

**For brevity, we write Animal/Country/Colours instead of producing three nearly identical question sets (differing only in the assigned dictionary). Each participant was only exposed to the dictionary assigned to them.**

**Please type in your ProlificID before proceeding:**

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Please do not use the back button on your browser during this survey. Using the back button may cause errors that could prevent you from completing the survey. To ensure your responses are saved and the study proceeds smoothly, please navigate through the survey using the provided buttons only.

### **Welcome!**

In this survey, you will receive two passwords (which will be explained on the next page) and answer several questions related to them. During the survey, you will be asked to re-enter these passwords multiple times. Before proceeding, we ask for your consent.

### **Consent Form**

#### *Description of research:*

The purpose of this study is to investigate how well users remember and understand passwords based on themes, which are intended to protect them against forced login.

#### *Withdrawal:*

You can withdraw your consent about being part of the study at any time before the completion of the study, meaning before you submit the survey. In this case your collected data will be deleted by the researchers. For more information on how to withdraw from a study before completion in Prolific, see this link: <https://participant-help.prolific.co/hc/en-gb/articles/360022342094-How-do-I-withdraw-my-participation-in-a-study>. Please note that we cannot delete your data after you have completed the study, since the data we collect is anonymised and we, therefore, have no chance to identify you (unless you choose to disclose identifying information about yourself when using the voting system or answering the questionnaire, in which case your data will be anonymised as described below).

#### *Compensation:*

Each participant will receive 2.25 £ at the conclusion of the study through Prolific.

*How we handle and delete data:* If a participant discloses any personal information about themselves or other people when answering the questionnaire that could lead to identification, the researchers will remove this from the dataset and replace it with a placeholder.

#### *What data we collect:*

The participants will be asked to share the following personal data:

- Gender
- Age
- Level of education

We further collect the answers that the participants give to the questions in the questionnaire.

*How we use the data:* These data will be used to derive statistical measures of users' recall rates, understanding, and errors of theme-based passwords. Furthermore, the data will be used to derive qualitative insights into how users perceive theme-based passwords. The data might be referenced or quoted but not printed in full unless it is completely anonymised in the published research reports and other academic publications.

*Who has access to the data:* The researchers have access to the original data until it has been edited to replace given personal information with placeholders to anonymise it.

*Researchers:*

The following researchers from XXX are involved.

XXX

*Questions:*

For any questions concerning our processing of your personal data, please contact the researchers involved in the project (see contact details above).

**I consent to participate as a subject in the research described above. I consent by answering "Yes" and clicking "Next".**

(1) Yes

### **Password Explanation of Thematic Passwords**

In this survey, you will receive **two passwords**, and you must **always use both** when logging in:

1. **Your Main Password** – A secure password that you can save and store (e.g., in a password manager).
2. **Your Secret Thematic Password** – A password based on a specific theme (e.g., animals/countries/colours) that you **must remember** but **not write down**.

### **How to Use Your Passwords:**

- **In a normal login (everything is fine):** You enter your **Main Password** + your **real Secret Thematic Password** (the one you remembered).
- **If someone is forcing you to log in:** You enter your **Main Password** + a **different word** from the same theme instead of your real Secret Theme Password.

## Example:

Situation	Main Password	Thematic Password (Animal)
Normal Login	Xy7&@pQ!3	rabbit
Forced Login	Xy7&@pQ!3	dog

/

Situation	Main Password	Thematic Password (Country)
Normal Login	Xy7&@pQ!3	Japan
Forced Login	Xy7&@pQ!3	Germany

/

Situation	Main Password	Thematic Password (Colour)
Normal Login	Xy7&@pQ!3	yellow
Forced Login	Xy7&@pQ!3	green

When you log in using **either example**, the system will look the same and indicate a successful login. However, if you enter a different word instead of your real Secret Thematic Password (e.g., "dog/Germany/green" instead of "rabbit/Japan/yellow" the system will secretly detect that something is wrong and trigger a silent alarm. This alarm is discreet and doesn't notify the user directly. Instead, it sends a hidden alert to system administrators or security personnel, who can then take appropriate action without the user being aware that their input was flagged.

### Helpful Tip: Stick to the Theme

To help you avoid mistakes, the system **checks** if your Thematic Password matches the theme.

- **Correct Example:** Theme = Animals/Countries/Colours → Password = "rabbit/Japan/yellow" "
- **Wrong Example:** Theme = Animals/Countries/Colours → Password = "pizza" (not an animal/country/colour)

If you enter a word **outside the theme**, the system will **show an error** so you can try again

### Key Things to Remember

- **You always enter TWO passwords to log in:** your Main Password and your Secret Theme Password.
- **Do NOT write down your Secret Thematic Password** – you must remember it.
- **If you're ever forced to log in, enter a different word from the same theme.**
- **Your Main Password can be saved, but your Secret Thematic Password stays in your memory.**

### Next Step

Click **Next** to receive your two passwords.

### Your Main Password

Below, you will find your **Main Password**, which you **can save and store** (e.g., in a password manager).

- **Rm2VRGNrWp**

This password must always be used together with a thematic password when logging in.

Click **next** to receive your thematic password.

### Your Thematic Password

Below, you will find your **Secret Theme Password**, which you **must remember but NOT write down**. The theme for your secret theme password is animals/countries/colours.

- **Elephant/Norway/Purple**

This password must always be used together with your main password when logging in.

### Understanding of Theme-based Passwords

In this part of the survey, we will ask you questions about your understanding of thematic passwords.

**Compared to other accounts where you use a password, how secure do you view thematic passwords (consisting of a main password and a secret thematic password) as a concept in general?**

- (1) Much less secure
- (2) Somewhat less secure
- (3) About equally secure
- (4) Somewhat more secure
- (5) Much more secure

**Imagine your theme is "animals" and your theme password is "Dolphin". Which of the following words would signal that you are being forced to log in?**

- (1) Turtle
- (6) Pizza
- (2) Germany
- (5) Dolphin
- (3) Purple
- (4) None of the above

**Imagine your theme is "countries" and your theme password is "Germany". Which of the following words would signal that you are being forced to log in?**

- (1) Red
- (6) Pizza
- (2) Germany
- (5) Cat
- (3) Japan
- (4) None of the above

**Imagine your theme is "colours" and your theme password is "Red". Which of the following words would signal that you are being forced to log in?**

- (1) Brown

- (6) Pizza
- (2) Turtle
- (5) Red
- (3) Japan
- (4) None of the above

**Imagine the theme of your second password is "animals". What will happen if you try to log in using the word "pizza"?**

- (1) The login will be successful
- (6) The login will fail
- (2) The login will succeed, but you will be asked to provide your main password as well
- (5) The system would prompt you to choose a new theme
- (4) None of the above

**Imagine the theme of your second password is "countries". What will happen if you try to log in using the word "pizza"?**

- (1) The login will be successful
- (6) The login will fail
- (2) The login will succeed, but you will be asked to provide your main password as well
- (5) The system would prompt you to choose a new theme
- (4) None of the above

**Imagine the theme of your second password is "colours". What will happen if you try to log in using the word "pizza"?**

- (1) The login will be successful
- (6) The login will fail
- (2) The login will succeed, but you will be asked to provide your main password as well
- (5) The system would prompt you to choose a new theme
- (4) None of the above

**Imagine your theme is "animals" and your theme password is "Dog". Which of the following words would signal that you are not being forced to log in?**

- (1) Dog
- (6) Pizza
- (5) Turtle
- (7) Red
- (8) Japan
- (4) None of the above

**Imagine your theme is "countries" and your theme password is "Japan". Which of the following words would signal you are not being forced to log in?**

- (1) Dog
- (9) Sweden
- (6) Pizza
- (7) Red
- (8) Japan
- (4) None of the above

**Imagine your theme is "colours" and your theme password is "Red". Which of the following words would signal you are not being forced to log in?**

- (1) Dog
- (6) Pizza
- (7) Red
- (8) Japan
- (5) Green
- (4) None of the above

**Re-calling Your Passwords**

In this part of the survey, we will ask you to recall your main password and your secret thematic password, which you received earlier in the process. We kindly ask that you do not go back and check the passwords, as we are investigating recall rates.

**1) Please enter your main password. (five attempts)**

\_\_\_\_\_

**1) Please enter your Secret Thematic Animal/Country/Colour Password. (five attempts)**

\_\_\_\_\_

**Personality Questions**

In this part of the survey, we will ask some questions about your personality to investigate how this influences your password behaviour.

**The following statements describe people's behaviours. Please select how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age.**

	Very inaccurate	Moderately inaccurate	Neither accurate nor inaccurate	Moderately accurate	Very accurate
Worry about things	(1) m	(2) m	(3) m	(4) m	(5) m
Make friends easily	(1) m	(2) m	(3) m	(4) m	(5) m
Have a vivid imagination	(1) m	(2) m	(3) m	(4) m	(5) m



Trust others	(1) m	(2) m	(3) m	(4) m	(5) m
Complete tasks successfully	(1) m	(2) m	(3) m	(4) m	(5) m
Get angry easily	(1) m	(2) m	(3) m	(4) m	(5) m
Love large parties	(1) m	(2) m	(3) m	(4) m	(5) m
Believe in the importance of art	(1) m	(2) m	(3) m	(4) m	(5) m
Use others for my own ends	(1) m	(2) m	(3) m	(4) m	(5) m
Like to tidy up	(1) m	(2) m	(3) m	(4) m	(5) m
Often feel blue	(1) m	(2) m	(3) m	(4) m	(5) m
Take charge	(1) m	(2) m	(3) m	(4) m	(5) m

**The following statements describe people's behaviours. Please select how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in**

**the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age.**

	Very inaccurate	Moderately inaccurate	Neither accurate nor inaccurate	Moderately accurate	Very accurate
Experience my emotions intensely	(1) m	(2) m	(3) m	(4) m	(5) m
Love to help others	(1) m	(2) m	(3) m	(4) m	(5) m
Keep my promises	(1) m	(2) m	(3) m	(4) m	(5) m
Find it difficult to approach others	(1) m	(2) m	(3) m	(4) m	(5) m
Am always busy	(1) m	(2) m	(3) m	(4) m	(5) m
Prefer variety to routine	(1) m	(2) m	(3) m	(4) m	(5) m
Love a good fight	(1) m	(2) m	(3) m	(4) m	(5) m
Work hard	(1) m	(2) m	(3) m	(4) m	(5) m
Go on binges	(1) m	(2) m	(3) m	(4) m	(5) m

Love excitement	(1) m	(2) m	(3) m	(4) m	(5) m
Love to read challenging material	(1) m	(2) m	(3) m	(4) m	(5) m
Believe that I am better than others	(1) m	(2) m	(3) m	(4) m	(5) m

**The following statements describe people's behaviours. Please select how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age.**

	Very inaccurate	Moderately inaccurate	Neither accurate nor inaccurate	Moderately accurate	Very accurate
Am always prepared	(1) m	(2) m	(3) m	(4) m	(5) m
Panic easily	(1) m	(2) m	(3) m	(4) m	(5) m
Radiate joy	(1) m	(2) m	(3) m	(4) m	(5) m
Sympathise with the homeless	(1) m	(2) m	(3) m	(4) m	(5) m

Jump into things without thinking	(1) m	(2) m	(3) m	(4) m	(5) m
Fear for the worst	(1) m	(2) m	(3) m	(4) m	(5) m
Feel comfortable around people	(1) m	(2) m	(3) m	(4) m	(5) m
Enjoy wild flights of fantasy	(1) m	(2) m	(3) m	(4) m	(5) m
Believe that others have good intentions	(1) m	(2) m	(3) m	(4) m	(5) m
Excel in what I do	(1) m	(2) m	(3) m	(4) m	(5) m
Get irritated easily	(1) m	(2) m	(3) m	(4) m	(5) m

**The following statements describe people's behaviours. Please select how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age.**

Very inaccurate	Moderately inaccurate	Neither accurate nor inaccurate	Moderately accurate	Very accurate
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Talk to a lot of different people at parties	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m
See beauty in things that others might not notice	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m
Cheat to get ahead	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m
Often forget to put things back in their proper place	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m
Dislike myself	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m
Try to lead others	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m
Feel others' emotions	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m
Am concerned about others	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m
Tell the truth	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m
Am afraid to draw attention to myself	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m

Am always on the go	(1) m	(2) m	(3) m	(4) m	(5) m
Prefer to stick with things that I know	(1) m	(2) m	(3) m	(4) m	(5) m

**The following statements describe people's behaviours. Please select how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age.**

	Very inaccurate	Moderately inaccurate	Neither accurate nor inaccurate	Moderately accurate	Very accurate
Yell at people	(1) m	(2) m	(3) m	(4) m	(5) m
Do more than what's expected of me	(1) m	(2) m	(3) m	(4) m	(5) m
Rarely overindulge	(1) m	(2) m	(3) m	(4) m	(5) m
Seek adventure	(1) m	(2) m	(3) m	(4) m	(5) m
Avoid philosophical discussions	(1) m	(2) m	(3) m	(4) m	(5) m

Think highly of myself	(1) m	(2) m	(3) m	(4) m	(5) m
Carry out my plans	(1) m	(2) m	(3) m	(4) m	(5) m
Become overwhelmed by events	(1) m	(2) m	(3) m	(4) m	(5) m
Have a lot of fun	(1) m	(2) m	(3) m	(4) m	(5) m
Believe that there is no absolute right or wrong	(1) m	(2) m	(3) m	(4) m	(5) m
Feel sympathy for those who are worse off than myself	(1) m	(2) m	(3) m	(4) m	(5) m
Make rash decisions	(1) m	(2) m	(3) m	(4) m	(5) m

**The following statements describe people's behaviours. Please select how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age.**

Very inaccurate	Moderately inaccurate	Neither accurate nor inaccurate	Moderately accurate	Very accurate
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Am afraid of many things	(1) m	(2) m	(3) m	(4) m	(5) m
Avoid contact with others	(1) m	(2) m	(3) m	(4) m	(5) m
Love to daydream	(1) m	(2) m	(3) m	(4) m	(5) m
Trust what people say	(1) m	(2) m	(3) m	(4) m	(5) m
Handle tasks smoothly	(1) m	(2) m	(3) m	(4) m	(5) m
Lose my temper	(1) m	(2) m	(3) m	(4) m	(5) m
Prefer to be alone	(1) m	(2) m	(3) m	(4) m	(5) m
Do not like poetry	(1) m	(2) m	(3) m	(4) m	(5) m
Take advantage of others	(1) m	(2) m	(3) m	(4) m	(5) m
Leave a mess in my room	(1) m	(2) m	(3) m	(4) m	(5) m



Am often down in the dumps	(1) m	(2) m	(3) m	(4) m	(5) m
Take control of things	(1) m	(2) m	(3) m	(4) m	(5) m

**The following statements describe people's behaviours. Please select how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age.**

Very inaccurate      Moderately inaccurate      Neither accurate nor inaccurate      Moderately accurate      Very accurate

Rarely notice my emotional reactions	(1) m	(2) m	(3) m	(4) m	(5) m
Am indifferent to the feelings of others	(1) m	(2) m	(3) m	(4) m	(5) m
Break rules	(1) m	(2) m	(3) m	(4) m	(5) m
Only feel comfortable with friends	(1) m	(2) m	(3) m	(4) m	(5) m
Do a lot in my spare time.	(1) m	(2) m	(3) m	(4) m	(5) m

Dislike changes	(1) m	(2) m	(3) m	(4) m	(5) m
Insult people	(1) m	(2) m	(3) m	(4) m	(5) m
Do just enough work to get by	(1) m	(2) m	(3) m	(4) m	(5) m
Easily resist temptations	(1) m	(2) m	(3) m	(4) m	(5) m
Enjoy being reckless	(1) m	(2) m	(3) m	(4) m	(5) m
Have difficulty understanding abstract ideas	(1) m	(2) m	(3) m	(4) m	(5) m
Have a high opinion of myself	(1) m	(2) m	(3) m	(4) m	(5) m

**The following statements describe people's behaviours. Please select how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age.**

Very inaccurate	Moderately inaccurate	Neither accurate nor inaccurate	Moderately accurate	Very accurate
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Waste my time	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m
Feel that I'm unable to deal with things	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m
Love life	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m
Am not interested in other people's problems	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m
Rush into things	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m
Get stressed out easily	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m
Keep others at a distance	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m
Like to get lost in thought	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m
Distrust people	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m
Know how to get things done	(1)	m	(2)	m	(3)	m	(4)	m	(5)	m

Am not easily annoyed	(1) m	(2) m	(3) m	(4) m	(5) m
<p>This question is not part of the survey and just helps us to detect bots and automated scripts. To confirm that you are a human, please choose 'Very inaccurate' here.</p>					

**The following statements describe people's behaviours. Please select how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age.**

	Very inaccurate	Moderately inaccurate	Neither accurate nor inaccurate	Moderately accurate	Very accurate
Avoid crowds	(1) m	(2) m	(3) m	(4) m	(5) m
Do not enjoy going to art museums	(1) m	(2) m	(3) m	(4) m	(5) m
Obstruct others' plans	(1) m	(2) m	(3) m	(4) m	(5) m
Leave my belongings around	(1) m	(2) m	(3) m	(4) m	(5) m

Feel comfortable with myself	(1) m	(2) m	(3) m	(4) m	(5) m
Wait for others to lead the way	(1) m	(2) m	(3) m	(4) m	(5) m
Don't understand people who get emotional	(1) m	(2) m	(3) m	(4) m	(5) m
Take no time for others	(1) m	(2) m	(3) m	(4) m	(5) m
Break my promises	(1) m	(2) m	(3) m	(4) m	(5) m
Am not bothered by difficult social situations	(1) m	(2) m	(3) m	(4) m	(5) m
Like to take it easy	(1) m	(2) m	(3) m	(4) m	(5) m
Am attached to conventional ways	(1) m	(2) m	(3) m	(4) m	(5) m

**The following statements describe people's behaviours. Please select how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age.**

	Very inaccurate	Moderately inaccurate	Neither accurate nor inaccurate	Moderately accurate	Very accurate
Get back at others	(1) m	(2) m	(3) m	(4) m	(5) m
Put little time and effort into my work	(1) m	(2) m	(3) m	(4) m	(5) m
Am able to control my cravings	(1) m	(2) m	(3) m	(4) m	(5) m
Act wild and crazy	(1) m	(2) m	(3) m	(4) m	(5) m
Am not interested in theoretical discussions	(1) m	(2) m	(3) m	(4) m	(5) m
Boast about my virtues	(1) m	(2) m	(3) m	(4) m	(5) m
Have difficulty starting tasks	(1) m	(2) m	(3) m	(4) m	(5) m
Remain calm under pressure	(1) m	(2) m	(3) m	(4) m	(5) m
Look at the bright side	(1) m	(2) m	(3) m	(4) m	(5) m

of life					
Believe that we should be tough on crime	(1) m	(2) m	(3) m	(4) m	(5) m
Try not to think about the needy	(1) m	(2) m	(3) m	(4) m	(5) m
Act without thinking	(1) m	(2) m	(3) m	(4) m	(5) m

## Demographics

In this part of the survey, we will ask you demographic questions.

### What gender do you identify as?

- (1) Woman
- (2) Man
- (3) Non-binary
- (4) Prefer not to disclose
- (5) Prefer to self-describe \_\_\_\_\_

### How old are you?

- (1) 18-24
- (2) 25-34
- (3) 35-44
- (4) 45-54
- (5) 55-64
- (6) 65 or older

(7) Prefer not to say

**What is the highest degree or level of school you have completed?**

- (1) No schooling completed
- (2) Some high school
- (3) High school
- (4) Some college
- (5) College
- (6) Trade, technical, or vocational training
- (7) Associate's Degree
- (8) Bachelor's Degree
- (9) Master's Degree
- (10) Professional Degree
- (11) Doctorate
- (12) Prefer not to disclose
- (13) Other: Please specify \_\_\_\_\_

**Which of the following best describes your educational background or job field?**

- (1) I have an education in, or work in, the field of computer science, computer engineering, or IT.
- (2) I do not have an education in, nor do I work in, the field of computer science, computer engineering, or IT.
- (3) Prefer not to say

**Re-calling Your Passwords**

In this part of the survey, we will ask you to recall your main password and secret theme password once again, which you received earlier in the process. We kindly ask that you do not go back and check the passwords, as we are investigating recall rates.

**1. Please enter your main password. (5 attempts)**



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**1. Please enter your Secret Thematic Animal/Country/Colour Password. (5 attempts)**

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### **Improvements of Survey**

**Do you have any thoughts or suggestions on the survey?**

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**Thank you for participating in our survey!**

You might be invited back for a second survey within 2 weeks of the completion of this survey