Design and Evaluation of a Data-Driven Password Meter (Supplementary Material)

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FULL REGRESSION RESULTS

In this section, we present additional explanations of how we fit our password-guessability regression models, in addition to providing the full results of these models. We first ran a Cox Proportional-Hazards Regression with all three design dimensions (composition policy, feedback, and stringency), as well as interaction terms for each pair of dimensions. For both experiments, we observed significant interaction effects involving the password-composition policy. For increased intelligibility, we subsequently ran separate regressions for 1class8 and 3class12 passwords. To build a parsimonious model, we removed any interaction terms that were not statistically significant, yet always kept all three main effects, and re-ran the model.

Tables 1–4 detail the results of these regressions. As described in the methodology, we corrected all p values in each experiment as a group using the Benjamini-Hochberg (BH) procedure, including those included in these tables.

We treated each dimension as an ordinal variable fit linearly. The baseline levels for policy, feedback, and stringency in Experiment 1 were 1class8, no feedback, and medium stringency, respectively. The corresponding baseline levels in Experiment 2 were 1class8, no bar, and low stringency.

Table 1: Results of our Cox regression model for 1class8 passwords in Experiment 1.

Dimension	coef	exp(coef)	se(coef)	z	p
Feedback	-0.575	0.563	0.099	-5.787	**<.001**
Stringency	-0.021	0.980	0.061	-0.338	0.825

Table 2: Results of our Cox regression model for 3class12 passwords in Experiment 1.

Dimension	coef	exp(coef)	se(coef)	z	p
Feedback	-0.239	0.787	0.144	-1.667	0.171
Stringency	-0.078	0.925	0.086	-0.910	0.463

Table 3: Results of our Cox regression model for 1class8 passwords in Experiment 2.

Dimension	coef	exp(coef)	se(coef)	z	p
Bar / No Bar	-0.043	0.958	0.090	-0.475	0.726
Stringency	-0.124	0.883	0.114	-1.091	0.426

Table 4: Results of our Cox regression model for 3class12 passwords in Experiment 2.

Dimension	coef	exp(coef)	se(coef)	z	p
Bar / No Bar	-0.082	0.921	0.097	-0.849	0.543
Stringency	-0.318	0.728	0.126	-2.522	**0.043**

ADDITIONAL GRAPHS

In the body of the paper, we presented graphs showing the impact of feedback on password security for medium-stringency 1class8 conditions. For completeness, we include here analogous graphs for high-stringency 1class8 conditions. The amount of feedback had a significant impact on password guessability for 1class8 passwords, but not for 3class12 passwords. Furthermore, stringency did not have a significant impact on password guessability for 1class8 passwords.

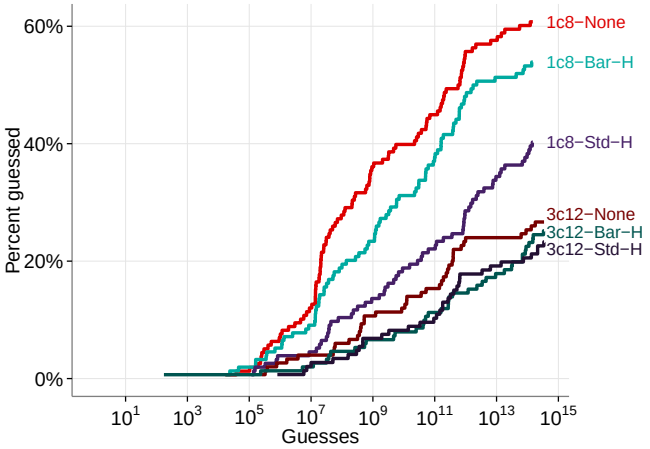

Figure 1: The guessability of passwords created without any feedback (“None”), with only a colored bar (“Bar”), and with both a colored bar and text feedback (“Std”) among high-stringency conditions.

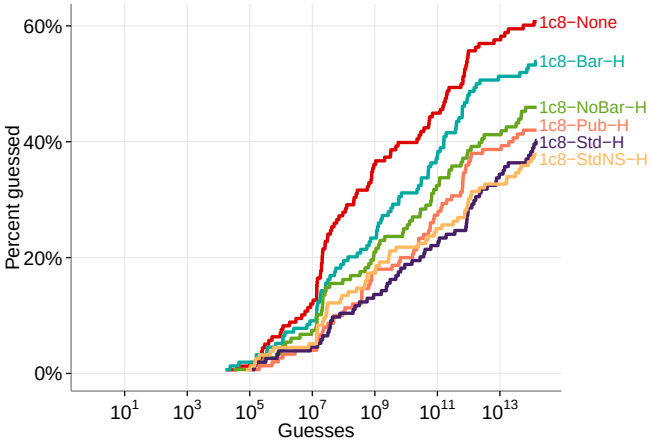

Figure 2: Guessability of high-stringency 1class8 passwords created with different levels of feedback, including none.