Does fear of automation motivate workers to reskill?

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Who's afraid of automation? Examining determinants of fear of automation in six European countries

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https://www.sciencedirect.com/science/article/pii/S0160791X24003300

Presentation outline

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Data and methods

- Used data from the **Central European Social Survey**, conducted using the Computer-Assisted Web Interviewing (CAWI) method

- Covered **11,000 individuals** engaged in the workforce from **six EU countries** (Austria, Czechia, Germany, Hungary, Poland, Slovakia) with a random quota sampling procedure reflecting demographic composition by gender, age, and size of residence

- Data collection period: **December 2021 to January 2022**

Survey questions:
- **Technology at work:** Assessed through questions on
  - recent technology experience (complementary, substitutionary, no impact),
  - automation potential of job tasks,
  - job insecurity due to automation,
  - views on automation-induced mass unemployment.
  - intentions to undertake (re)training
- **Temporal scope:** Questions covered expectations for the next ten years to capture evolving technology impacts.

Goals of the study

- **Developing the Concept of Fear of Automation**

- **Examining the Determinants of Fear of Automation**

- **Identifying the determinants of training motivation**
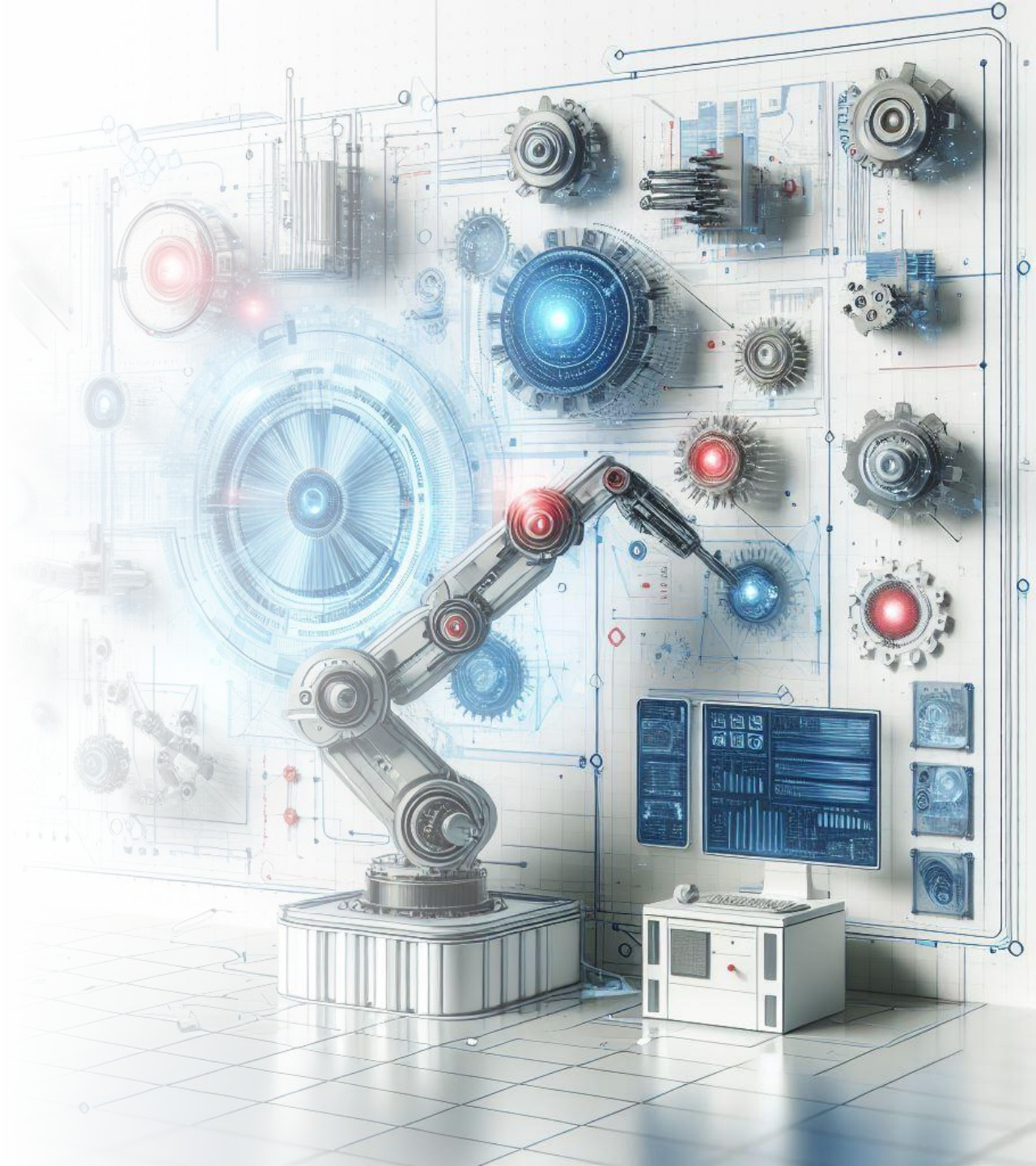
Linking fear to technological change
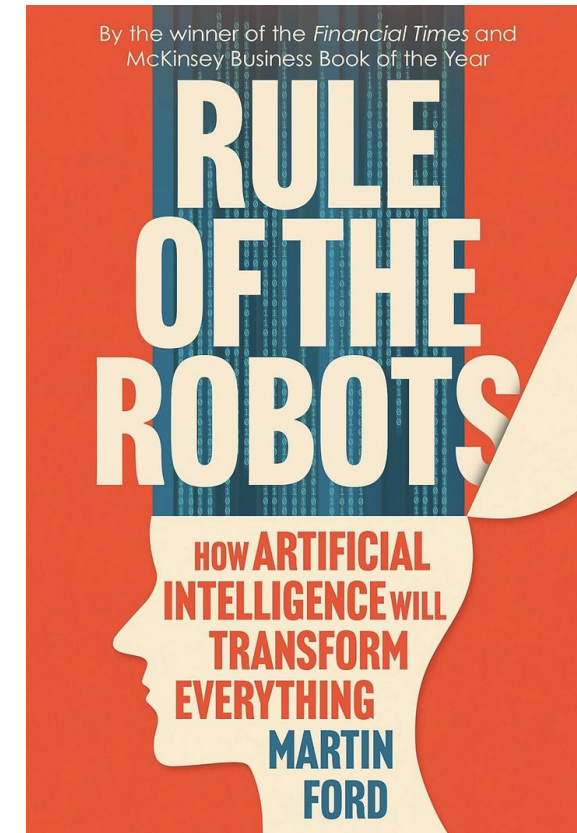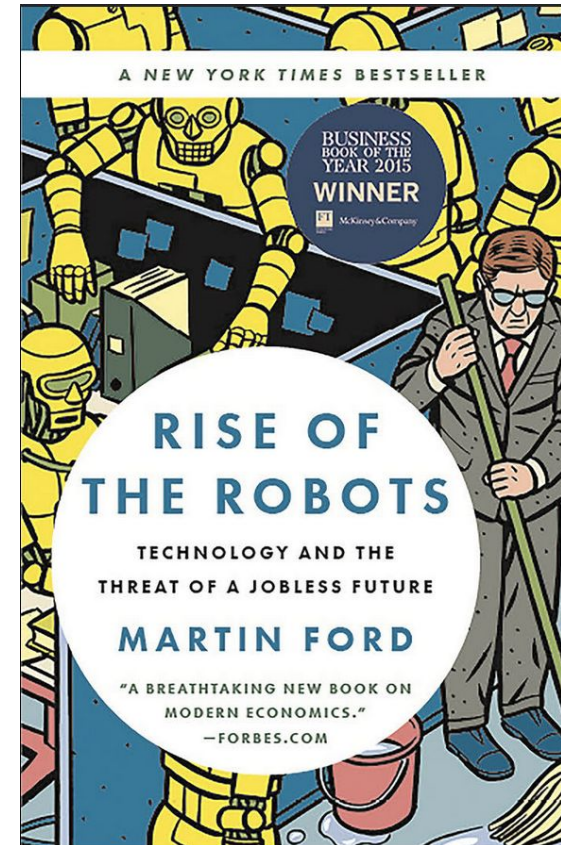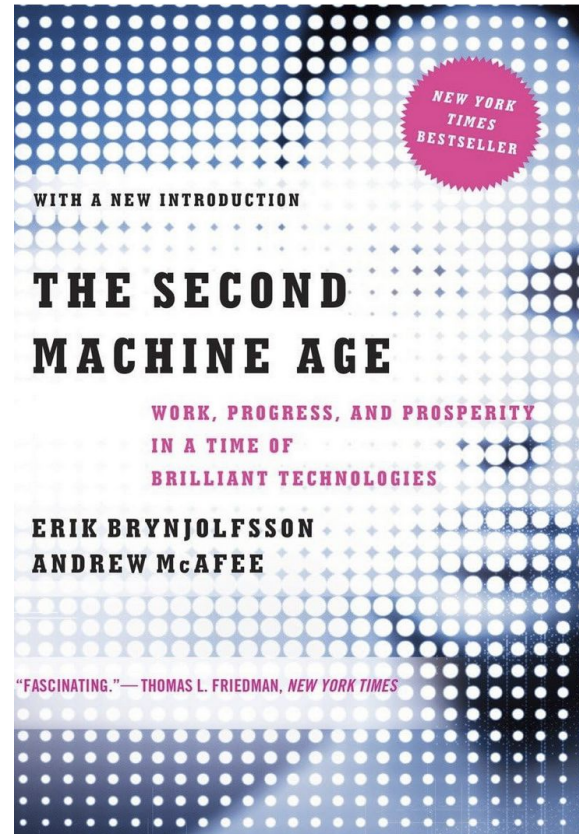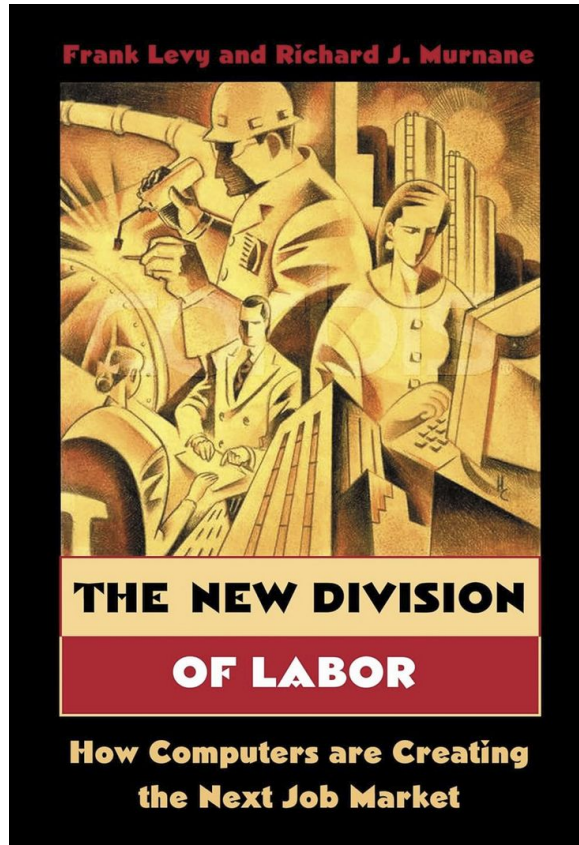
Automation and labour market

- Automation means declining employment in sectors with routine physical and intellectual tasks & job growth in high-skill sectors and low-skill, non-routine sectors (Autor et al., 2003; Autor & Dorn, 2013; Autor & Salomons, 2018).

- The future of work does not signal the end of employment, but neither does it guarantee benefits for workers.

- If automation boosts productivity, human labor may shrink in production.

- Sustained wage growth relies on new tasks and technologies that enhance human work intensity (Acemoglu   and   Restrepo,   2019)

Hollowing out of the middle

Task encroachment

Substitution or complementarity?

Source: Acemoglu, D., Restrepo P. (2019). Automation and New Tasks: How Technology Displaces and Reinstates Labor. Journal of Economic Perspectives—Volume 33, Number 2

Substitution and complementarity

Substitution
Machine-only activities

No change
Activities performed exclusively by humans

- **Non-routine** physical tasks
- **Non-routine** cognitive tasks
- Collaboration with others
- People management
- Entrepreneurship

Complementarity
Hybrid activities performed jointly by humans and machines

Humans complement AI

AI empowers people

Source: Daugherty&Wilson 2018

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Linking fear to technological change

THE FUTURE OF EMPLOYMENT: HOW
SUSCEPTIBLE ARE JOBS TO
COMPUTERISATION?*

Carl Benedikt Frey[†] and Michael A. Osborne[‡]

September 17, 2013

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Abstract

We examine how susceptible jobs are to computerisation. To assess this, we begin by implementing a novel methodology to estimate the probability of computerisation for 702 detailed occupations, using a Gaussian process classifier. Based on these estimates, we examine expected impacts of future computerisation on US labour market outcomes, with the primary objective of analysing the number of jobs at risk and the relationship between an occupation's probability of computerisation, wages and educational attainment. According to our estimates, about 47 percent of total US employment is at risk. We further provide evidence that wages and educational attainment exhibit a strong negative relationship with an occupation's probability of computerisation.

Keywords: Occupational Choice, Technological Change, Wage Inequality, Employment, Skill Demand
JEL **Classification:** E24, J24, J31, J62, O33.

AI Should Augment Human Intelligence, Not Replace It
https://hbr.org/2021/03/ai-should-augment-human-intelligence-not-replace-it

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Robots Are Stealing Our Jobs
https://www.entrepreneur.com/science-technology/robots-are-stealing-our-jobs/332468

Will a robot take your job?
🕐 11 September 2015

Type your job title into the search box below to find out the likelihood that it could be automated within the next two decades.

About 35% of current jobs in the UK are at high risk of computerisation over the following 20 years, according to a study by researchers at Oxford University and Deloitte.

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Find out my automation risk >

https://www.bbc.com/news/technology-34066941

From psychological to sociological framework

Fear as a Societal Construct

- Fear is shaped by cultural patterns, interactions, and societal structures (Tudor, 2003)

- Fear serves as a societal integrator, uniting individuals against common threats or recognizing shared predicaments

Significance of Fear in Late Modernity

- Fear has evolved into a significant aspect of social life in late modern societies, often seen as a response to rapid socioeconomic and cultural transformations (Bauman, 2013; Sik, 2020)

- "Liquid fear" - pervasive anxiety experienced by individuals conscious of their vulnerability in a rapidly changing world (Bauman, 2013)

Cultural and Economic Manipulation of Fear

- Fear of automation is exacerbated by "fear entrepreneurs" who benefit from and perpetuate a culture of fear, influencing societal views and behaviors toward technology (Furedi, 2018)

- Prominent discussions and predictions about the "end of work" due to automation (Willcocks, 2020; Rifkin, 1996; Ford, 2016)

Critiques and Reassessments of Technological Fear

- The study by Frey and Osborne (2017) – claims that nearly half of all jobs were at risk, though this methodology faced considerable academic critique for its approach to analyzing job susceptibility to automation.

- Subsequent discussions have suggested that rather than replacing humans outright, technology will more likely complement human work (Autor, Levy, and Murnane, 2003; Daugherty and Wilson, 2018)

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From psychological to sociological framework

Fear vs. Anxiety

(American Psychological Association, 2024; Mayiwar and Björklund, 2023)

- **Fear:** A response to a present, clearly identifiable threat, prompting immediate solutions.
- **Anxiety:** Oriented to a distant and diffuse threat, requiring broader and more adaptable solutions.

Technophobia and Technoparanoia

(McClure, 2017; Agogo, 2018)

- Terms like technophobia (related to computer anxiety) and technoparanoia (fear of job loss due to machines) reflect specific fears associated with technology.

Emerging Definition of Fear of Automation

- Perceived risk of unemployment due to automation effects (Innocenti and Golin, 2022)
- Response to a perceived threat of job loss because of automation (Golin and Rauh, 2022)
- Negative perception of how automation will shape the future of work, turning into collective angst (Mulas-Granados et al., 2019)

Unified Concept

- Merging technological fear and anxiety into fear of automation, linked with job insecurity concepts in sociology of work.
- Aligned with LeDoux's definition of fear as the conscious awareness of being in harm's way (Mobbs et al., 2019), with specific reference to the risk of job loss due to machines.

Presentation outline

Who is vulnerable to automation?

Individuals in jobs with automatable tasks
(Arntz, Gregory, and Zierahn, 2016; Nedelkoska and Quintini, 2018)

Highly skilled workers in non-routine jobs
(Autor, 2022)

Workers in low and medium-skill jobs
(Acemoglu and Autor, 2011; Autor, Goldin, and Katz, 2020)

Some studies suggest **women may face greater risks** due to their higher representation in routine jobs
(Roberts et al., 2019; Blanas et al.)

Employees in routine jobs
(Osborne and Frey)
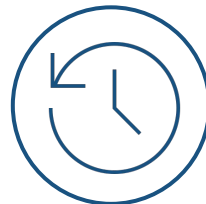
Older workers and teenagers in specific job categories
(Nedelkoska and Quintini, 2018)

What determines fear of automation?

Vulnerability linked to less skilled and routine tasks

Influence of technology exposure

Impact of weaker market position

Demographic factors affecting fear

Education and skill level as buffers

Sense of control reduces fear

Description of measures

Variable Name	Description
Fear of Automation	Synthesized from responses to three questions using a 5-point Likert scale; measures concerns about job loss, task automation, and mass unemployment.
Experience with Technology at work	Categorical variable based on whether technology at work is seen as having no impact (answer 1), complementary (answer 2), or substitutionary (answers 3 and 4).
Routine Task Intensity (RTI)	Calculated using a formula from Goos et al. (2014) that compares the intensity of routine, abstract, and manual tasks at work, standardized across countries.
Technology Exposure	Quantified by the number of operational industrial robots per thousand workers in each sector and country, using data from the International Federation of Robotics (IFR) and Eurostat. Measure has been standardized.
Locus of Control	Variable assessing the perception of personal control over life events. Based on a 7-point scale response to feeling a lack of influence over events in life; higher values indicate a more external locus of control.

Research hypotheses

Fear of automation is **higher**:

H1: if a worker has already experienced her **tasks** being **substituted** or complemented by the new technologies

H2: the more routine tasks in a given job

H3: the more intense workers' exposition to technology within their sector.

H4: the weaker is position in the labour market as defined by gender, age, education, and income.

H5: the lower is the sense of control over workers lives exhibit a higher fear of automation.

Presentation outline

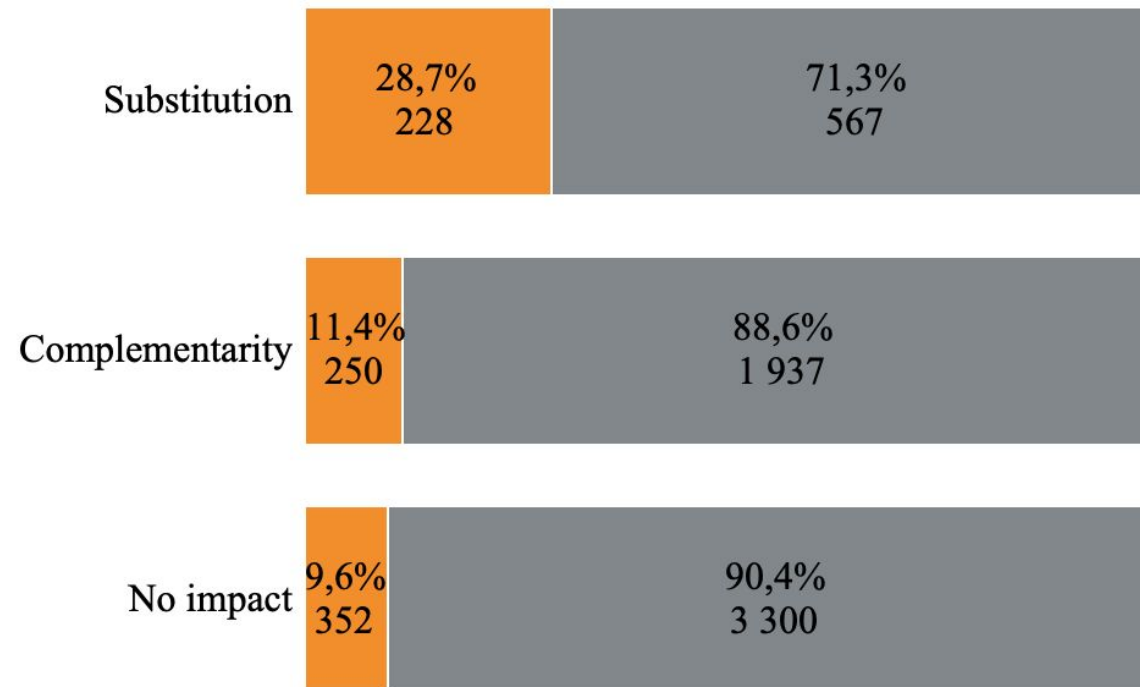# Results - descriptive

<div style="border: 2px solid #1b5e91; background-color: #e0e0e0; padding: 10px;">

33% of the respondents

agreed with the statement

I feel that the development of new technologies and the associated automation of tasks will lead to mass unemployment within the next 10 years.

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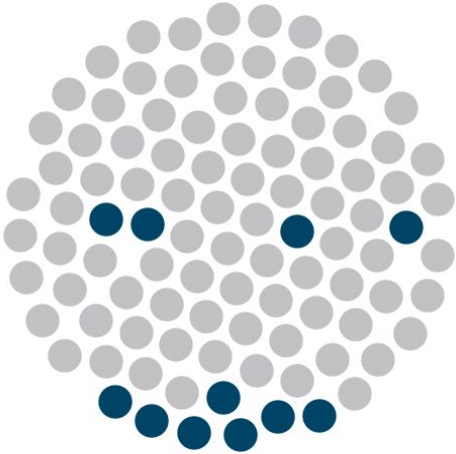Fear of automation and the experience with technology at work

	Orange	Grey
Substitution	28,7% / 228	71,3% / 567
Complementarity	11,4% / 250	88,6% / 1 937
No impact	9,6% / 352	90,4% / 3 300

More workers experience complementarity

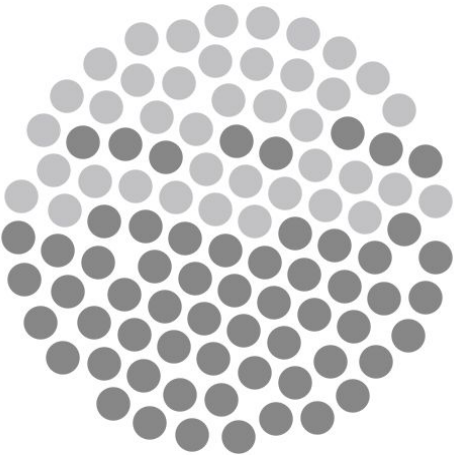**Experience with technology:**
I feel that in my current job, new technologies...

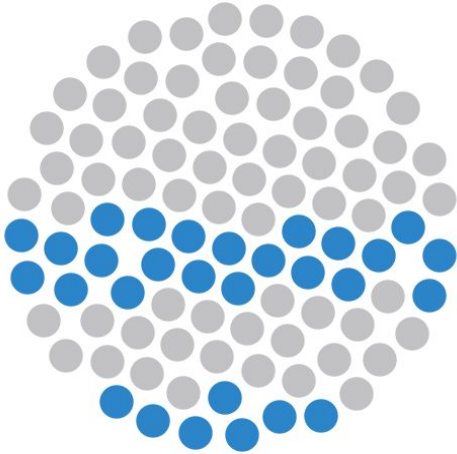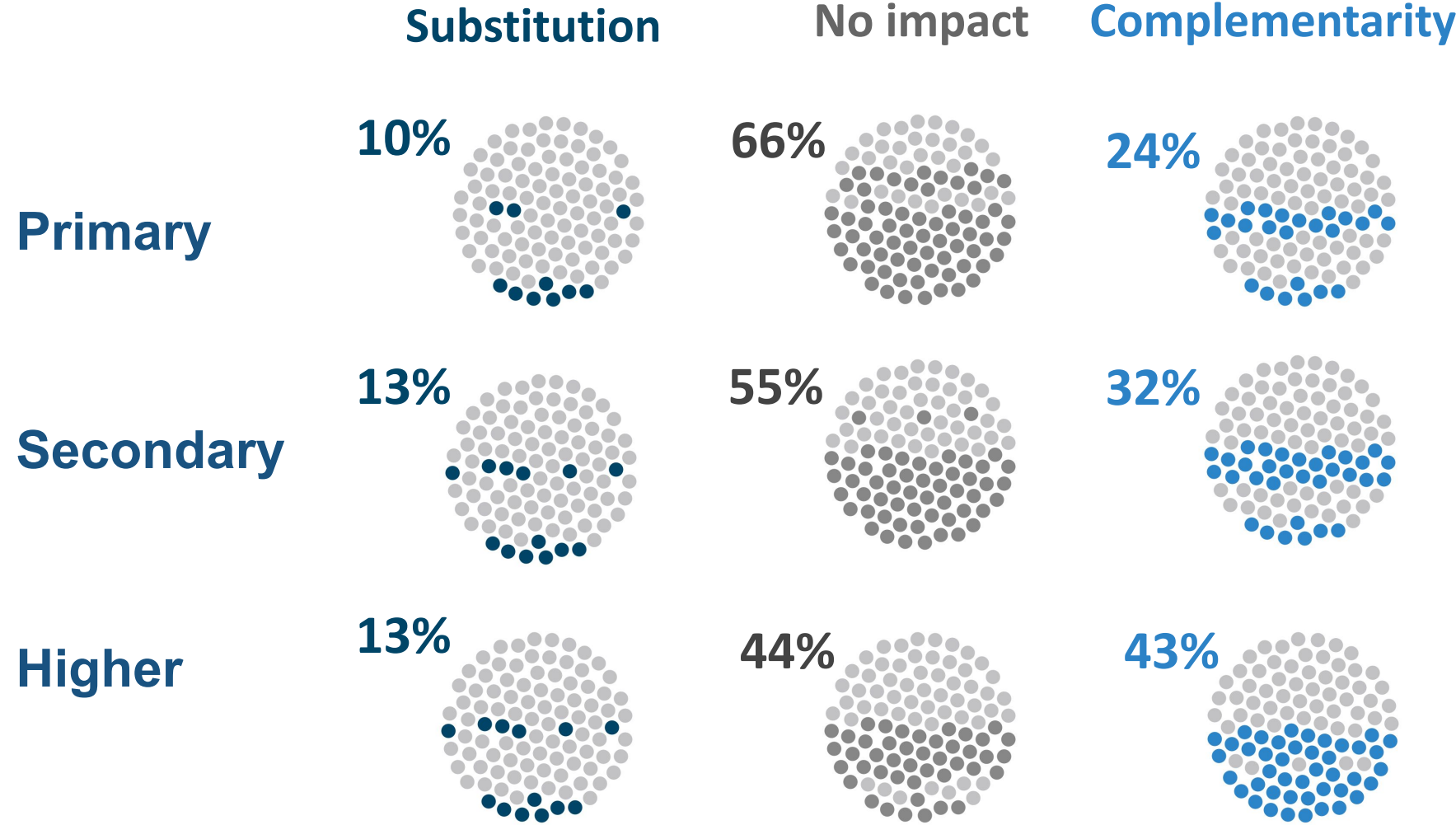| Substitution	No impact	Complementarity
11%	60%	29%

The more educated feel that technology will complete their work

	Substitution	No impact	Complementarity
Primary	10%	66%	24%
Secondary	13%	55%	32%
Higher	13%	44%	43%

Experience with technology:
I feel that in my current job, new technologies...

Results

Hypotheses	Results
H1: Fear of automation is higher if a worker has already experienced her tasks being substituted or complemented by new technologies.	**Supported**: Workers experiencing technology changes in their job tasks show significantly higher levels of fear of automation.
H2: Fear of automation is higher the more routine tasks in a given job.	**Supported**: An increase in routine tasks correlates with rising fear of automation.
H3: Fear of automation is higher the more intense workers' exposure to technology within their sector.	**Supported**: Greater exposure to digital technologies in the workplace and sector increases fear of automation.
H4: Fear of automation is higher the weaker the position in the labor market as defined by gender, age, education, and income.	**Partially supported:** Younger workers, those with lower income, and less education exhibit higher fear levels. Gender showed no significant impact. Education inversely related to fear. Wage levels show an inverse relationship with fear.
H5: Fear of automation is higher the lower the sense of control over workers' lives.	**Supported**: Higher external locus of control (feeling less influence over events) is associated with increased fear of automation.

Presentation outline

Hypotheses

More willing to train:

- H1: workers in sectors exposed to automation
- H2: in the middle of career
- H3: women
- H4: experiencing task substitution
- H5: fearing jobs loss
- H6: fearing widespread technological unemployment
- H7: with higher education
- H8: who previously participated in training

Results

66% of respondents willing to engage in further training.

Most common interests:
- occupational training (**39%**),
- software skills (**24%**).

Interest in:
- programming: **16%**
- higher education: **12%.**

Age and Education: Older workers and those with vocational education less willing to train.

Gender: Men more likely to pursue programming and software skills training.

Technology Impact: Workers whose tasks are complemented by technology show highest interest in training.

Results

Hypotheses	Results
H1: Workers in sectors exposed to automation more willing to train.	**Supported**: workers in automation-prone sectors more likely to train.
H2: Workers in the middle of their career more willing to train.	**Partially supported:** young workers more likely to train, especially in programming.
H3: Women more willing to train.	**Not supported**: men more likely to participate in training.
H4: Workers experiencing task substitution more willing to train.	**Supported**: technology substitution motivates workers to seek digital skills.
H5: Workers fearing job loss more willing to train.	**Supported**: fear of job loss motivates training, especially in software and programming.
H6: Workers fearing widespread technological unemployment less willing to train.	**Supported**: fear of mass unemployment discourages training.
H7: Workers with higher education more willing to train.	**Partially supported**: workers with vocational training have lower training motivation (and participation).
H8: Workers who previously participated in training more willing to train.	**Supported**: previous training experiences increase future training intentions.

Presentation outline

Discussion

Main contributions to literature:

- Introduced a new conceptual framework viewing fear of automation as a socially embedded economic phenomenon.

- Validated the significant role of occupational task structure and technology exposure in heightening fear of automation.

- Supported the theories of skill-biased and routine-biased technological impacts, where routine tasks increase fear due to higher automation risks.

- Found that more educated individuals and those with higher control over life events exhibit less fear of automation.

Insights for organizational and policy implementation:

- Understanding fear determinants can help leaders manage digital transformation more effectively.

- Fear can act both as a barrier and a motivator for employees to adapt to technological changes.

- Organizational strategies should address psychological impacts and encourage skill development to mitigate automation fears.

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Conclusions

Training motivations shaped by fear of job loss, but **fear of technological unemployment can demotivate workers.**

Vocationally educated and older workers less willing to engage in reskilling.

Younger workers and those with higher education more inclined to participate in training.

Organizations need to create supportive environments for lifelong learning to ensure workers adapt to technological changes.

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Thank You for Your Attention!