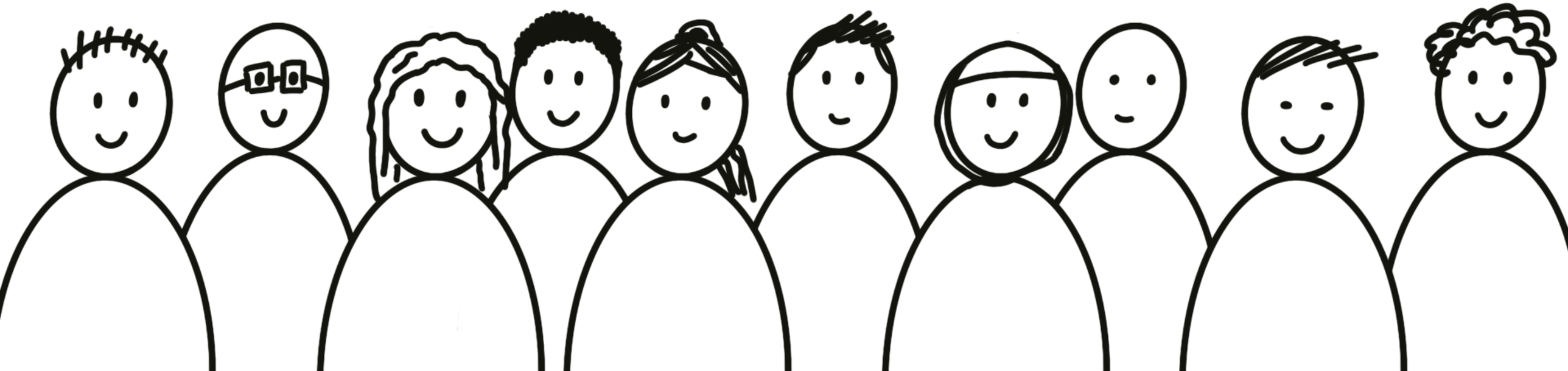
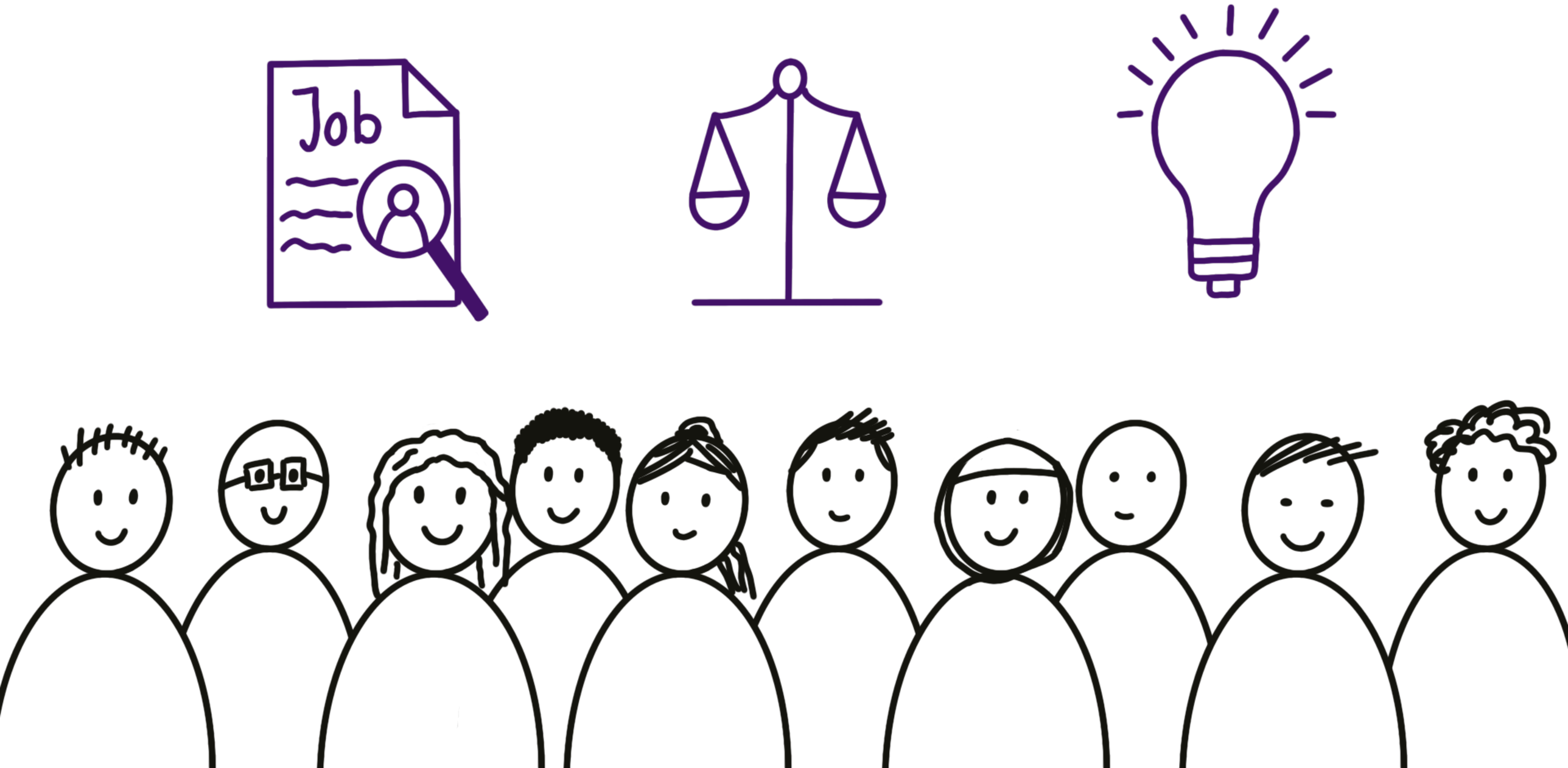
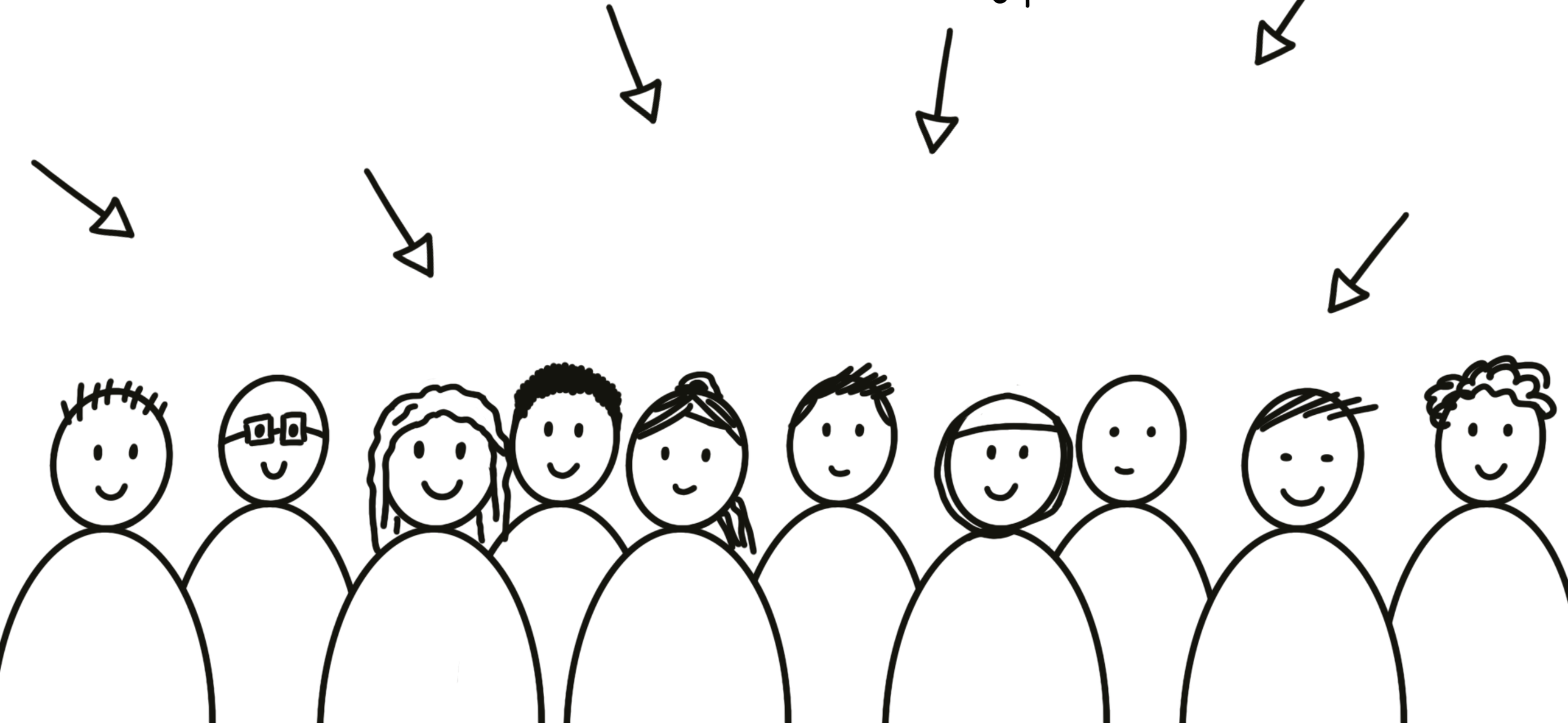
Gender, Social Interactions and Interests of Characters Illustrated in Scratch and Python Programming Books for Children

Shirley de Wit, Felienne Hermans, Marcus Specht, Efthimia Aivaloglou
Delft University of Technology & Vrije Universiteit Amsterdam

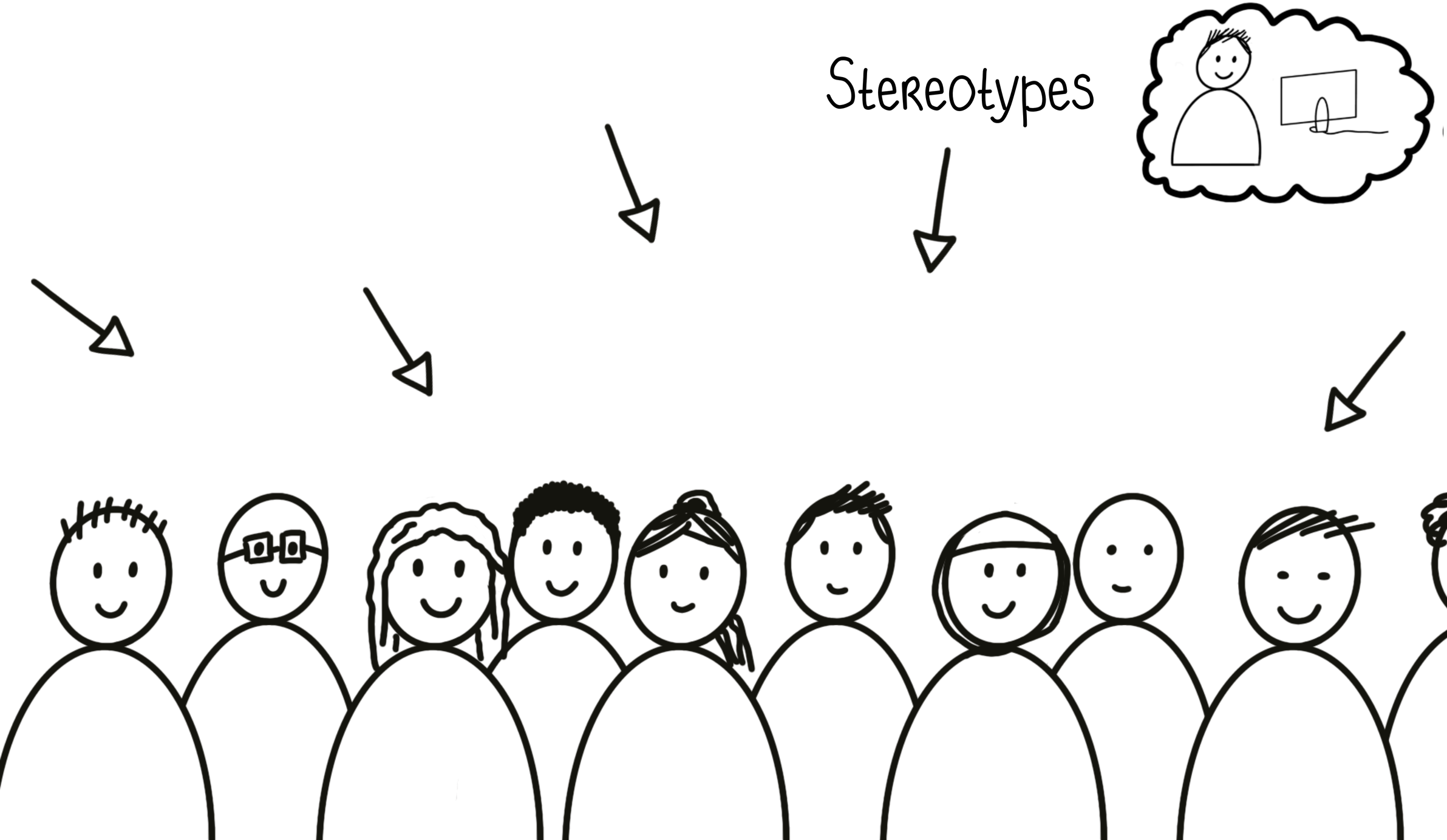


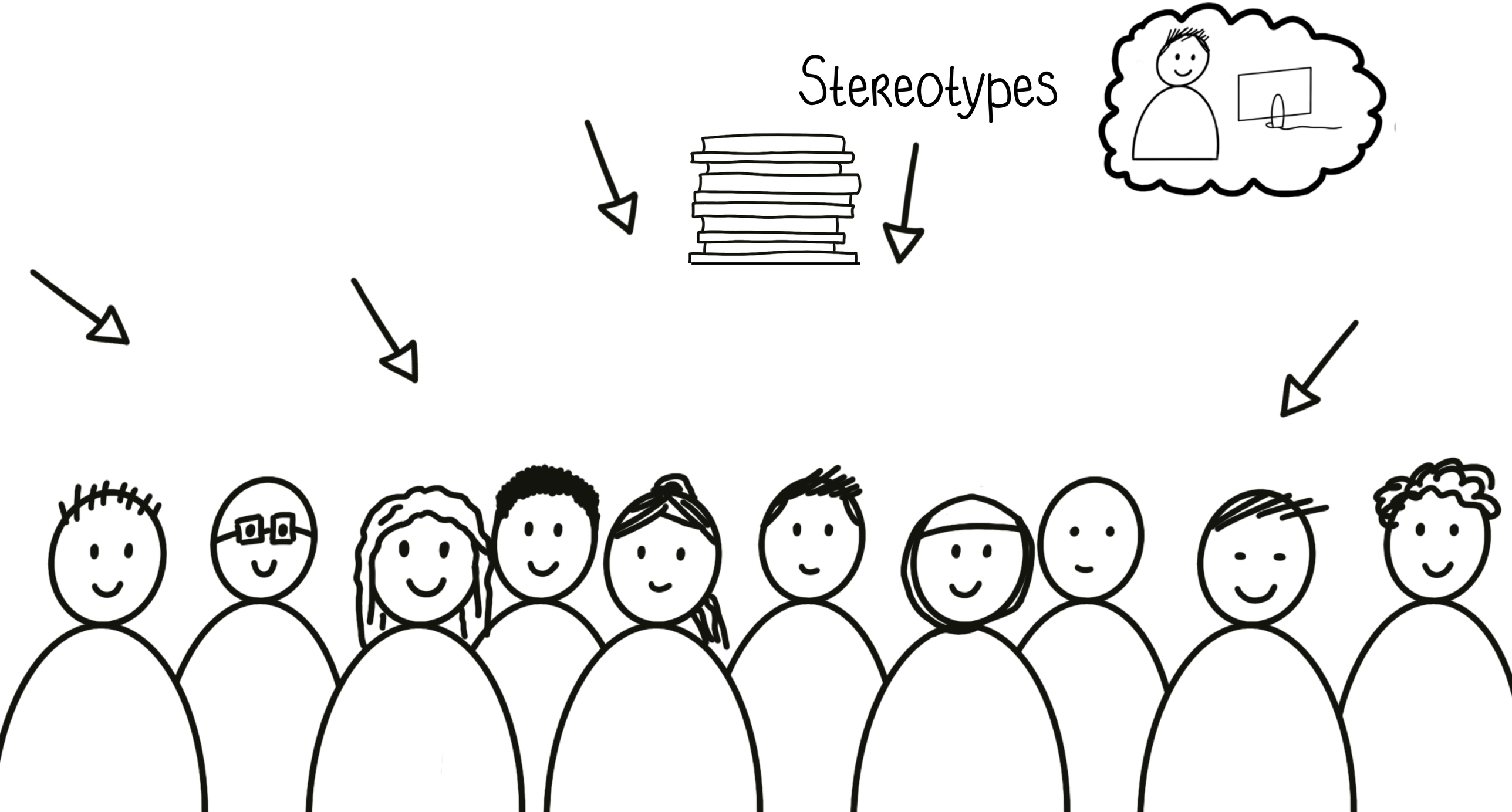

Job

Stereotypes

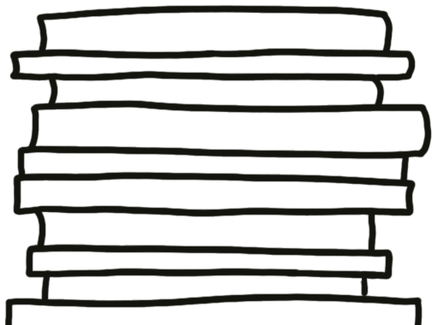


Stereotypes



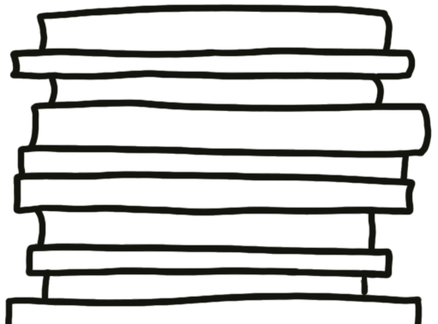

Stereotypes

Visuals in STEM books



Visuals in STEM books

- Men are more frequently depicted than women
- Stereotypical roles: (scientific) professionals, teachers, domestic activities



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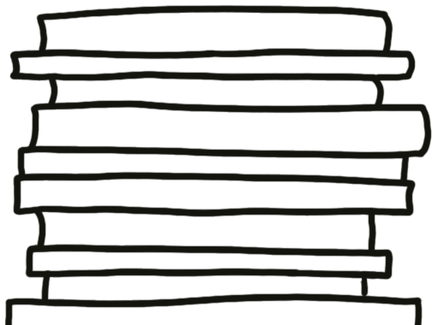
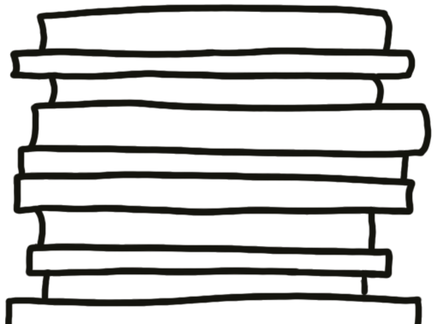


Limitation: focus on textbooks in schools, and work on CS is rare

RQ. To what extent do characters illustrated in Scratch and Python books for children fit the stereotypical CS a) gender, b) social interactions, and c) interests traits?

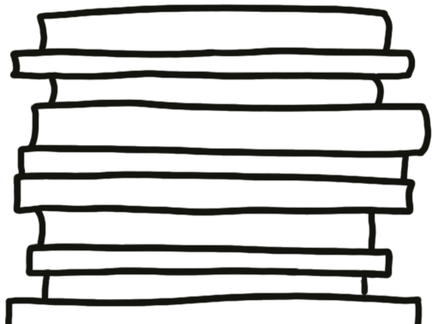


Materials

10 books (5 Python, 5 Scratch)

1,803 pages

1,639 characters



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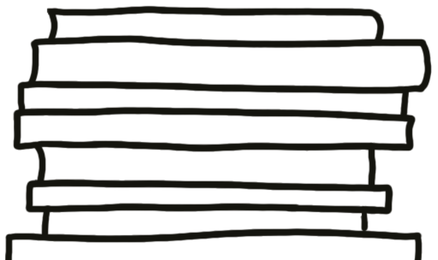
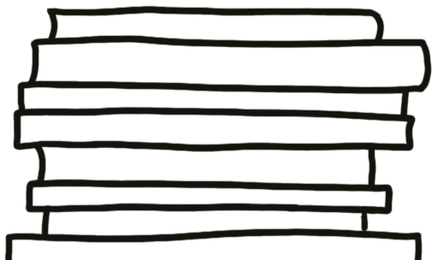


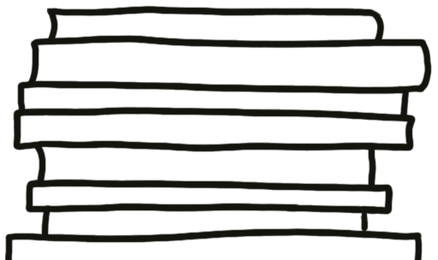
2 books had no characters

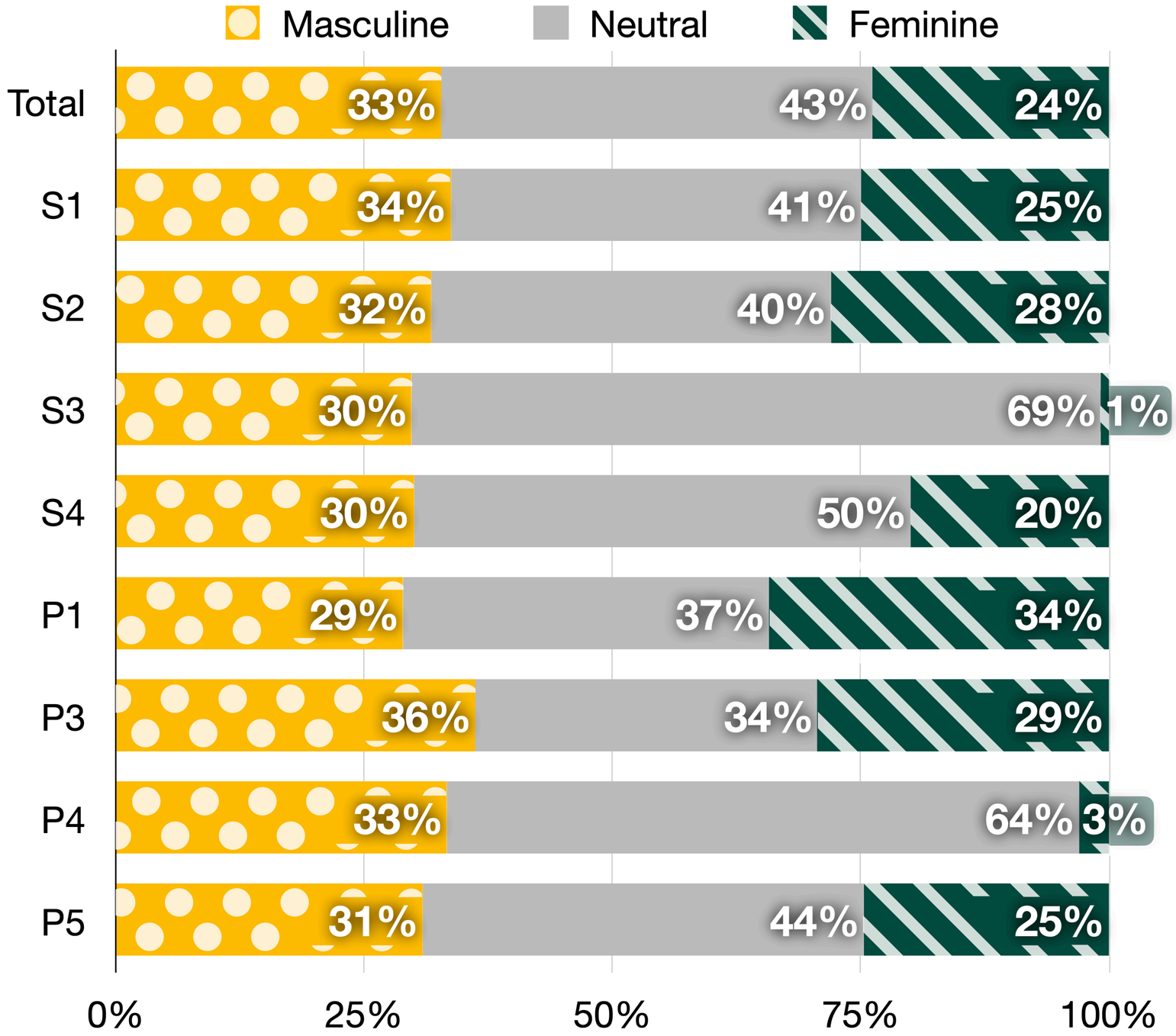
Gender



Gender

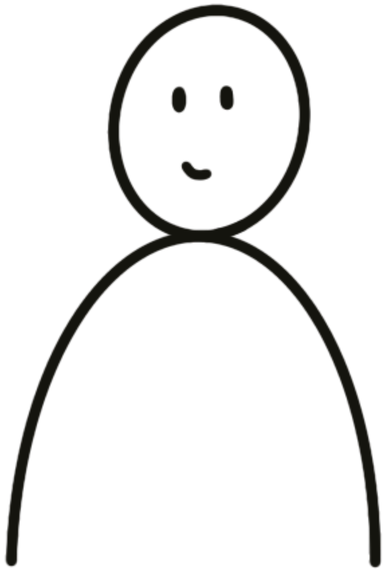
- Pronouns
- Masculinity and femininity of characters' appearance
  - Main colours
  - Clothes
  - Accessories
  - Hairstyle

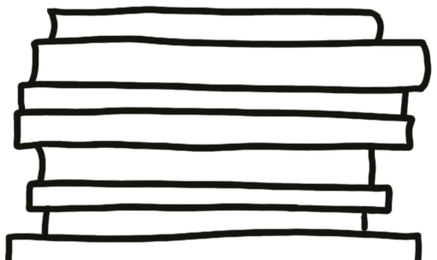



Masculine
Neutral
Feminine
Total
33%
43%
24%
S1
34%
41%
25%
S2
32%
40%
28%
S3
30%
69%
1%
S4
30%
50%
20%
P1
29%
37%
34%
P3
36%
34%
29%
P4
33%
64%
3%
P5
31%
44%
25%
0%
25%
50%
75%
100%

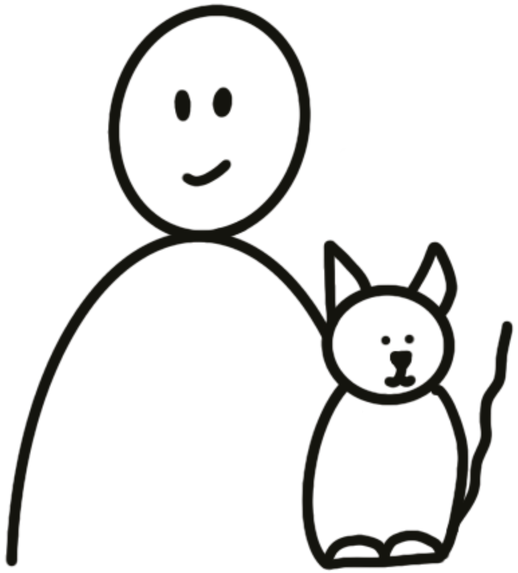
Social interactions

Alone

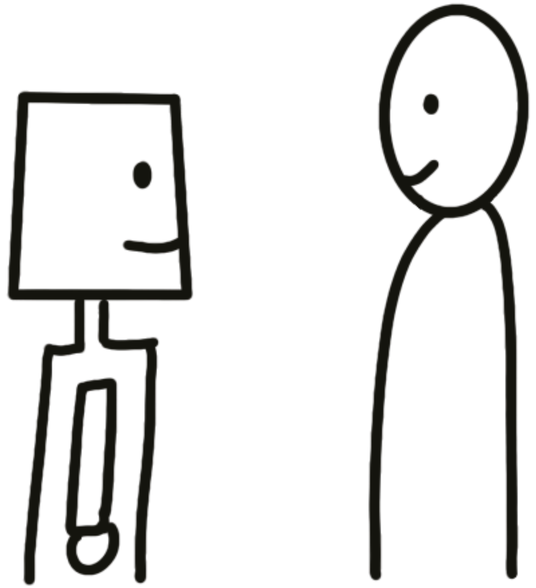


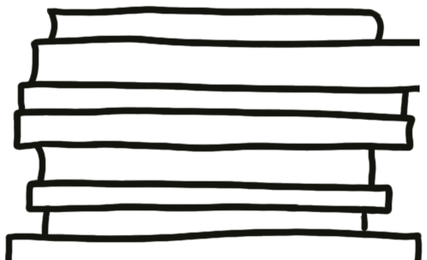


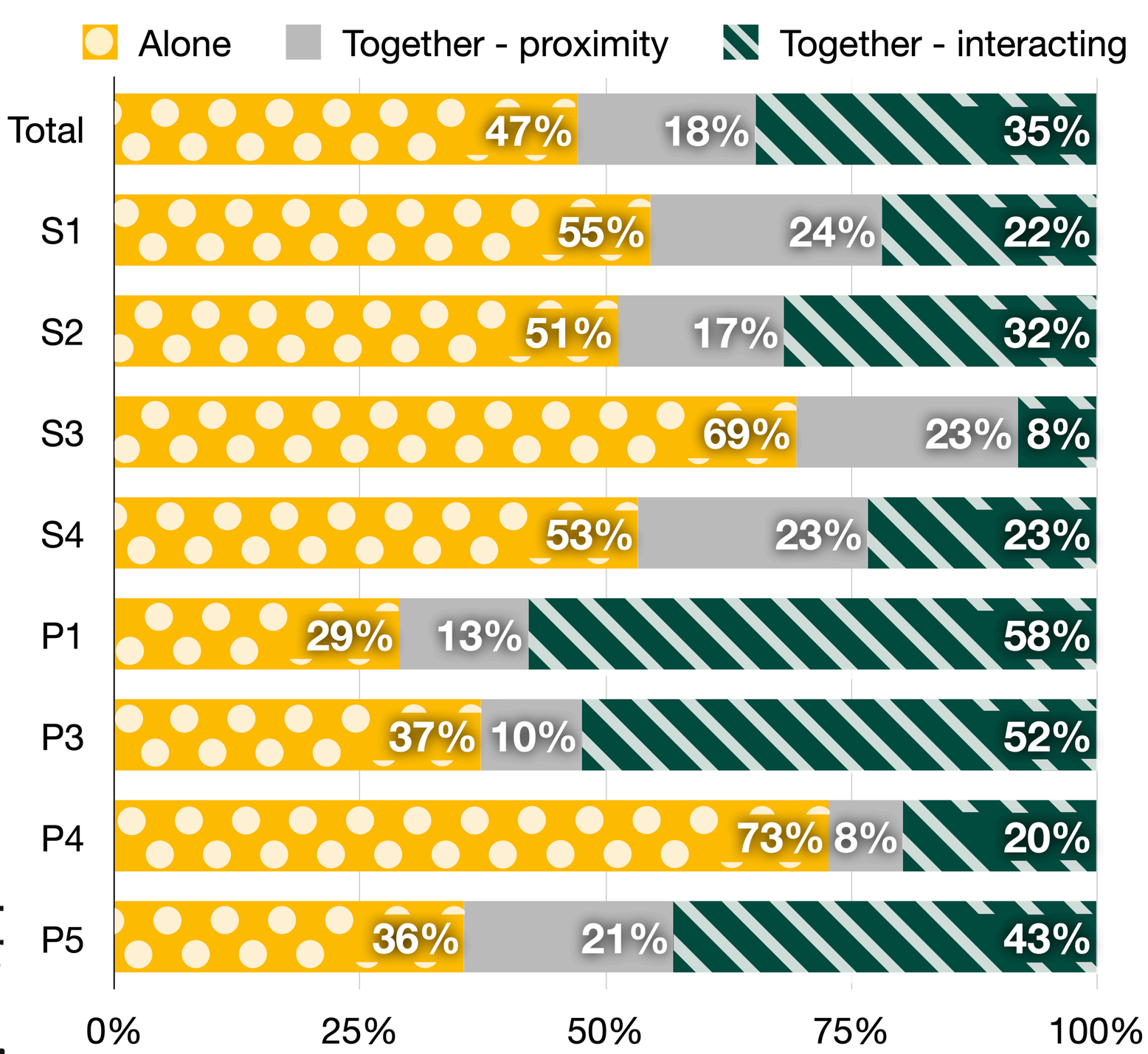
In proximity



Interacting

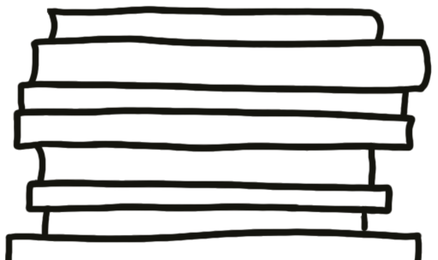


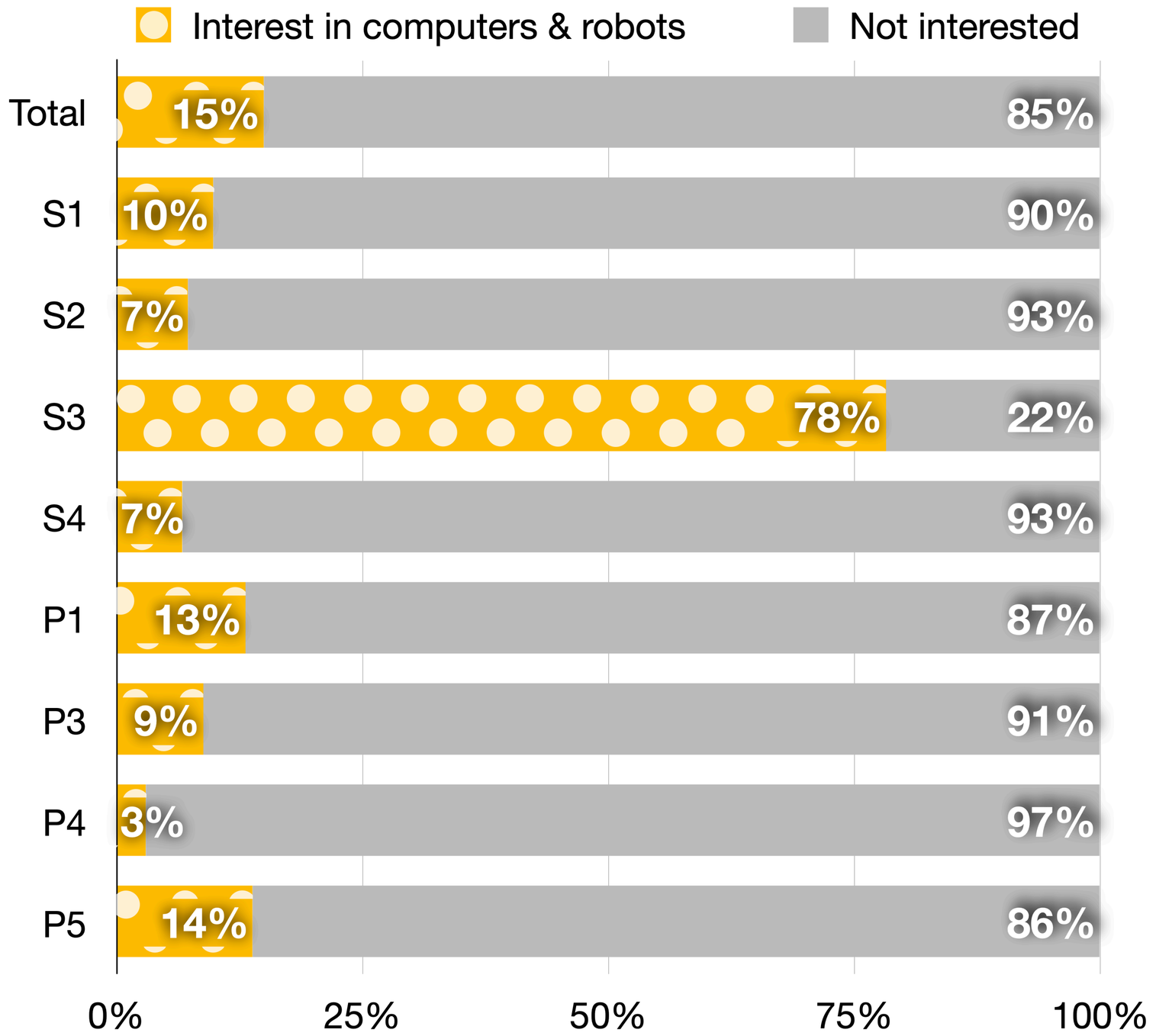



Alone
Together - proximity
Together - interacting
Total
47%
18%
35%
S1
55%
24%
22%
S2
51%
17%
32%
S3
69%
23%
8%
S4
53%
23%
23%
P1
29%
13%
58%
P3
37%
10%
52%
P4
73%
8%
20%
P5
36%
21%
43%
0%
25%
50%
75%
100%

Interests

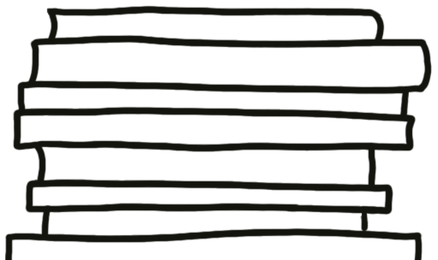
- Type of character
  - Humans
  - Animals
  - Computers & robots
  - Fantasy & history
  - Others
- Activity

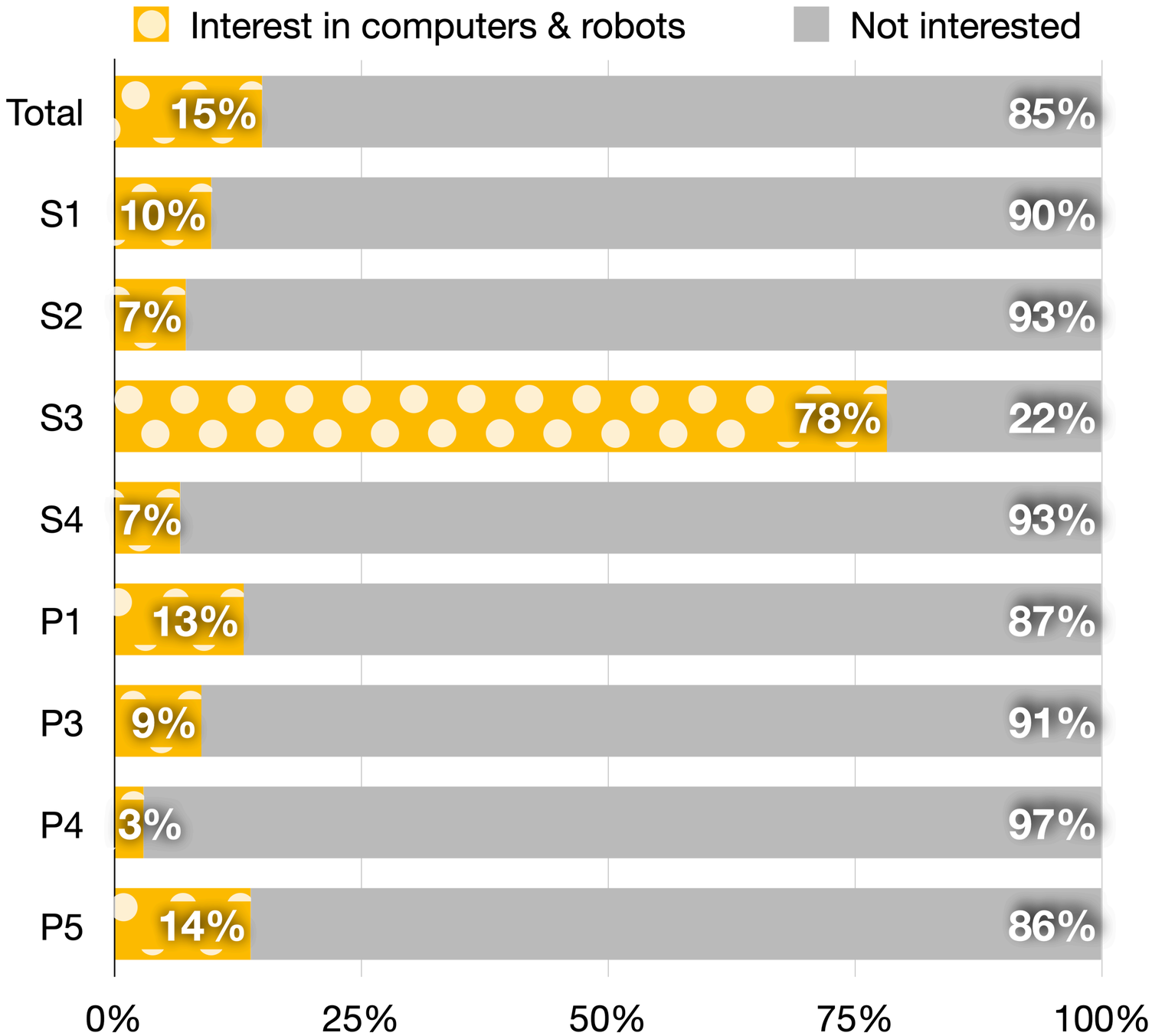



Interest in computers & robots
Not interested
Total
15%
85%
S1
10%
90%
S2
7%
93%
S3
78%
22%
S4
7%
93%
P1
13%
87%
P3
9%
91%
P4
3%
97%
P5
14%
86%
0%
25%
50%
75%
100%

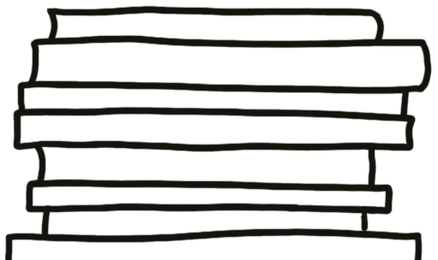
Popular activities

- Sports
- Computer & robots
- Outdoors
- Music
- Many characters are doing nothing





Combination of stereotypical CS traits



Combination of stereotypical CS traits

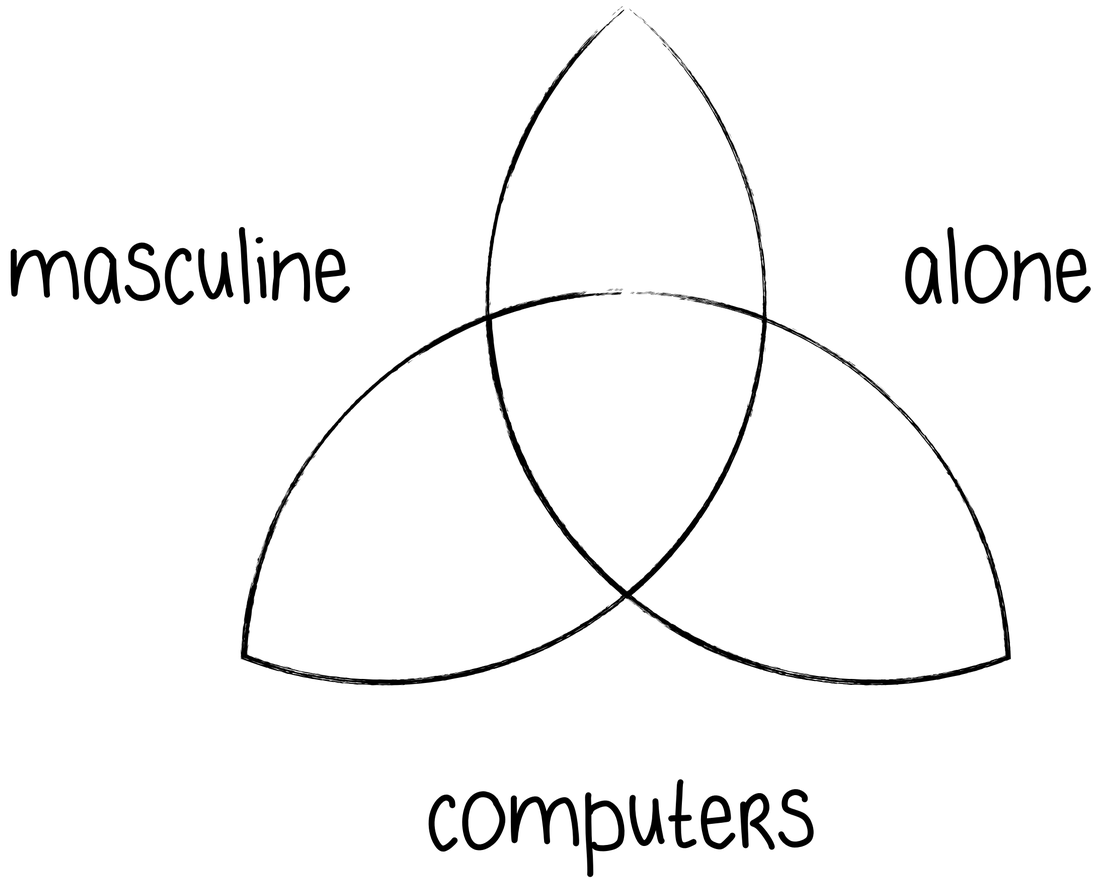
masculine
33%

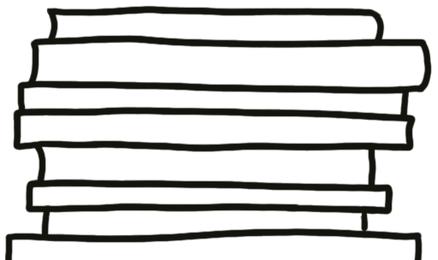
computers
15%

alone
47%

none
32%

Combination of stereotypical CS traits





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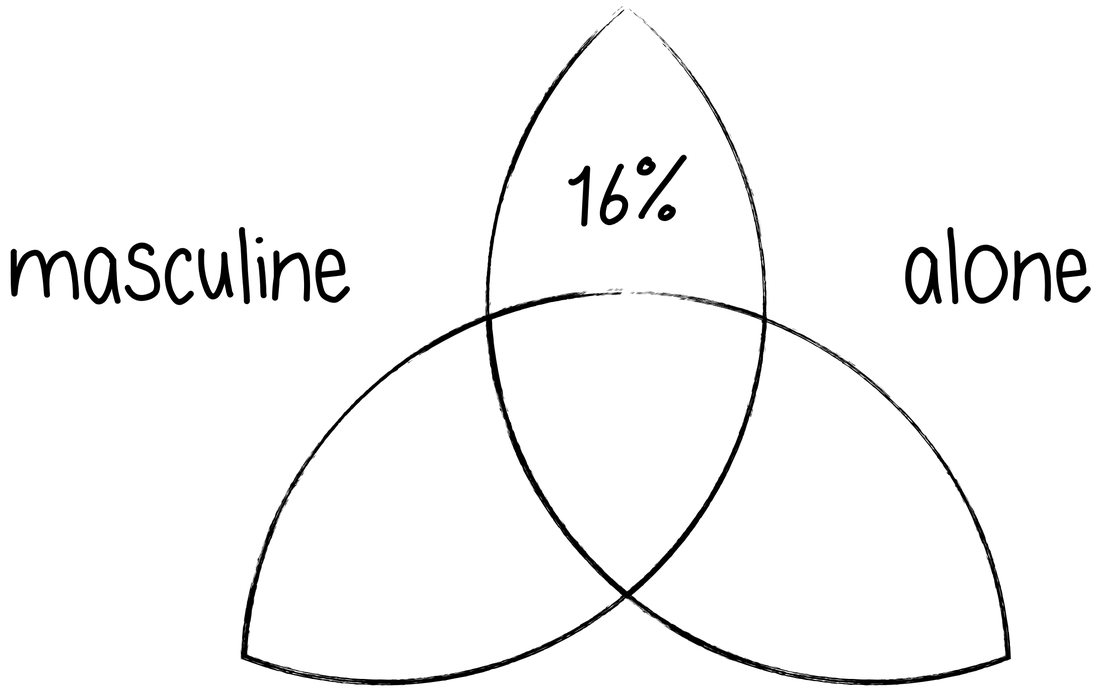

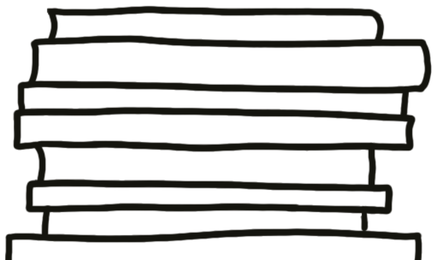

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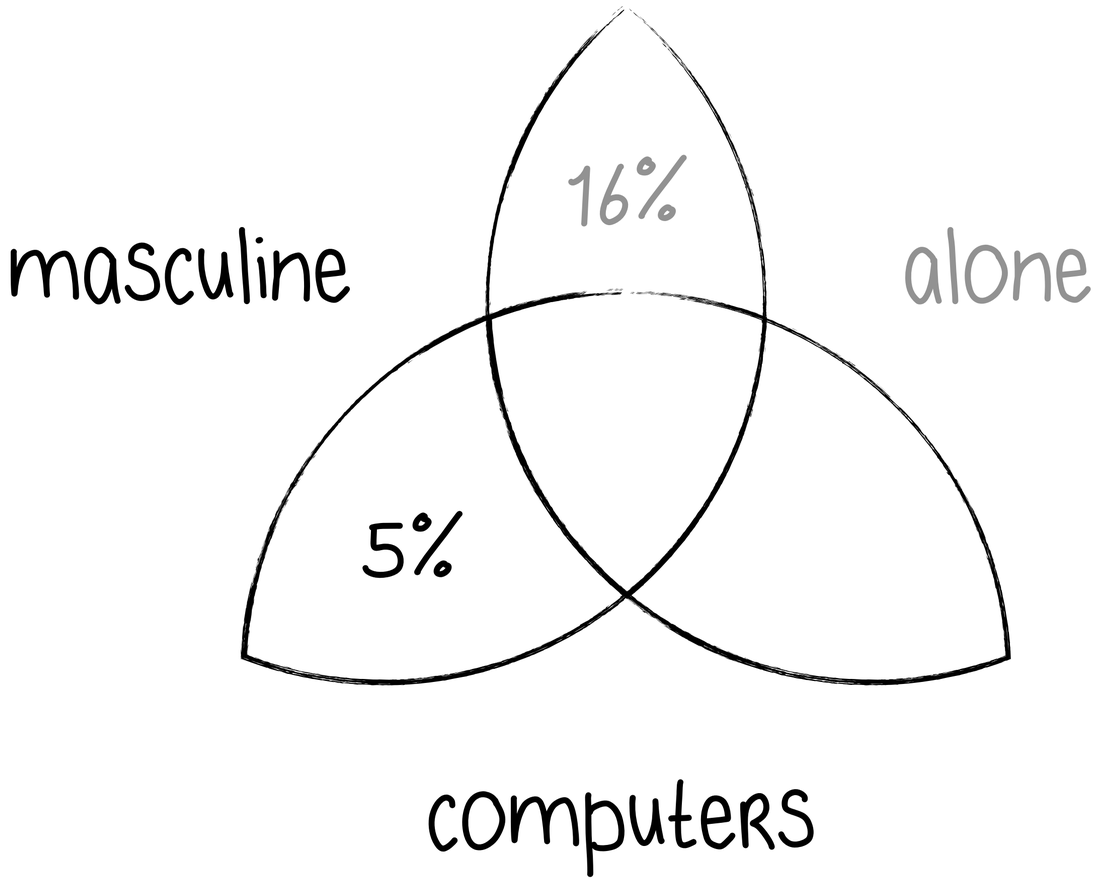

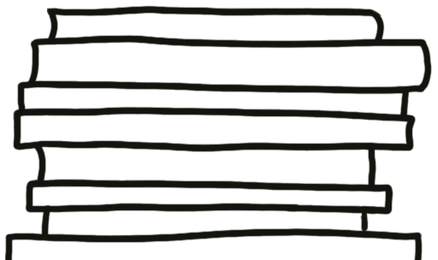

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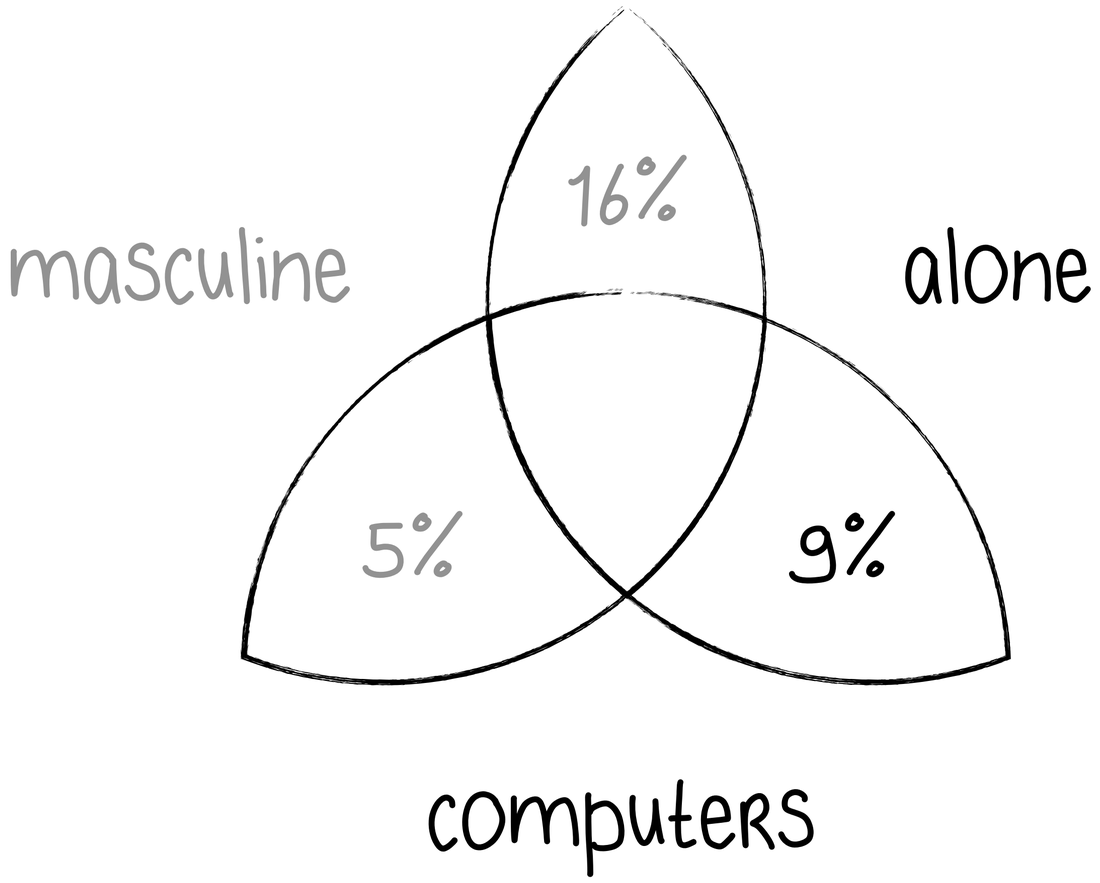
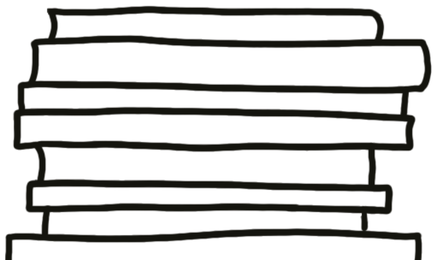
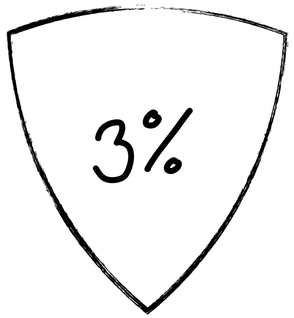




Combination of stereotypical CS traits

masculine

alone



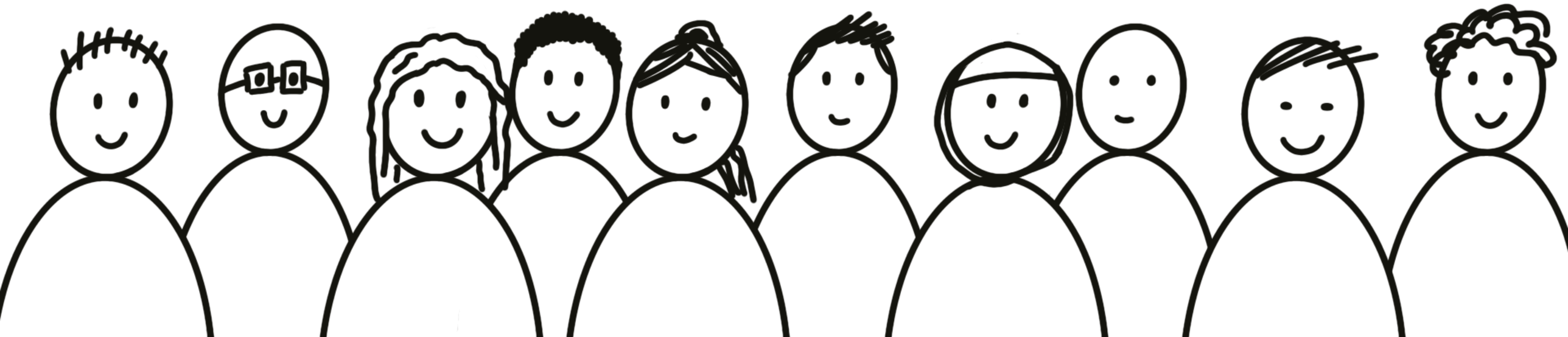
computers

Some other results

Some other results

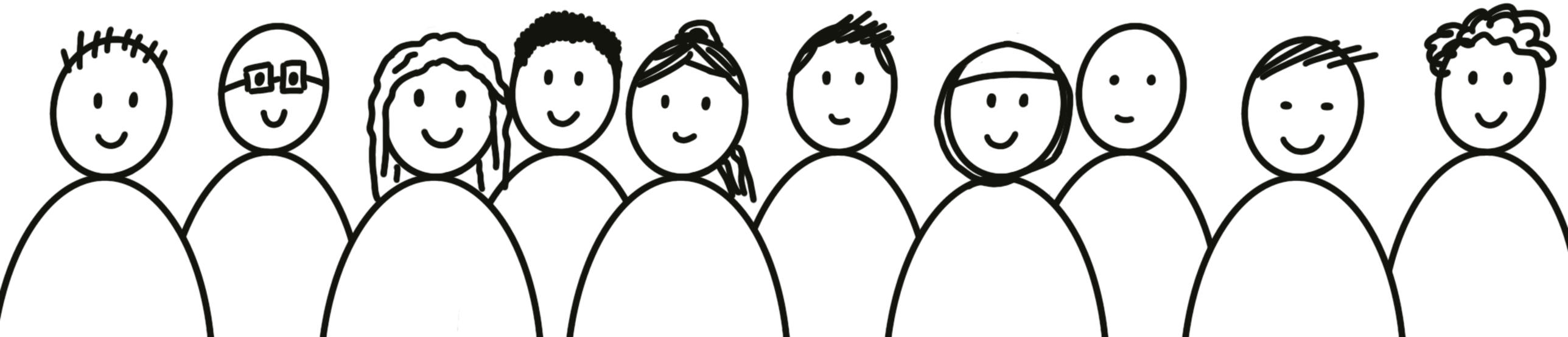
- Skin color
  - 518 light-skinned
  - 165 medium-skinned
  - 99 dark-skinned
- Did not identify any characters with a visible disability

What's next?



What's next?

- Analyse text
- Automate detecting stereotypes and biases
- Biases in software and programming languages



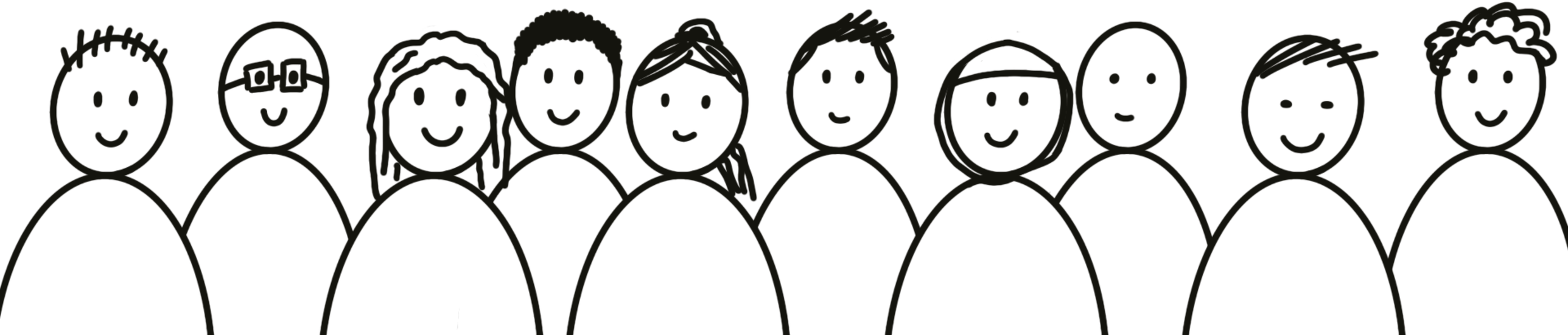
Towards Open Inclusive STEM Education

Shirley de Wit, Jorge Martinez Castaneda, Sanne Alblas, Efthimia Aivaloglou,
Hanno van Keulen, Ajay Jagadeesh, Anandini Jayanthi, Isabelle El-Hajj

Open-source resources on inclusive STEM Education

Domain-specific Examples of Inclusive STEM Education

Training Sessions on Open Inclusive STEM Education



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