Accessibility and Graphical Passwords

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Click-based graphical passwords

PassPoints

Persuasive CCP (PCCP)

Cued Click-Points (CCP)

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Accessibility?

- Inaccessible for some user populations
  - Rely on vision
  - Rely on fine motor control

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Content vs Presentation

• Semantic content should be separated from presentation modality
  ◦ Same content linked with different modalities
  ◦ E.g. Cascading Style Sheets in web design
Structure of click-based graphical passwords

- Presentation: Cue
  - System triggers memory of password
    - Displays image

- Selection: Response
  - User provides secret
    - Clicks on specific area

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Generalized Cue-Response Authentication Model

- **Presentation**: any cue, any modality
  - Image, text, sound, haptic, video...

- **Response**: any user input, any modality
  - Clicking, typing, verbal, gesture, mouse movement...
Example: PassSounds

• Cue: Music clip
  ◦ What is an acceptable length?

• Response: Click at appropriate time
  ◦ How accurate can users be?
    • Musicians can synchronize at approximately 250ms
  ◦ How many clicks?

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PassSounds: Security

• PassPoints:
  ◦ Image size 451x331
  ◦ 5 clicks
  ◦ Tolerance 19x19
  ◦ Theoretical password space $1.2 \times 10^{13} \approx 43$ bits

• PassSounds:
  ◦ 30-second clip
  ◦ 5 clicks
  ◦ Tolerance 1 second
  ◦ Theoretical password space $1.4 \times 10^{5} \approx 17$ bits

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Hotspots and Patterns

- PassPoints
  - Choose similar
    - Click-points on an image (hotspots)
    - Patterns (lines)
  - Minimize by:
    - Using several images
    - Helping select passwords

- PassSounds
  - Choose points related to
    - Lyrics
    - Beats
    - Sequential order
  - Minimize by:
    - Using several clips?
    - Suggesting clicks?
    - Identifying other elements in the clip?

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Alternatives

- Any combination of presentation and response
  - Audio
    - As a cue to trigger behaviour other than click
  - Haptics
    - As a cue or as input

- Allow users to select their preferred modalities for a given system
  - In-progress

- Caution:
  - Cue and response cannot be evaluated in isolation
Summary

• General cue-response authentication
  ◦ Allows for
    • separation of cue and response
    • modalities most appropriate for different users