex information in her username. This notion of intentionality is an additional variable that warrants investigation, as it seems inextricably linked to self-presentation. And beyond mere questions about whether or not some piece of information was intentionally included, it may be worthwhile to investigate the intentions themselves—not just if users intend to include information, but what they intended for it to represent and why they felt this was important.

Second, the username alone is only one small part of a person's online identity. Although they may be an important first cue for users in interactive environments, and as Bechar-Israel suggested, they may carry important clues as to the identity of the person behind the name, they are only one element in the overall picture.³³ Whereas past research has failed to consider usernames as tools for communicating important information, the research reviewed earlier includes data from interactions in which individuals relied on other information (e.g., behavioral cues) to make attributions about the sex of their interaction partner. An important future consideration would be to combine several sets of stimulus materials that may be better representative of the judgments made by users during a typical online interaction,

for example, combining usernames with chat transcripts. This could potentially also impact accuracy rates as well as salience of the categories.

Third, asking participants to make an attribution of sex category obviously made this salient information that everyone was forced to consider. In a more open-ended task, it is possible that they would have focused on other categories or been less likely to point to sex category assignment. This may explain why those with experience with chat rooms were less likely to provide sex category information when sex category was not made salient when users were choosing usernames, but why it is not a predictor in of those categorizing usernames.

CONCLUSION

The results presented above provide insight into people's ability and willingness to provide and interpret information for sex category assignment in cue lean media. In considering the influence of biological sex, researchers have argued that women and men have recognizably different ways of communicating, and these differences are apparent when they communicate in virtual environments.^{12,25,41} It is important to note that in the results presented above men and women were equally accurate, likely to make a sex category assignment and equally willing to provide that information about themselves. This lends support to the concept that in Cyberspace sex category behavior and assignment is related more to stereotypically gendered behavior than to actual biological sex.

Further, people were generally inaccurate in their ability to assign others to sex category, which is consistent with the suggestion that in CMC environments, sex category assignment cannot be related to biological indicators, therefore is difficult to successfully identify.²⁰ In CMC sex category may maintain salience in that there may be two distinct types of behaviors that are consistent with gender stereotypes, but these behaviors are unlikely to be related to biological sex. As CMC is increasingly a part of people's lives and further research continues to examine this issue it is likely that this pattern will become clearer. And, future research in this area should not only focus on the processes involved and indicators used for primitive categories like biological sex, but also continue to monitor the influence of new and possibly as yet undefined categories that evolve with long term experience and use of the technologies.

ACKNOWLEDGMENTS

An earlier version of this paper was presented to the Communication Technology division of the International Communication Association, San Diego, 2003.

REFERENCES

1. Madden, M. (2004). America's Online pursuits: the changing picture of who's online and what they do. Pew Internet and American Life Project Report. Available at: <www.pewinternet.org/pdfs/PIP_Online_Pursuits_Final.PDF>.
2. Beniger, J. (1987). Personalization of mass media and the growth of pseudo-community. *Communication Research* 14:352-371.
3. Chesebro, J., & Bonsall, D. (1989). *Computer-mediated communication: human relationships in a computerized world*. Tuscaloosa, AL: University of Alabama Press.
4. Lea, M., & Spears, R. (1992). Paralanguage and social perception in computer-mediated communication. *Journal of Organizational Computing* 2:321-341.
5. Parks, M., & Floyd, K. (1996). Making friends in cyberspace. *Journal of Communication* 46:80-97.
6. Parks, M., & Roberts, L. (1998). Making MOOsic: the development of personal relationships on-line and a comparison to their off-line counterparts. *Journal of Social and Personal Relationships* 15:517-537.
7. Rheingold, H. (1995). *The virtual community*. New York: HarperPerennial.
8. Reid, E.M. (1994). Virtual worlds: culture and imagination. In: Jones, S. (ed.), *CyberSociety: computer-mediated communication and community*. Thousand Oaks, CA: Sage, pp. 164-183.
9. Rice, R., & Love, G. (1987). Electronic emotion: socioemotional content in a computer-mediated communication network. *Communication Research* 14:85-108.
10. Siegel, J., Dubrovsky, V., Kiesler, S., et al. (1986). Group processes in computer-mediated communication. *Organizational Behavior and Human Decision Processes* 37:157-187.
11. Clark, N. (1995). Rear-view mirrorshades: the recursive generation of the cyberbody. In: Featherstone, M., & Burrows, R. (eds.), *Cyberspace/cyberbodies/cyberpunk: cultures of technological embodiment*. Thousand Oaks, CA: Sage, pp. 113-133.
12. Yates, S. (1997). Gender, identity and CMC. *Journal of Computer Assisted Learning* 13:281-290.
13. Bodenhausen, G., & Macrae, C.N. (1998). Stereotype activation and inhibition. In: Wyer, J.R. (ed.), *Advances in social cognition Vol. XI*. Mahwah, NJ: Erlbaum, pp. 1-52.
14. Gilbert, D.T., & Hixon, J.G. (1991). The trouble of thinking: activation and application of stereotypic

- beliefs. *Journal of Personality and Social Psychology* 60:509–517.
15. Barnes, S.B. (2003). *Computer-mediated communication: human-to-human communication across the Internet*. Boston: Allyn and Bacon.
 16. Turkle, S. (1995). *Life on the screen: identity in the age of the Internet*. New York: Simon & Schuster.
 17. Wallace, P. (2001). *The psychology of the Internet*. Cambridge: Cambridge University Press.
 18. Waskul, D., & Douglass, M. (1997). Cyberself: the emergence of self in on-line chat. *The Information Society* 13:375–397.
 19. Wynn, E., & Katz, J. (1997). Hyperbole over cyberspace: self-presentation and social boundaries in Internet home pages and discourse. *The Information Society* 13:297–327.
 20. Lipton, M. (1996). Forgetting the body: cybersex and identity. In: Strate, L., Jacobson, R., & Gibson, S. (eds.), *Communication and cyberspace: social interaction in an electronic environment*. Cresskill, NJ: Hampton Press, pp. 335–350.
 21. Nowak, K. (2003). Sex categorization in CMC: exploring the utopian promise. *Media Psychology* 5: 83–104.
 22. Spender, D. (1996). *Nattering on the net: women, power and cyberspace*. Melbourne, Australia: Spinifex Press.
 23. Suler, J. (2001). Life at the palace: a cyberpsychology case study. Available at: <www1.rider.edu/~suler/psyber/psyber.html>.
 24. Walther, J.B. (1996). Computer-mediated communication: impersonal, interpersonal, and hyperpersonal interaction. *Communication Research* 23:3–43.
 25. Witmer, D., & Katzman, S. (1997). On-line smiles: does gender make a difference in the use of graphic accents? *Journal of Computer Mediated Communication* 2. Available at: <www.ascusc.org/jcmc/vol2/issue4/index.html>.
 26. Daft, R., & Lengel, R. (1984). Information richness: a new approach to managerial behavior and organizational design. *Research in Organizational Behavior* 6:191–233.
 27. Trevino, L., Lengel, R., & Daft, R. (1987). Media symbolism, media richness, and media choice in organizations: a symbolic interactionist perspective. *Communication Research* 14:553–574.
 28. Foster, D. (1997). Community and identity in the electronic age. In: Porter, D. (ed.), *Internet culture*. London: Routledge, pp. 23–37.
 29. Davis, D. (1995). Illusions and ambiguities in the telemedia environment: an exploration of the transformation of social roles. *Journal of Broadcasting & Electronic Media* 39:517–554.
 30. Palmer, M. (1995). Interpersonal communication and virtual reality: mediating interpersonal relationships. In: Biocca, F., & Levy, M. (eds.), *Communication in the age of virtual reality*. Hillsdale, NJ: Erlbaum, pp. 277–299.
 31. Walther, J., & Burgoon, J. (1992). Relational communication in computer-mediated interaction. *Human Communication Research* 19:50–88.
 32. Walther, J.B., & Parks, M.R. (2002). Cues filtered in, cues filtered out: computer-mediated communication and relationships. In: Knapp, M.L., & Daly, J.A. (eds.), *The handbook of interpersonal communication*, 3rd ed. Thousand Oaks, CA: Sage, pp. 529–563.
 33. Bechar-Israeli, H. (1996). From <Bonehead> to <LoNehEAd>: nicknames, play, and identity on Internet relay chat. *Journal of Computer-Mediated Communication* 2. Available at: <http://jcmc.mscc.huji.ac.il/vol1/issue2/bechar.html>.
 34. Skitka, L., & Maslach, C. (1996). Gender as schematic category: a role construct approach. *Social Behavior and Personality* 24:53–74.
 35. West, C., & Zimmerman, D. (1991). Doing gender. In: Lorber, J., & Farrell, S.A. (eds.), *The social construction of gender*. Newbury Park, CA: Sage, pp. 13–37.
 36. Fiske, S., & Neuberg, S. (1990). A continuum of impression formation, from category-based to individuating processes: influences of information and motivation on attention and interpretation. In: Zanna, M.P. (ed.), *Advances in experimental social psychology*. Vol. 23. Ontario, Canada: Academic Press, pp. 1–74.
 37. Hamilton, D., & Sherman, J. (1994). Stereotypes. In: Robert, J., Wyer, S., & Srull, T.K. (eds.), *Handbook of social cognition*. Vol. 2. Hillsdale, NJ: Erlbaum, pp. 3–58.
 38. Ashmore, R.D., & Del Boca, F.K. (1979). Sex stereotypes and implicit personality theory: toward a cognitive-social psychological conceptualization. *Sex Roles* 5:219–248.
 39. Balsamo, A. (1995). Forms of technological embodiment: reading the body in contemporary culture. In: Featherstone, M., & Burrows, R. (eds.), *Cyberspace/cyberbodies/cyberpunk: cultures of technological embodiment*. Thousand Oaks, CA: Sage, pp. 215–237.
 40. Watson, N. (1997). Why we argue about virtual community: a case study of the phish.net fan community. In: Jones, S. (ed.), *Virtual culture: identity and communication in cybersociety*. London: Sage, pp. 102–132.
 41. Herring, S. (1993). Gender and democracy in computer-mediated communication. *Electronic Journal of Communication* 3:1–17.
 42. Matheson, K. (1991). Social cues in computer-mediated negotiations: gender makes a difference. *Computers in Human Behavior* 7:137–145.
 43. Daly, N., Bench, J., & Chappell, H. (1996). Interpersonal impressions, gender stereotypes and visual speech. *Journal of Language and Social Psychology* 15:468–479.

44. Stets, J.E., & Burke, P.J. (1996). Gender, control, and interaction. *Social Psychology Quarterly* 59: 193–220.
45. Collins-Jarvis, L. (1995). Explaining gender group discrimination in computer-mediated communication: a social identity approach. Presented at the Organization for the Study of Communication, Language and Gender, Minneapolis.
46. Maguire, K. (1999). Is it a boy or a girl?": an analysis of anonymity and gender in on-line interactions. Pre-

sented at the Annual Convention of the National Communication Association, Chicago.

Address reprint requests to:

Dr. Kristine Nowak
Department of Communication Sciences
University of Connecticut
850 Bolton Rd., U-1085
Storrs, CT 06269

E-mail: KristineNowak@uconn.edu

Copyright of CyberPsychology & Behavior is the property of Mary Ann Liebert, Inc. and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.