Consent/introduction

Dear respondent, welcome to the Sentiment 2020 survey!

The survey is conducted by Tampere University in Finland. The study investigates public opinion and emotion including questions on AI and robots and some background information about yourself. The survey takes about 10–15 minutes to complete.

Participation is voluntary and you may exit the survey at any time. Unfinished responses will be deleted from the final dataset. For the success of this research, however, we wish you will complete the survey. You may leave feedback in the end of the survey.

Your responses are treated as confidential. In the end of this research project, the anonymous data will be handed over to the Finnish Social Science Data Archive (https://www.fsd.tuni.fi/en/). By completing the survey, you give your consent for participating in our research and allow the reuse of this data for further research. If you have any questions about this survey, you may contact the research team anonymously via [Anonymized].

You can find the Privacy Statement of the research project here: https://research.tuni.fi/robots-in-society/privacy-policy/.

Closing words

Thank you for participating in our study!

After the background information section, you were asked to picture yourself in imaginary situations. Here, the respondents were randomly assigned to different groups, each of which received slightly different scenarios. The purposes of these were to examine at first, if people write about working with robots differently when the number of robot co-workers increase, and second, if people demonstrate self-efficacy and usefulness beliefs differently when influenced socially.

Sentiment 2020 survey is a part of a wider research project *Robots in Society*. If you wish, you may contact the research team of this project anonymously via [Anonymized]. You may also follow the progress of our research here: https://research.tuni.fi/robots-in-society/.

Hidden, response statistic, and transformation variables:

[grouprp]: IDs for the experimental groups (1–4) of the 1. experiment, hidden from respondents.

[groupse]: IDs for the experimental groups (1–4) of the 2. experiment, hidden from respondents.

[submitdate]: Date stamp when answers submitted.

[interviewtime]: Response time in seconds.

[agegroup]: Age group of the respondent.

[region]: Living region of the respondent.

PART 1: BACKGROUND QUESTIONS

Background information [BV]

Gender **[bv1; male = M, female = F, no answer = (empty)]**

Is English your native language? **[bv3a, No=0, Yes=1]**

How would you describe where you live? **[bv4]**
1. A large city (over 250,000 inhabitants)
2. A medium-sized city (50,000 – 250,000 inhabitants)
3. A small city or town (under 50,000 inhabitants)
4. A suburb near a city
5. Open country or a rural area

Are you currently **[bv5]**
1. Living alone
2. Married or living with a partner, no children
3. Single parent
4. Married or living with a partner, children
5. I live with my parents
6. Other household type (e.g. living with roommates)

Which is the highest level of education you have achieved? **[bv6]**
1. Less than a High School diploma
2. High School diploma
3. Some college
4. A college degree
5. A master's degree, professional degree, or higher

Do you have a degree from the field of engineering or technology? **[bv7; Yes = 1, No = 0]**

What is your main occupation? **[bv8]**
1. I'm in school / I'm a student

2. I'm in a paid, full-time job
3. I'm in a paid, part-time job, and I am not looking for a full-time job
4. I'm in a paid, part-time job, but I am looking for a full-time job
5. I'm unemployed and looking for a job
6. I'm unemployed and not looking for a job

Has your occupational status changes due to COVID-19 crisis? **[corona1]**
No change. [0]
Yes, some partial changes. [1]
Yes, significant changes. [2]

Has your work been less or more demanding during the COVID-19 crisis? **[corona2]**
No change. [0]
Less than before. [1]
More than before. [2]

What is your household's gross annual income (before taxes)? **[bv10]**
1. Under $15,000
2. $15,000–$34,999
3. $35,000–$74,999
4. $75,000–$154,999
5. $155,000–$499,999
6. $500,000 and over

Big Five Inventory & Social Anxiety [BF] [SA]
BFI-S (Lang, John, Lüdtke, Schupp, & Wagner 2011) (Apaolaza et al. 2019)

Please answer to what degree you agree with the following statements (Strongly disagree 1 – 7 Strongly agree):

I see myself as someone who:
> Worries a lot **[bf1]**
> Gets nervous easily **[bf2]**
> Is relaxed, handles stress well **[bf3]**
> Is talkative **[bf4]**
> Is outgoing, sociable **[bf5]**
> Is reserved **[bf6]**
> Is original, comes up with new ideas **[bf7]**
> Values artistic, aesthetic experiences **[bf8]**
> Has an active imagination **[bf9]**
> Is sometimes rude to others **[bf10]**
> Has a forgiving nature **[bf11]**
> Is considerate and kind to almost everyone **[bf12]**
> Does a thorough job **[bf13]**
> Tends to be lazy **[bf14]**
> Does things efficiently **[bf15]**

Please answer to what degree you feel the statement is characteristic or true of you.
(Not at all characteristic or true of me 1 – 7 Extremely characteristic or true of me):

I have difficulty making eye contact with others. **[sias1]**
I find it difficult mixing comfortably with the people I work with. **[sias2]**
I tense up if I meet an acquaintance on the street. **[sias3]**
I feel tense if I am alone with just one person. **[sias4]**
I have difficulty talking with other people. **[sias5]**
I find it difficult to disagree with another's point of view. **[sias6]**

Views on work and technology use [TE]
(Unanimity te1-te2, identification te3-te4, perceived technology support te5-te7)

Please answer to what degree you agree with the following statements [Strongly disagree 1 – 7 Strongly agree]

In my field of work or study, I get to work with people who share my thoughts. [**te1**]
If bv8 = 2-4 ask; At my workplace, I believe I work with like-minded people**. [te2]**
I identify with my field of work or study. **[te3]**
If bv8 = 2-4 ask; I identify with my workplace. **[te4]**
I have people whom I can rely on when I have questions about technology. **[te5]**
There are people who provide help in case of issues with technology when I need it. **[te6]**
There are people who provide technological advice when buying new devices. **[te7]**

PART 2: EXPERIMENTS

1. WORK-TEAM Experiment Vol 3: Role-playing [RP]

GROUP 1: **grouprp==1** (team with 4 robots)
GROUP 2: **grouprp==2** (team with only humans, no robots = 1. control group)
GROUP 3: **grouprp==3** (4 robots co-workers, no team)
GROUP 4: **grouprp==4** (only human co-workers, no robots and no team = 2. control group)

GROUP 1: Imagine that you have just *been assigned to a new <u>team</u> in your new job*. Based on merit, *you and four robots have been chosen to this new <u>work team</u>*. Now, imagine that you have just had your first day at your new job. Please write a post to your favorite social media site about your first day (max. 160 characters). **[rp1, ____]**

GROUP 2: Imagine that you have just *been assigned to a new <u>team</u> in your new job*. Based on merit, *you and four other people have been chosen to this new <u>work team</u>*. Now, imagine that you have just had your first day at your new job. Please write a post to your favorite social media site about your first day (max. 160 characters). **[rp2, ____]**

GROUP 3: Imagine that you have just *started at your new job*. Based on merit, *you and four robots were selected from the <u>job applicants</u>*. Now, imagine that you have just had your first day at your new job. Please write a post to your favorite social media site about your first day (max. 160 characters). **[rp3, ____]**

GROUP 4: Imagine that you have just *started at your new job*. Based on merit, *you and four other people were selected from the <u>job applicants</u>*. Now, imagine that you have just had your first day at

your new job. Please write a post to your favorite social media site about your first day (max. 160 characters). **[rp4, _____]**

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! *Cursive* and <u>underlining</u> will not be visible to the respondents!

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2. SOCIAL ASPECT OF ROBOT USE SELF-EFFICACY Experiment [SE]

The experiment manipulates the (a) proximity of the message giver and (b) orientation of the message describing previous experiences of using assistive robots. After the experiment, robot use self-efficacy, general robot attitudes and perceived robot usefulness are measured.

GROUP1: **groupse==1 (**Colleague & positive orientation)
GROUP2: **groupse==2 (**Colleague & negative orientation)
GROUP3: **groupse==3 (**A previously unfamiliar person from your field & positive orientation)
GROUP4: **groupse==4 (**A previously unfamiliar person from your field & negative orientation)

GROUP1: Imagine that you meet *your colleague* who has started using an assistive robot for helping with a daily work-related task. You find out that learning to use the robot has been *smooth and the robot has been significantly beneficial in accomplishing the intended task.*

GROUP2: Imagine that you meet *your colleague* who has started using an assistive robot for helping with a daily work-related task. You find out that learning to use the robot has been *difficult and the robot has significantly disrupted the accomplishment of the intended task.*

GROUP3: Imagine that you meet *a previously unfamiliar person from your field* who has started using an assistive robot for helping with a daily work-related task. You find out that learning to use the robot has been *smooth and the robot has been significantly beneficial in accomplishing the intended task.*

GROUP4: Imagine that you meet *a previously unfamiliar person from your field* who has started using an assistive robot for helping with a daily work-related task. You find out that learning to use the robot has been *difficult and the robot has significantly disrupted the accomplishment of the intended task.*

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! *Cursive* will not be visible to the respondents!

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Keeping in mind the context of your work or study, please answer to what degree you agree with the following statements. [Strongly disagree 1 – 7 Strongly agree]
(RUSH-3 se1-se3, perceived robot usefulness se4-se7, general robot attitude se8)

I'm confident in my ability to learn how to use assistive robots. **[se1]**
I'm confident in my ability to learn simple programming of assistive robots if I were provided the necessary training. **[se2]**
I'm confident in my ability to learn how to use assistive robots in order to guide others to do the same. **[se3]**
Using assistive robots would improve my job performance. **[se4]**
Using assistive robots in my job would increase my productivity. **[se5]**
Using assistive robots would enhance my effectiveness on the job. **[se6]**
I would find assistive robots useful in my job. **[se7]**

I have a positive view on assistive robots in general. **[se8]**

GROUP 1: g1se1–g1se8
GROUP 2: g2se1–g2se8
GROUP 3: g3se1–g3se8
GROUP 4: g4se1–g4se8

PART 3: ROBOT QUESTIONS

Exposure to robots [RE]

Have you ever used a robot or been in an interaction with a robot? **[re1a; No = 0, Yes = 1, Don't know = 2]**

If re1a=1, ask: Generally speaking, how positive or negative have your use or interaction experiences with robots been? **[re1c]**
    1 Very negative [1]
    2 [2]
    3 [3]
    4 [4]
    5 [5]
    6 [6]
    7 Very positive [7]

Views on robots and technology [RT]
(rt13–rt15 & rt16–rt18 social influence; rt3 technology self-efficacy; rs1–rs3 robot-use self-efficacy altered from RUSH-3; rt10–rt12 & rt19–rt21 attitude multicomponent -theory, anx1-4 anxiety)

How positive or negative is [Very negative 1 – 7 Very positive]
… your view on robots in general? **[rt1]**
… the view on robots in general of the people that are close to you? **[rt16]**
… the view on robots in general of other people you know? **[rt17]**
… the view on robots in general of the people that you respect? **[rt18]**
… your view on robots if you think about your gut feeling? **[rt19]**
… your view on robots if you think about the facts you know about robots? **[rt20]**
… your view on robots if you think about using or interacting with a robot? **[rt21]**

Please answer to what degree you agree with the following statements [rt2–rt9; Strongly disagree 1 – 7 Strongly agree]

I am interested in technology and its development. **[rt2]**
I think I can learn to use new technology easily. **[rt3]**
I'm confident in my ability to learn how to use robots. **[rs1]**
I'm confident in my ability to learn simple programming of robots if I were provided the necessary training. **[rs2]**
I'm confident in my ability to learn how to use robots in order to guide others to do the same. **[rs3]**
Robots suit my occupational field well. **[rt9]**

I would interact with a robot, if given the opportunity. **[rt10]**
I feel excited when I think about robots of the future. **[rt11]**
Based on my knowledge about robots, I think they are a necessary part of the future. **[rt12]**

I know a lot of people who have a positive view on robots. **[rt13]**
Most of the people who are close to me have a positive view on robots. **[rt14]**
Most of the people I respect have a positive view on robots. **[rt15]**

I feel apprehensive about using robots. **[anx1]**
It scares me to think that I could lose a lot of information using robots by hitting the wrong key. **[anx2]**
I hesitate to use robots for fear of making mistakes I cannot correct. **[anx3]**
Robots are somewhat intimidating to me. **[anx4]**

REFERENCES

A short 15-item Big Five Inventory (BFI–S) of personality dimensions
Lang, F. R., John, D., Lüdtke, O., Schupp, J., & Wagner, G. G. (2011). Short assessment of the Big Five: Robust across survey methods except telephone interviewing. *Behavior Research Methods, 43*(2), 548–567. http://doi.org/10.3758/s13428-011-0066-z

Social interaction anxiety SIAS-6, altered from**:**
Peters, L., Sunderland, M., Andrews, G., Rapee, R. M., & Mattick, R. P. (2012). Development of a short form Social Interaction Anxiety (SIAS) and Social Phobia Scale (SPS) using nonparametric item response theory: The SIAS-6 and the SPS-6. *Psychological Assessment, 24*(1), 66–76. https://doi.org/10.1037/a0024544

Identification, altered from:
Postmes, T., Haslam, S. A., & Jans, L. (2013). A single-item measure of social identification: Reliability, validity, and utility. *British Journal of Social Psychology*, *52*(4), 597–617. https://doi.org/10.1111/bjso.12006

Perceived technology support, measures used in:
Kamin, S. T., Beyer, A., & Lang, F. R. (2019). Social Support is Associated with Technology Use in Old Age. *Zeitschrift für Gerontologie und Geriatrie, 53*, 256–262. https://doi.org/10.1007/s00391-019-01529-z

Robot-use self-efficacy
Turja, T., Rantanen, T., & Oksanen, A. (2019). Robot use self-efficacy in healthcare work (RUSH): development and validation of a new measure. *AI & Society, 34*(1), 137–143. https://doi.org/10.1007/s00146-017-0751-2

Perceived robot usefulness (4-item), altered from:
Davis, F.D, Bagozzi, R.P., & Warshaw, P.R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science,* 35(8), 983–1003. https://doi.org/10.1287/mnsc.35.8.982

Anxiety, altered from measures used in:
Venkatesh, V., Morris, M.G., Davis, G.B., & Davis, F.D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly,* 27(3), 425–478. https://doi.org/10.2307/30036540