

# Poster: Motivating Users to Choose Better Passwords Through Peer Pressure

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## 1. INTRODUCTION

The main authentication and security mechanism employed on millions of computer installations and web sites is passwords. Despite their predominance as a security mechanism as well as their ease of maintenance and deployment as a means of authentication, passwords have been identified from the early years of their usage as the weak link in the security chain of many applications. A popular mechanism, employed in many web sites, that helps users choose strong passwords is to proactively check passwords. The most common way of implementing the proactive password checker is by a bar that indicates password strength by growing, changing color and characterizing the password as strong, medium or weak motivating users to choose stronger passwords. In this research we propose another method of implementing a password motivator that is based on peer pressure. The user receives an indication of how his password strength relates to other users' password strengths in the system. We seek to investigate the possible advantages that a password strength meter, comparing the user's password strength to the one of his peers, would have over the traditional password strength meter and/or the lack of one. Our research focuses in answering whether, and to what extent, peer pressure motivators (PPM) stimulate users more effectively than other types of existing motivators (EM) in creating stronger passwords. In addition we seek to investigate whether PPM would effect memorability of the chosen password as well as, what is the best way to implement a PPM strength meter so as to be more effective in guiding/convincing users to create stronger passwords. The platform we used for this experiment is UBC's Campus Wide Login (CWL) system. For EM and PPM we calculated a scalar value for password strength in order to be able to show the strength of the password in the EM condition and to compare different passwords with each other. The strength of the password was the estimated entropy (uncertainty of the password). Participants were divided in three conditions and were asked to change (as part of a general not password related task) their CWL password while receiving guidance from our PPM and EM indicators or while not receiving guidance at all (control condition) as it happens in the current CWL implementation. Participants were informed for the real purpose of the study so as

not to be prompted to deliberately choose strong passwords.

## 2. STUDY AND SYSTEM DESIGN

Our work aims at answering the following three research questions:

1. *RQ1*. To what extent, peer pressure motivators (PPM) stimulate users to create stronger passwords in comparison to other types of existing motivators (EM)?
2. *RQ2*. Do PPM have an impact in the memorability of passwords?

We implemented our prototypes replicating CWL's change password web site with the addition of our prototype motivators. We maintained the exact layout of the current web site with the addition of Javascript and HTML code for our motivators. Our study was implemented as a between subjects design with three conditions.

1. Control Condition (CC). In this condition we replicated the current CWL change password web site that does not use any motivators to entice users to create stronger passwords. Figure 3.
2. Existing Motivator Condition 2 (EM2). In this condition a bar with the color/length progression and the characterization of the passwords from weak to strong was used with the motivator being a vertical bar that resembles the PPM condition visually. Figure 1.
3. Peer Pressure Motivator Condition (PPM). In this condition we implemented a vertical bar that used a green and red sub-bar that informed the user whether the input password is stronger or weaker than a percentage of CWL users. Figure 2.

Participants were not aware about the true purpose of the study. Instead they were informed that they will do a number of tasks using the the myUBC portal which would help the researchers assess the portal's usability and usefulness so as to give recommendations for a new design for it. The participant was greeted by one researcher and was shown to the room where a computer was set up for this study. The researcher having memorized a script informed them about

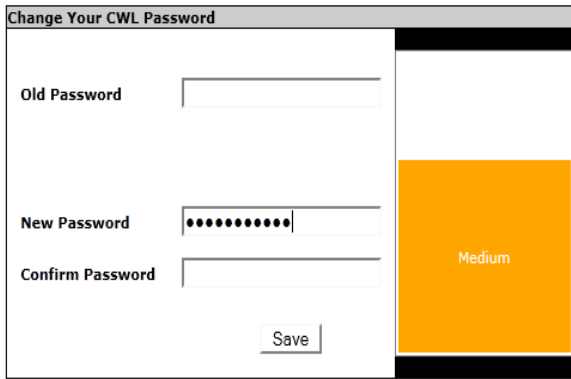


Figure 1: The EM2 condition prototype.

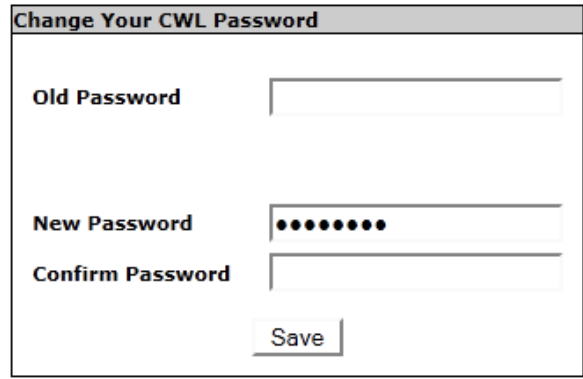


Figure 3: The control condition prototype.

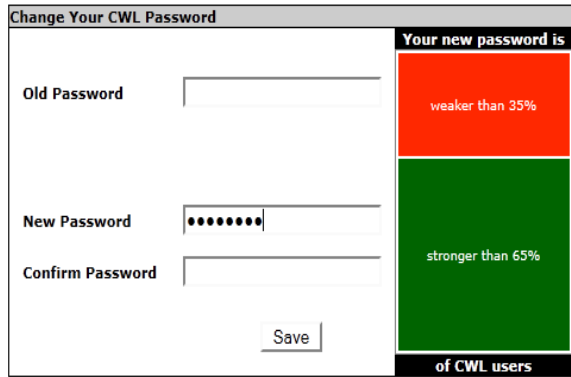


Figure 2: The PPM condition prototype.

the supposed goals of our study and explained the experimental procedure. Each participant was first directed to an online survey that was used to gather demographic information, information about their computer expertise and also included some dummy questions about the myUBC portal in order to reinforce their belief in the study’s advertised goals. We chose to direct them to the online survey before they perform the tasks as the prototypes would be presented early in the study, as discussed below, and we felt that this might alert them about our true purpose. By asking questions about the usability of the portal before handing them the tasks it would help obfuscate the study’s purpose. After the participant had completed the survey the researcher handed them the first task. After the completion of the first task the second was handed to the participant. The two tasks were the following.

1. Using the myUBC portal find the most popular question from the Vancouver - Ask Me.
2. Add and delete an ad in the classified section in the other section for a \$50 coupon for the KEG restaurant in downtown Vancouver at 1499 Anderson Street.

We felt that these two tasks required enough effort on the part of the participant in order to convince them for our goal to assess the various aspects of the portal’s usability. In order for the prototypes to be presented to the user we implemented a proxy server between the computer the participant used and the myUBC site. The proxy server redi-

rected the participant to one of our prototypes while they were trying to log into the myUBC site.

After the participant completed the two tasks a dummy questionnaire was presented to them and upon its completion was over. We chose not to debrief the participants at this stage as we planned to contact them again at a later time to investigate whether they still used the password that they created or they ended up changing it because they found it being too hard to remember. This choice was made because we wanted to investigate whether password motivators might lead users to create too complicated password that they found hard to remember after some time.

## 2.1 Follow Up Study

About three weeks later the researchers contacted the participants and asked them to come once again to the lab to complete a survey regarding their experience with the study and the my.UBC.ca. We still had not revealed the true purpose of our study. In order for the participant to log into the survey they should use their CWL account. This was done so as to be sure that the password they were still using was the one they created during the first study. Once they used their credential the participants were presented with a survey. In the survey the participants gave information about how often they have used their CWL login since the first part of the study, what are their practices for password handling (e.g., password managers) and, in case they had changed their password, they were asked about their reasons of doing so. Finally, that gave them a short description of our study and debriefed them.