Usability of Usernames for Online Accounts

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Abstract

From the dawn of time to the age of disco and beyond, people have needed to identify each other to facilitate communication. In the age of the Internet, users typically authenticate with a username and password. However, people are not given a universal username that can be used across the world wide web and people end up with a variety of usernames. The burden of remembering multiple usernames could have an impact on the usability of login credentials. In this study, we explore username habits and the implications of user behavior on the usability and security of usernames. We find that users tend to repeat usernames, and use username families across websites in order to increase memorability. However, connections between accounts may pose a security risk or allow their accounts to be associated with the users identity. Users wishing to avoid these connections can choose unique usernames for certain accounts or keep those usernames more private.

1 Introduction

> *Many current computer systems ask users to enter a username and password pair before granting access. This method of authentication relies on the password's secrecy and, in some cases, the username's secrecy. If secrecy is not compromised, the system asserts that these tokens uniquely identify a valid user* (Cranor and Simpson 199).

When logging into a website account, a user generally needs to use both a username and a password; access is granted only when both are correct. Research on the usability of login credentials has mainly been focused on passwords. However, usernames are equally as important.

Usernames forge connections between accounts on multiple websites. If users have identical or similar usernames across multiple websites, adversaries can potentially identify users across those accounts. The implication is that if one account is compromised, an adversary could more easily gain access to other accounts of the same person on different websites since they use related passwords

In the Perito paper, researchers calculated username traceability by measuring the entropy of publicly gathered Google usernames. They were able to link "username couples that belong to the same users" with high precision, finding that usernames "might be easily traceable" across profiles. This greatly increases the vulnerability of user accounts to cross-channel attacks. Combined with research on password reuse, further study could determine the vulnerability of a users accounts to an attack on a single account.

Shirley Gaw and Edward Felten studied the usability of passwords for online accounts both in terms of how users select them and how they well they are remembered. In their research, they found that users have a limited number of passwords, which they reuse across many accounts. Users justify this practice by stating that repeating passwords made it easier to remember login credentials. Dhamija and Perrig also found that users make use of a small number of related passwords for their accounts. In their study, they found that users had 1-7 unique passwords for 10-50 accounts. These passwords also tended to be related to each other. Our focus is on the selection of usernames, particularly on the prevalence of repeated usernames and username families.

Gaw and Felten also explored the memorability of login credentials. They noted that the most common reason for failed logins was users inability to remember password. The second most common reason was users forgetting usernames. We will look into the memorability of usernames to see how often users forget usernames.

One component of the usability of password-based authentication is the usability of the username/password recovery process. Gaw and Felten found that forgetting login credentials is a common reason why people are unable to access accounts; the process of recovering login credentials can be difficult and painful for the user. Since forgetting usernames can directly lead to this recovery process, we also surveyed common problems with credential recovery.

They also studied the memorability of login credentials. In addition to previously mentioned efforts to select easily-remembered passwords (such as repeating passwords and using password families), users tend to write passwords down (Gaw and Felton). Users also tend to save login credentials in browsers. In part, our study aims to determine whether similar behaviors apply to usernames.

2 Method

We studied usernames by surveying 32 Dartmouth students and community members. Our survey (see below) was designed to address the main questions on the selection and usability of usernames. It starts with a list of popular websites based on data from Alexa ("Top Sites"). Participants were told to list whether they had an account on that site; if respondents had an account, they were instructed to list the username—or check a box indicating they did not want to disclose the username. This portion of the survey showed how often users could recall their usernames. We also analyzed the usernames to determine the prevalence of username reuse and username families.

The remainder of the survey consisted of direct questions. These questions gauged how comfortable users feel disclosing usernames, how users feel about username selection, methods users use to remember usernames, and the memorability of usernames.

We distributed surveys in person and via email.

3 Survey

Please list your usernames for the following websites if you have an account (or check the last column if you prefer not to share that particular username) :

Website	Do you have an account on this site?	If you remember your username, enter it below:	I prefer not to disclose this username
Facebook			
Twitter			
LinkedIn			
Instagram			
Reddit			
Other social media? List account(s):			
Amazon			
eBay			
Other eCommerce? List account(s):			

Netflix			
Spotify			
Hulu			
NY Times			
Other media / entertainment? List account(s):			
Gmail			
Yahoo			
Gmail			
Hotmail			
Dartmouth (Banner/Blitz)			
Other email? List account(s):			
Chase			
Bank of America			
Other bank? List account(s):			
Kayak			
Expedia			
Travelocity			
Other travel? List account(s):			

1) If there were any accounts for which you did not want to disclose your username, why?

2) Do you safeguard your username as heavily as your password?

3) People often reuse usernames. If you create a new username for a website, rank the most common reasons why (on a scale of 1 to 5, where 1 is the most common reason, or leave blank if not applicable):

___ I do not want to use the same username that I use on other sites for privacy reasons

___ My username is already taken

___ The website assigned me a username

___ Im sharing an account with someone else

___ I have never created a unique username for a website

4) Which of the following is your favorite type of username?:

___ Email address or phone number as username

___ Login with another account (e.g. Facebook, Google, Twitter, etc.)

___ Choosing own username

___ Username assigned by website

5) How do you remember your usernames? Select all that apply.

___ Rely on memory

___ Write down on paper

___ Store electronically (spreadsheet or document)

___ Allow browser to remember username/password

___ Other: _____

6) How often do you have trouble logging into accounts because you forgot your username?

___ Never ___ Rarely ___ Sometimes ___ Frequently ___ Always

7) How often do you have trouble resetting your password because you forgot which email address you provided during registration?

___ Never ___ Rarely ___ Sometimes ___ Frequently ___ Always

4 Results & Analysis

The following table contains an overview of the data from the 32 respondents to our survey:

	Total Accounts	Unique usernames	Recalled usernames	Usernames not disclosed	Usernames that map to real name
Applicable responses	32	32	32	32	30
Mean	9.81	4.34	8.5	1.31	3.53
Median	9	4.5	8	0	3
Standard Deviation	3.78	2.06	3.45	2.68	2.91
Min	3	1	3	0	0
Max	18	9	17	11	11

Table 1: Username Attributes

4.1 Username Re-use

We found that users tend to have few unique usernames, often reusing usernames from other accounts. When users do create new usernames, they tend to do so for reasons beyond their control. The most commonly reported reason (as cited by 23 out of the 32 participants) was that their usual username was already taken on the website. The second-most common reason for creating a unique password is that the website assigns a username. Less frequently, users create new usernames for security purposes.

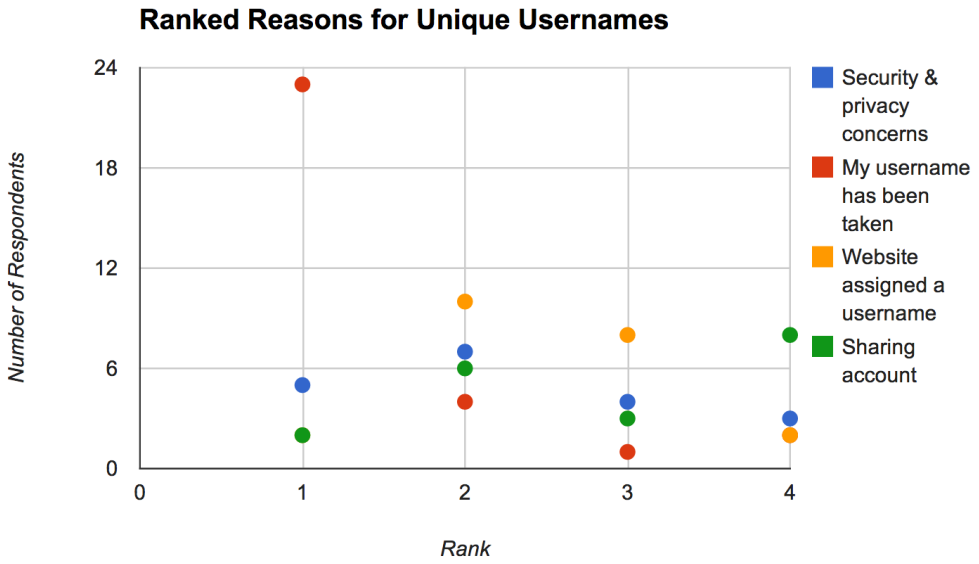

Figure 1: Ranked reasons for having usernames that differ across accounts. This plot shows results for data retrieved from question 3 of the survey, where respondents were asked to rank the options with 1 being the most common. For example, looking at the top-left most data point, we can determine that 23 respondents indicated that the most common reason for having a unique username is that their typical username has been taken. This result implies that many respondents often reuse a particular username.

4.2 Private Usernames

For the most part, respondents were willing to share their usernames (although there were a few respondents so keen on privacy that they did not disclose any username). As one user noted, usernames are often publicly available on websites, so attempting to keep them private is futile. However thirteen respondents kept one or more usernames private. The most common type of account the respondents withheld is banking, where 9 out of the 32 participants chose not to disclose the usernames. Users tend to feel that hiding their usernames provides an additional level of security—beyond the secretness of their password.

Respondents gave various reasons for withholding usernames. Six reported that they did not want to share usernames with us due to general privacy concerns. Four users specifically mentioned that they did not want to disclose usernames for banking account. One user did not disclose a username because it was not his/her information to disclose: the account was shared with her parents.

One user mentioned that he did not disclose his Reddit username due to the large amount of information available: "I like keeping anonymity of my posting, upvoting, & lurking" This is a trend we saw elsewhere in the data: of the 8 users with Reddit accounts, 3 did not disclose them.

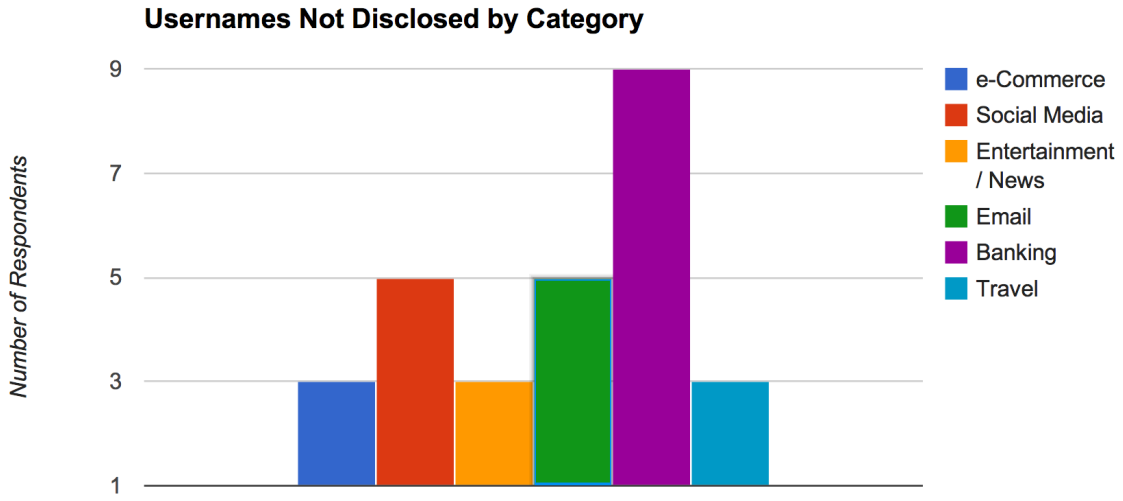

Figure 2: The number of respondents who chose not to disclose particular usernames in the given categories. Banking is the most common category for withholding usernames, due to security concerns. In the social media category, Reddit was the most common withheld username for privacy reasons.

Respondents withheld usernames from other sites at much lower rates (with 5 non-disclosures for email and social media; 3 for e-Commerce, entertainment/news, and travel).

4.3 Usernames Families

A large number of users modify usernames rather than creating a unique username. Drawing from the analogous term "password family," we defined a username family as: a collection of usernames that are variations on a root username (Perito, et al). Some common strategies for creating username families 1) appending numbers to an existing username when creating a new account and 2) using the name of the website as part of the username. For example, a username family might be: {bob, bob72, bobnetflix, bobfacebook}. We found that 19 out of the 32 participants used username families.

Furthermore, there seems to be a marginal benefit to using username families with respect to username memorability.

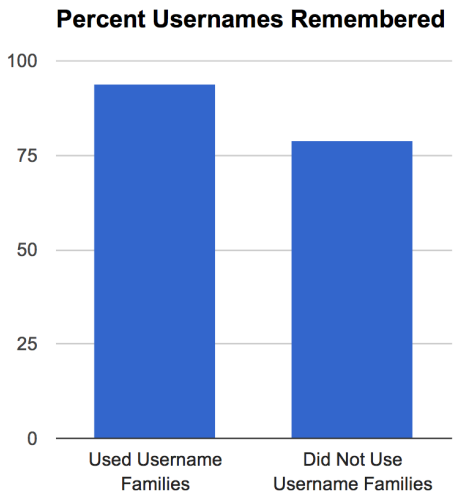

Figure 3: The average percentage of usernames remembered among respondents who use username families, versus those respondents who do not. This indicates that username families aid with memorability.

4.4 Usernames Map to Real Names

Many users select usernames that contain their real names. Some real-name usernames contain their first and last name, some contain their first initial and last name, or a combination of the three. For example: {bobsmith,b.smith, and bobsmithsecretacct} are all real-name usernames. We found a weak correlation between the percentage of real-name usernames used and the percentage of usernames subjects remember. It is not clear whether real-name usernames lead to an increase in username memorability.

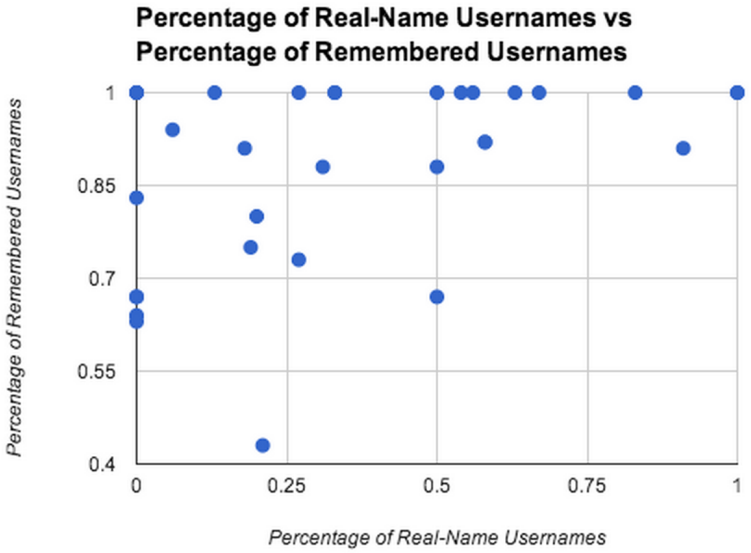

Figure 4: Percentage of respondents' usernames that map to their real names, vs the percentage of usernames that respondents remembered. The data implies a weak positive correlation between real-name usernames and memorability.

4.5 Memorability

It seems intuitive that as the number of usernames increase, users begin to forget them. However, the data shows that most people do not have problems remembering their usernames. As the number of usernames increases, the average number of remembered usernames increases as well.

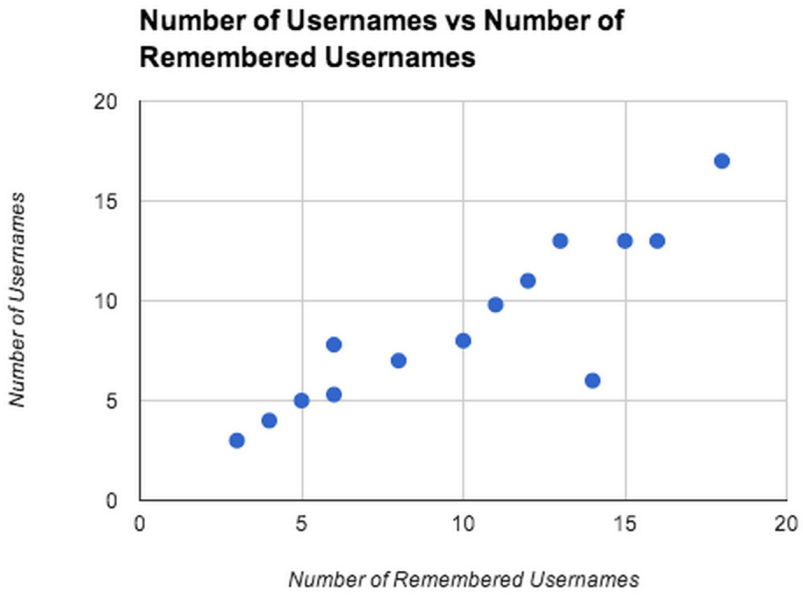

Figure 5: Correlation between number of usernames versus number of remembered usernames.

The explanation for this phenomenon seems to lie in the fact that most users utilize username families. We found that users who use username families remember 94% of their accounts compared 79% of usernames remembered for users who did not use username families. Username families can aid in memorability, but their traceability can lead to security risks. See the "Username Families" section for the relevant chart. Users with many usernames may also employ tools more often to help them remember account information.

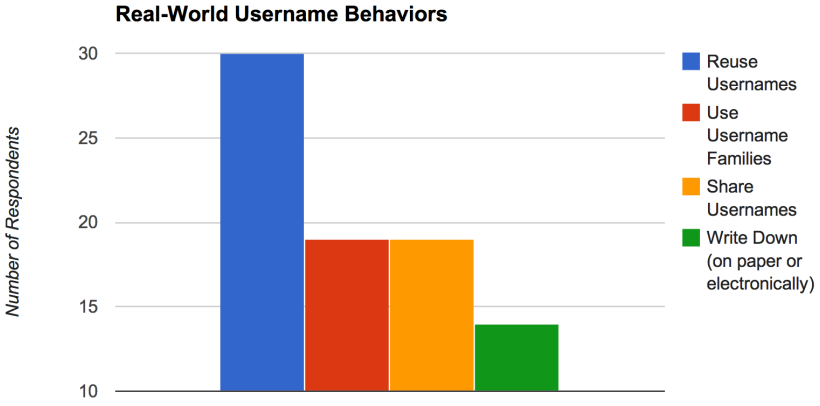

Figure 6: Number of respondents who practice behaviors that are not consistent with the "textbook model". Real-world behaviors include reusing usernames, sharing accounts, writing down usernames, and using username families.

As for the methods users utilize, the most popular method is to rely on their memory with the second

most popular being to allow their browser to store their usernames (most likely along with the associated password). It is hard to gauge the security risk that storing account information in browsers represents because it depends on user specific practices (e.g. who has access to the browser, is the account information password protected etc.).

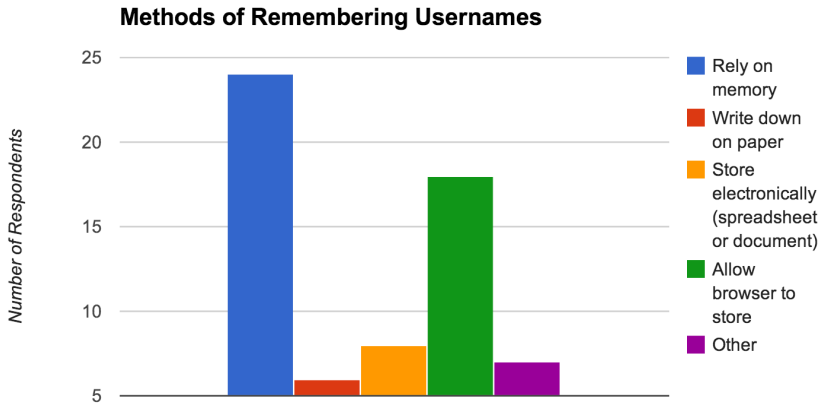

Figure 7: Methods that respondents use to remember their usernames. Respondents who indicated that they rely on other options mentioned that they try to use similar usernames or use a password manager.

4.6 Login Troubles

We found that users tend to have only minor username usability issues when logging into accounts. Three out of the 32 respondents stated that they frequently or always have trouble logging into accounts because they cannot remember their username. However, 17 respondents stated they sometimes have such trouble while 12 said they never or rarely have this username issue.

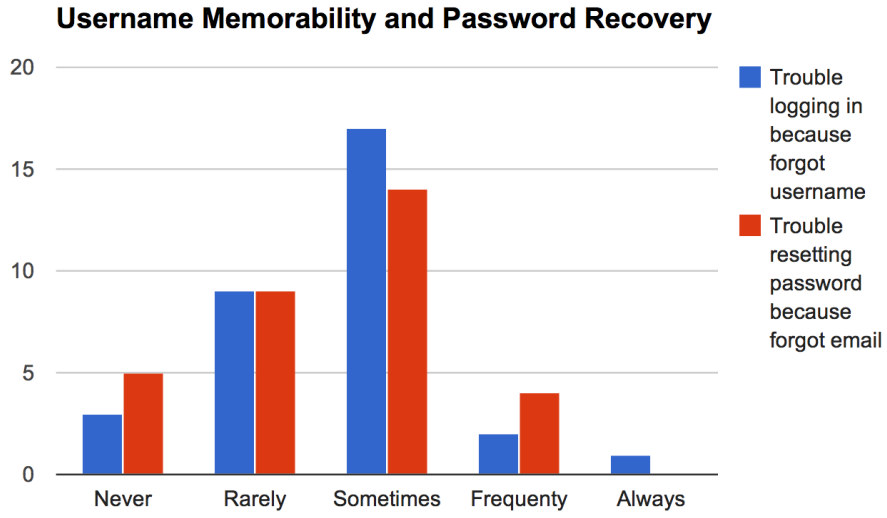

Figure 8: Usability problems with usernames. Respondents have indicated how often they have trouble logging in and resetting passwords due to memorability issues.

Usually, the real-world consequence of forgetting a login credential is a recovery process, which itself may

have usability problems. In our study, users tended to have only occasional problems using the password recovery process. Fourteen participants stated that they sometimes have issues resetting a password because they forgot the email associated with the account. Fourteen other participants also stated that they never or rarely have this recovery issue.

4.7 Username Preferences

We found that users tend to prefer an email address or phone number as the login username. This implies that the users like to have a single username for many accounts (since users tend to have only a couple email addresses and only one phone number). In our study, 62.5% of respondents stated that this would be their preferred method of login username. Fewer people preferred a central account (e.g. Facebook or Google) or choosing their own username (18.7% each). No respondents preferred a website-assigned username.

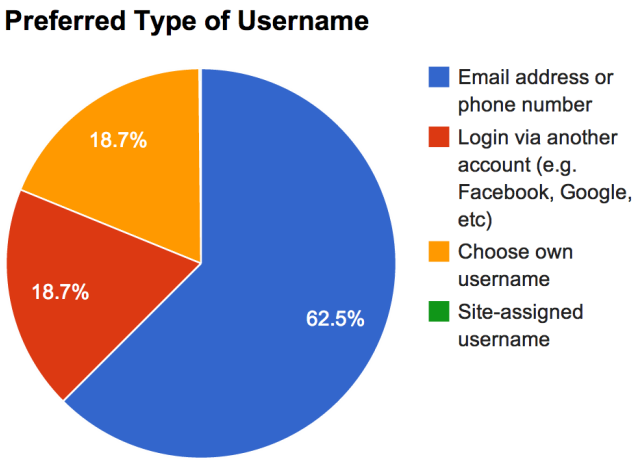

Figure 9: Breakdown of preferred username types by percentage. The most preferred method is using an email address or phone number as a username. No respondents preferred for the website to assign their username, perhaps for recall reasons.

5 Conclusions

As the Internet has become a large part of modern life, people create accounts across many websites. Since usernames are one half of the authentication equation, their usability is important. Many others have looked into the usability of passwords, but little research has been done on the the usability of usernames. As a followup to the Gaw/Felton paper on the usability of passwords for online accounts, we aim to quantify the usability of usernames.

In our study, we found that users tend to have a relatively small number of unique usernames compared to the number of accounts. People tend to repeat usernames and use username families (similar to password families) in order to promote memorability. While username families aid memorability, there is a potential to make connections between a users accounts on multiple websites. The security implication is that if one of these accounts is compromised, the other accounts of the user could be at risk if there is a clear connection between the accounts. Username families also allow for the potential to track users activity across websites.

We also looked at how frequently users have trouble logging into a website. Our survey found that many users have this issue, often because they could not remember which username they used to sign up for an account. Further, the account recovery process can be challenging if the user forgets the email associated with the account. This issue was less prevalent than forgetting usernames. Users appear to have fewer email addresses than usernames, so our research indicates that a recovery process that requires the user to recall an email address might be more usable than a login processes that require recalling a username.

We found a trade-off that users face when selecting usernames. Repeating usernames for accounts across websites and utilizing username families allow users to better remember usernames. However, since usernames are mostly publicly visible, it is often possible to make connections between users accounts if they re-use usernames (or username families). Users tend to recognize this dichotomy between ease of memorability and security when it comes to username selection. They tend to withhold usernames for accounts they do not want to be identified with (e.g. banking); however, for accounts with a lower security priority, users tend to use username families and reuse usernames to make them easier to remember.

References

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