

# Exploring the Usability of Pronounceable Passwords



Shing-Hon Lau, Stephen Siena, Ashutosh Pandey, Sroaj Sosothikul  
Lorrie Cranor, Blase Ur, Richard Shay  
**Carnegie Mellon University**  
Pittsburgh, PA, USA



## Introduction

### System Assigned Text Password

- No additional hardware required
- Can be made Cryptographically complex
- Difficult to remember

## Research Questions

- Are pronounceable passwords more memorable than random passwords?
- Do users like pronounceable passwords more than random passwords?

## References

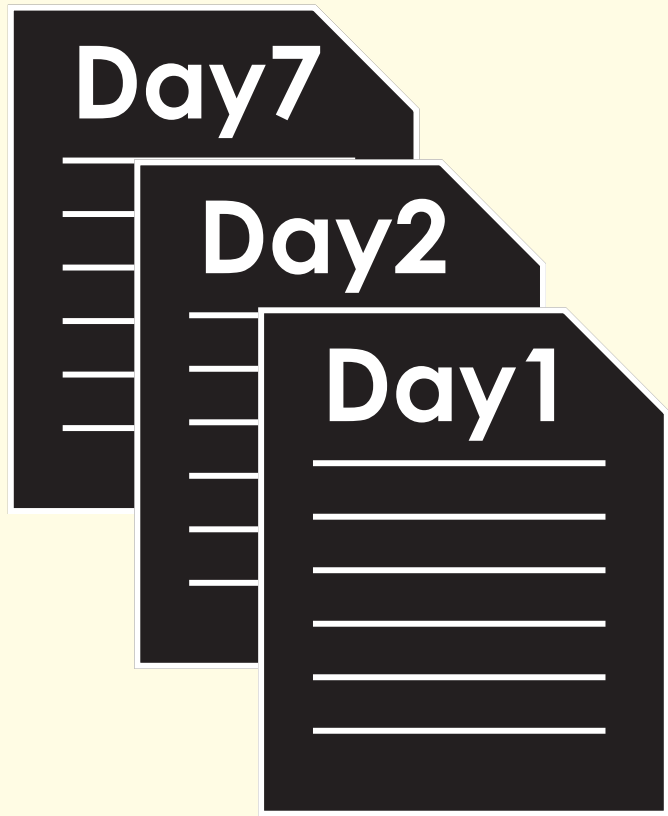
- R. Ganesan, C. Davies, and B. Atlantic. A new attack on random pronounceable password generators. In *Proceedings of the 17th {NIST}-{NCSC} National Computer Security Conference*, 1994.
- M. Gasser. A random word generator for pronounceable passwords. Technical report, DTIC Document, 1975.
- R. Shay, P. G. Kelley, S. Komanduri, M. L. Mazurek, B. Ur, T. Vidas, L. Bauer, N. Christin, and L. F. Cranor. Correct horse battery staple: Exploring the usability of system-assigned passphrases.

## Methodology

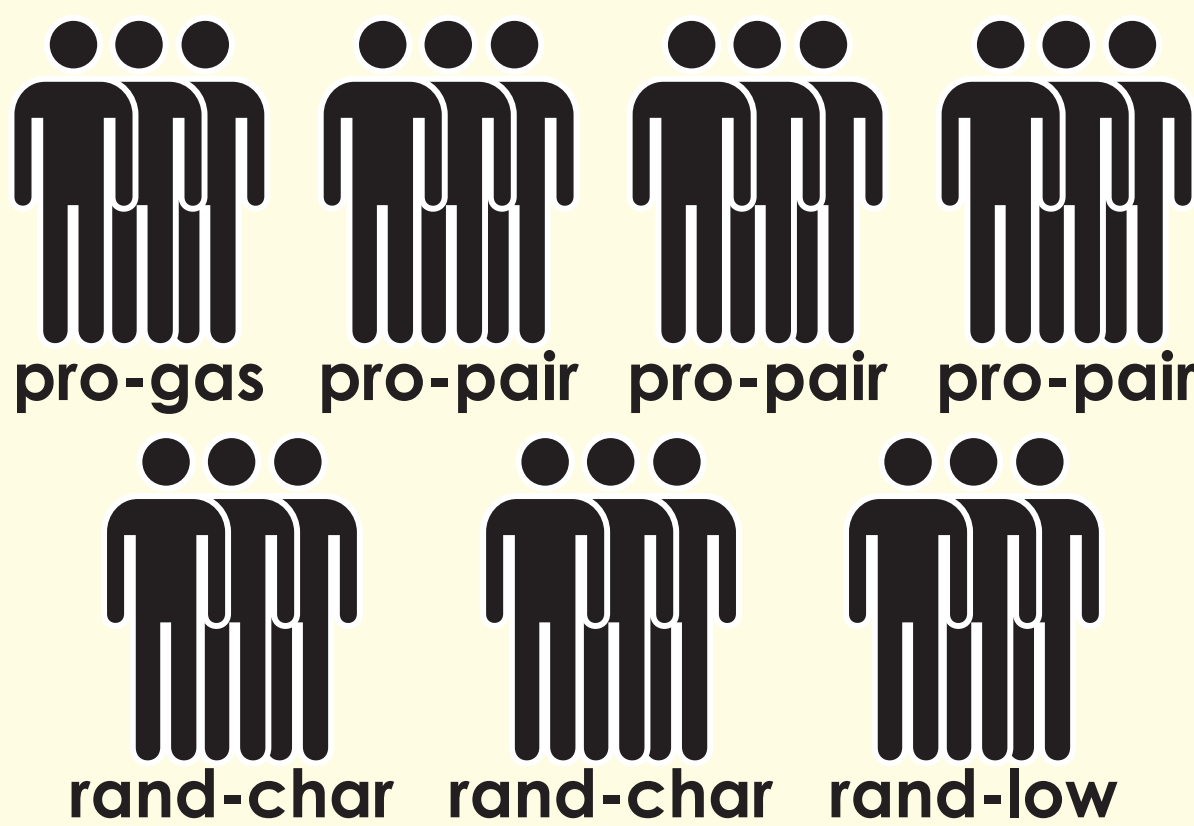
700 Participants



3 Day Survey



100 Participants Per Condition



Condition	Entropy	Example
pro-gas	30.2	cytuchva
pro-pair-4	30.6	rishespuhi
pro-pair-5	38.2	huthuslawoce
pro-pair-3d2	45.2	sujohu46spuca
rand-char-5	30.0	y Qzw
rand-char-7	42.0	US\$#-P5
rand-low-7	32.9	vfkmlqc

Table 1: Password conditions, Bits of Entropy, and Examples.

## Results

### Quantitative results

- There was no significant differences, across conditions, in terms of gender, age, degree type, or education.
- There was no statistically significant differences in the dropout rate between conditions.
- There was no statistical difference, across conditions, for storage usage reported for the second or third studies. 251 (56%) of our subjects reported that they did not use storage.
- There was no significant difference between conditions in the number of attempts required to enter the password or the fraction of subjects that successfully recalled the password.

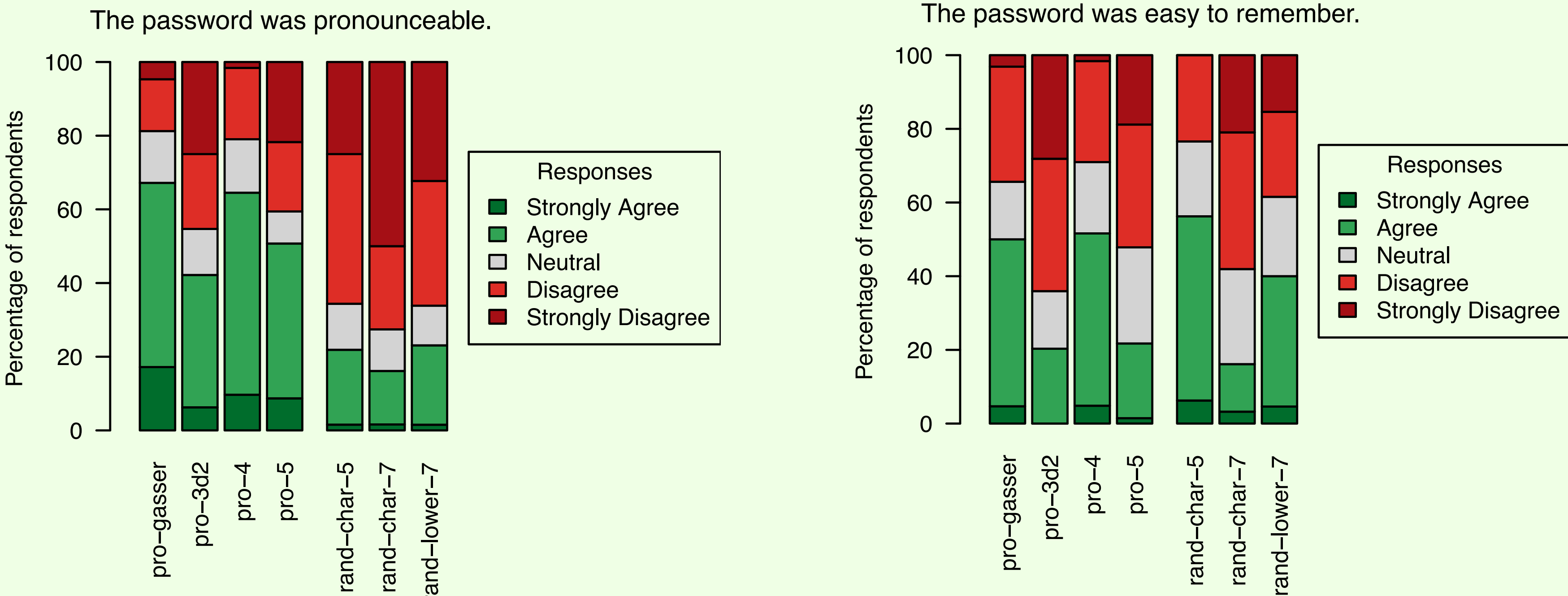


Figure 1: User sentiment towards passwords. Subject responses to sentiment questions are displayed for each password condition. Responses that indicate the password is "good" are colored in green; responses that indicate the password is "bad" are colored in red.

### Qualitative results

- Users were concerned about finding the "correct" pronunciation of a password.
- Users were concerned that the shorter passwords may not offer enough security since they did not have uppercase letters, digits, or symbols, which are typically associated with Strong passwords.

## Discussion

- The Results suggests that pronounceable passwords may be able to offer additional security without negatively affecting user ability to recall passwords.
- Users need to be told the advantages of the benefits of pronounceable passwords.
- Users must be assured that they are secure, despite the deviation from what is generally considered a strong password.

## Participants Quotes

- "ch" can sometimes make different sounds in different contexts  
- Participant for pro-pair-4 "gludrechibla"
- It is unlike any word that I have ever seen before and that makes it harder to associate it with something.  
- Participant for pro-pair-4 "yuludiwi"
- I disliked the password because it is probably pretty easy to crack via dictionary attack.  
- Participant for pro-pair-4 "loflushufa"