

BEND PASSWORDS

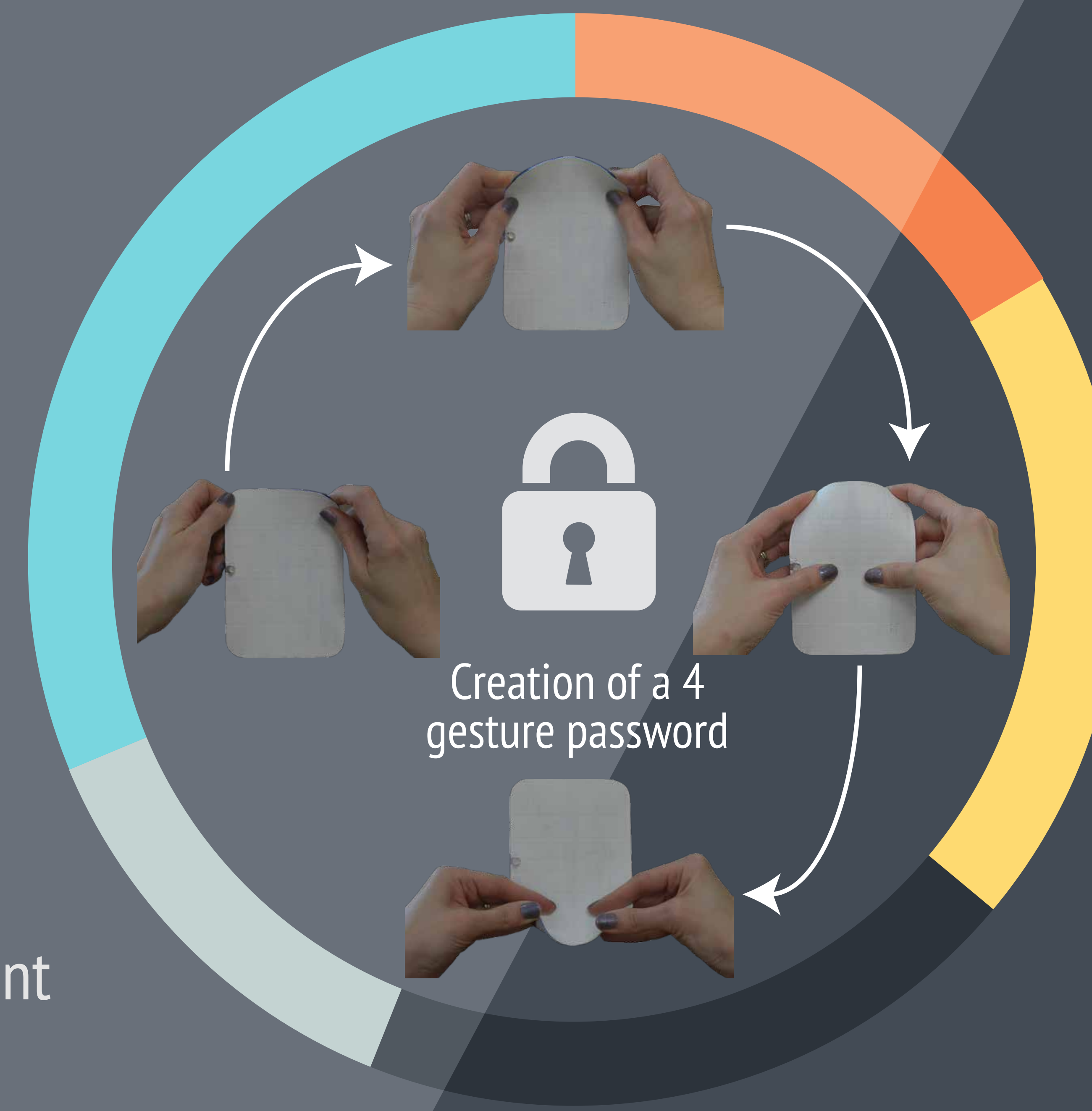
Gesture authentication on Flexible Devices

Flexible devices allow users to interact with the device by deforming the surface of the display through bending.

? Can bend interaction be used to authenticate on flexible displays?

Design

Passwords consist of a series of bend gestures on the flexible display. 20 gestures are available: each corner can be bent up or down (8 gestures) and pairs of corners can be bent up or down simultaneously (12 gestures).



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EVALUATION: 3 USER STUDIES

User Chosen Passwords

Two part study. In the first session users created a Bend password and PIN (on mobile phone). A week later users re-entered both passwords from the first session.



First session
(45 minutes)



Second session
(15 minutes)

create password

confirm 3 times

rehearse 5 times

re-enter password

System-assigned Passwords

Participants learned a system assigned Bend password and PIN. The remainder of the methodology was same as the user chosen passwords study.



First session
(45 minutes)

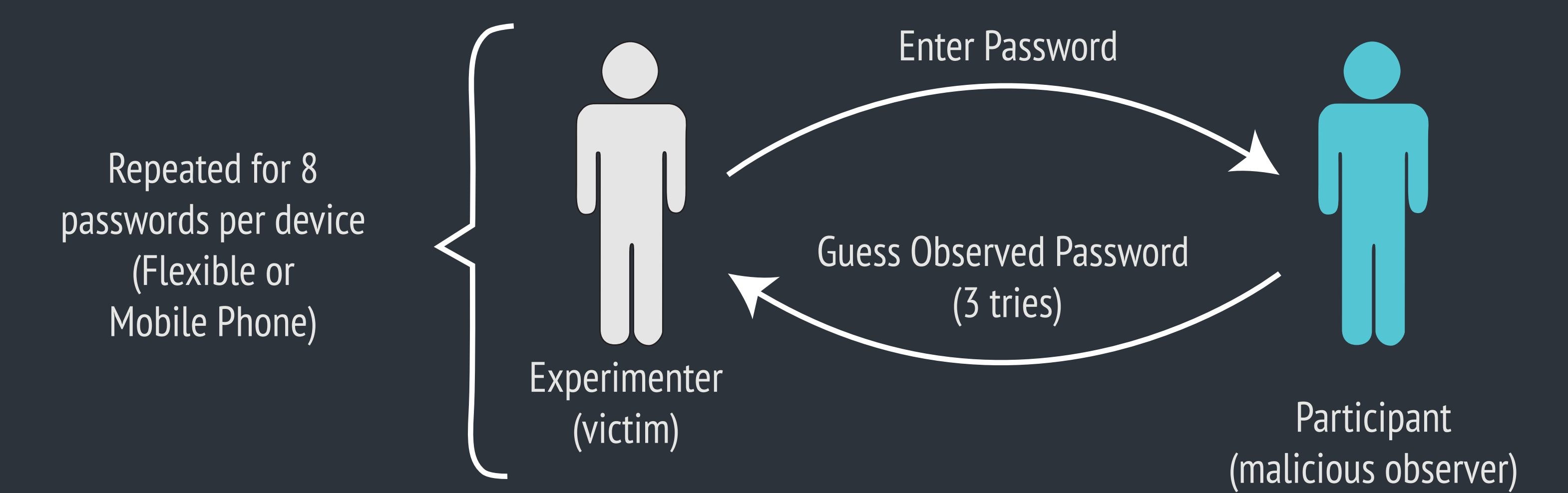
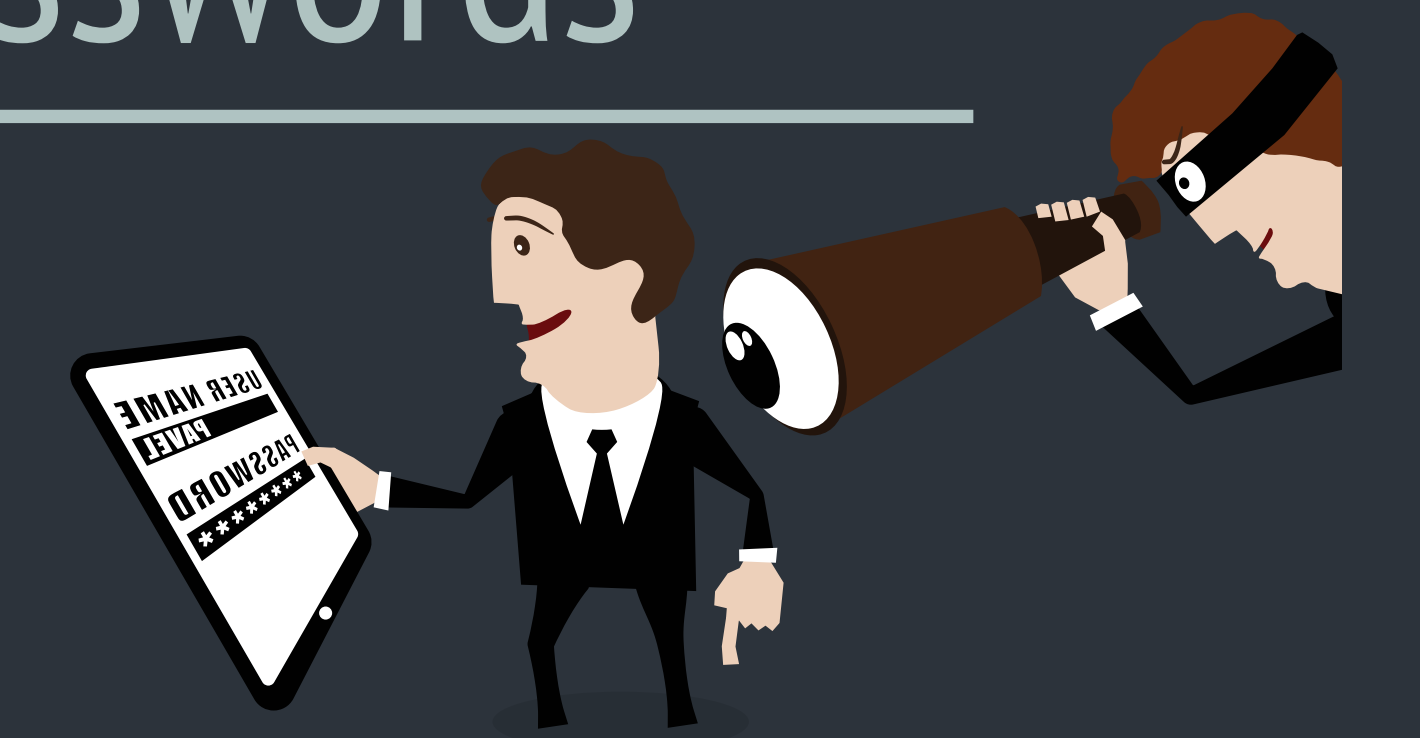


Second session
(15 minutes)



Shoulder-surfing Passwords

A within-subjects user study compared the shoulder surfing vulnerability of Bend passwords and PINs.



Login time

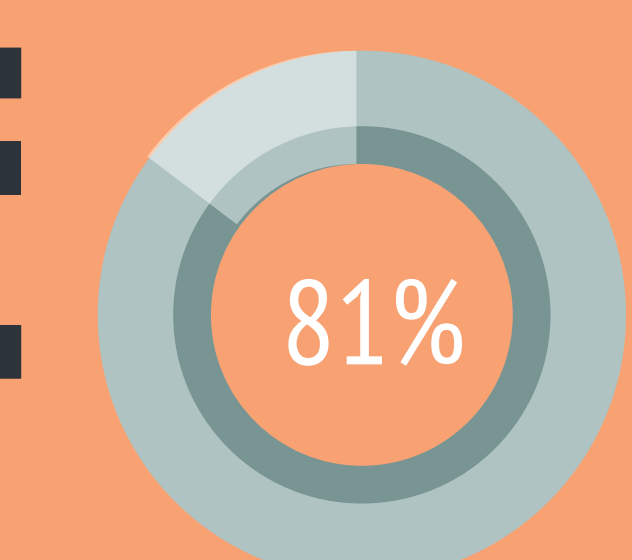
Bend
Study 1: 16s
Study 2: 13s



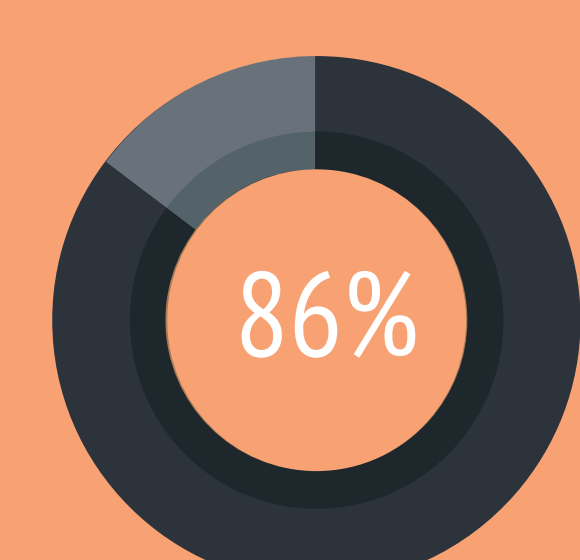
PIN
Study 1: 5s
Study 2: 3s

Measured in the rehearsal stage of session 1

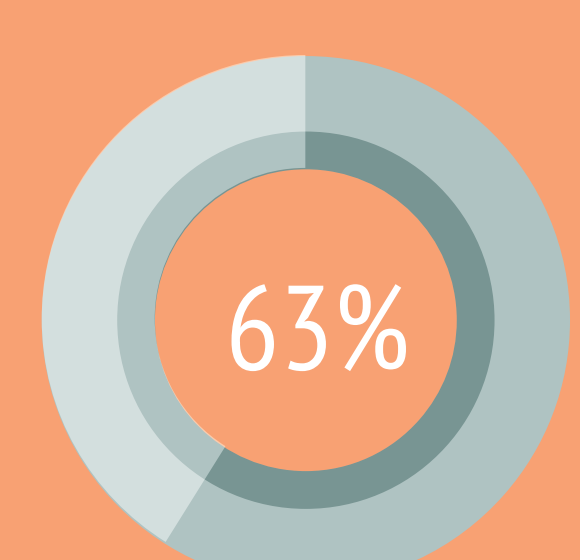
Memorability



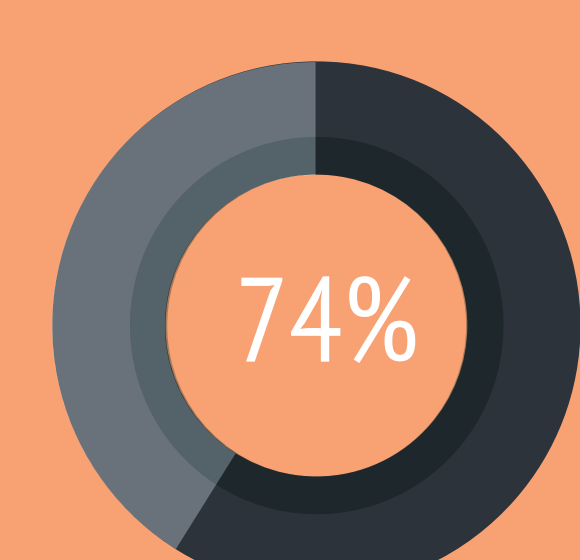
User Chosen Bend Passwords



User Chosen PINs



System-assigned Bend Passwords

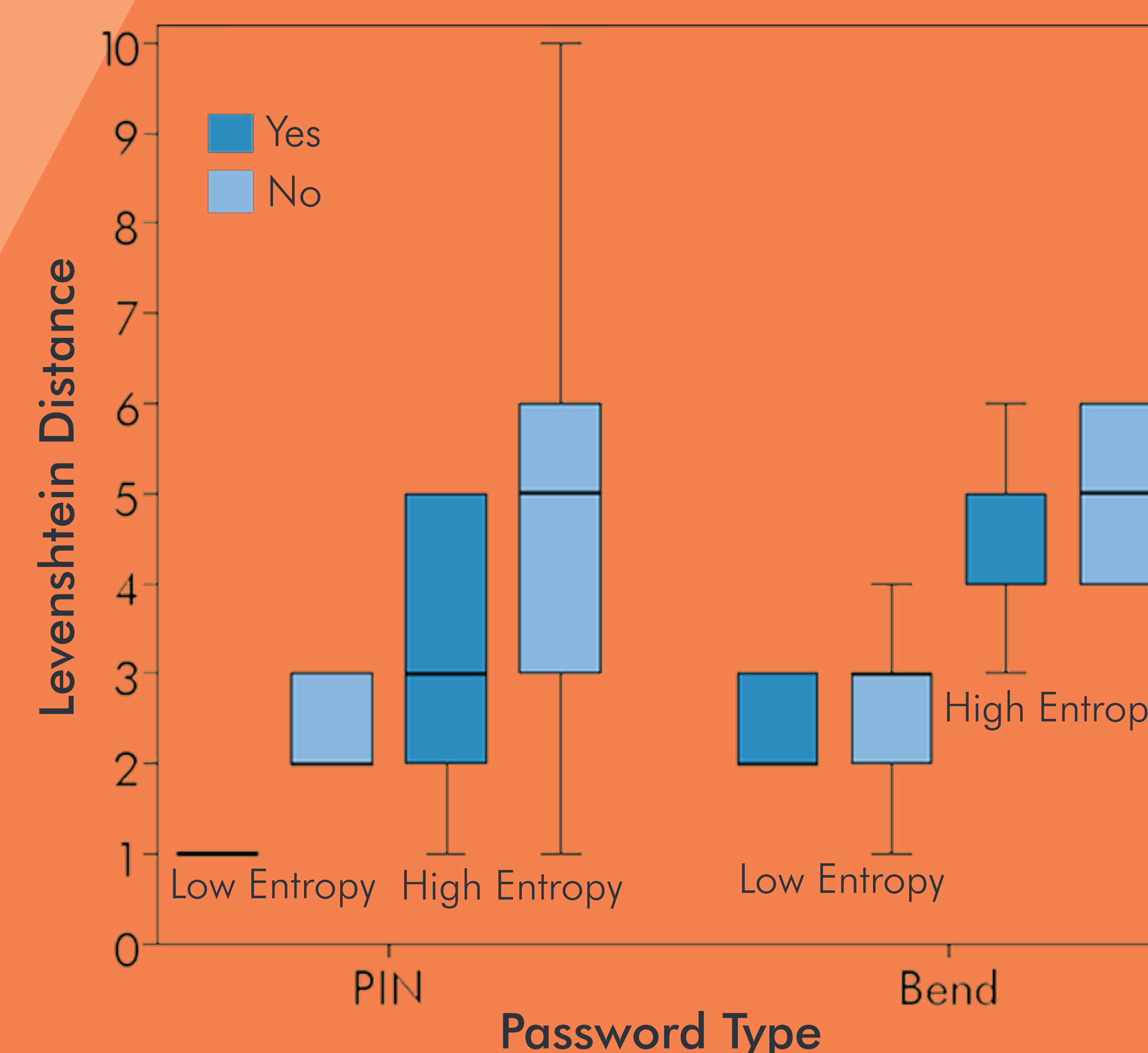


System-assigned PINs

No significant differences found

Shoulder-surfing susceptibility

Both Bend passwords and PINs were very difficult to shoulder-surf.



User feedback

The gestures were fairly easy to remember, which was good.

It is harder to have multiple bends at same area as you get confused.

There were various combinations that could be made, allowing for variety.

Conclusion

Results from our studies are mixed, but indicate that Bend Passwords are worthy of further exploration. We believe that several of our findings and the insight gained will generalize to eventual market quality devices.

Using results from our studies, we proposed eight design recommendations for the eventual implementation of Bend passwords on real flexible display devices.

FINDINGS