



# Unpacking the Perceived Productivity of GitHub Copilot

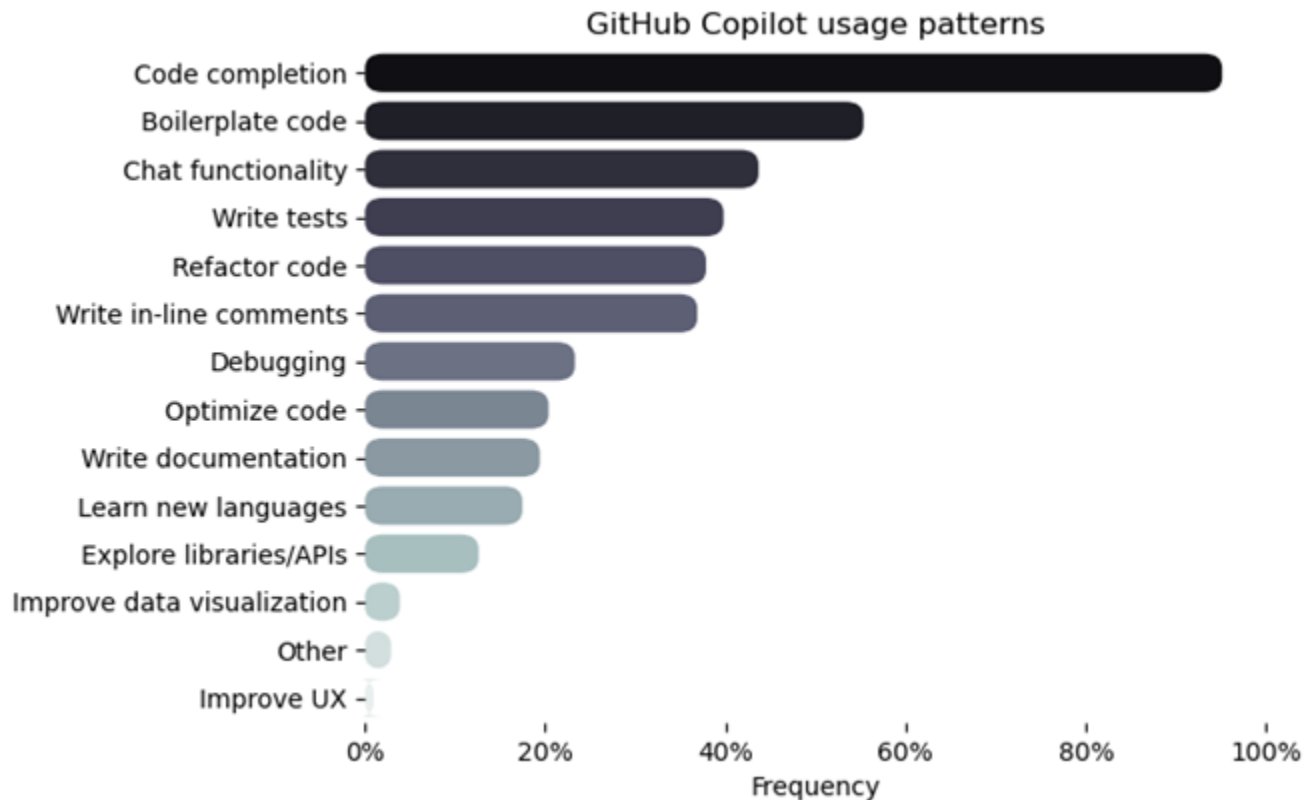
*SERT Conference 2024*  
**Viggo Tellefsen Wivestad**  
*Researcher & data scientist*



Technology for a better society

# GitHub Copilot

- Official launch June 2022
- AI-based coding assistant
- Codex: LLM trained on English and code

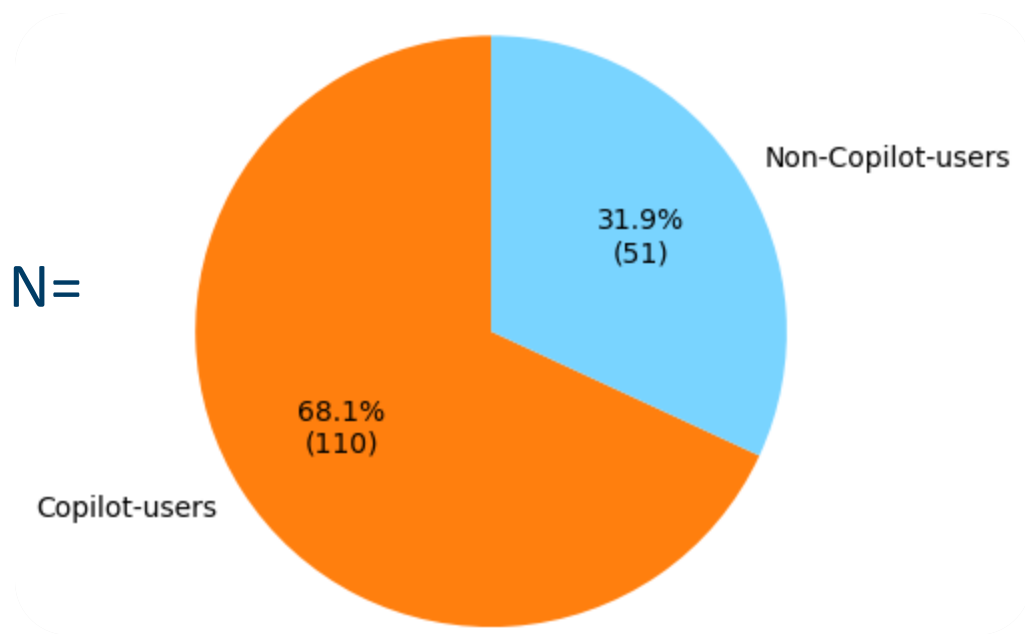




# Survey

- RQ: «What are the effects of introducing GitHub Copilot as a developer tool?»

• N=



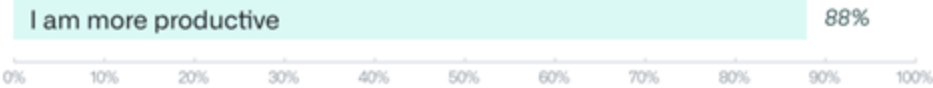


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# Self-assessment by Copilot preview users

## When using GitHub Copilot...

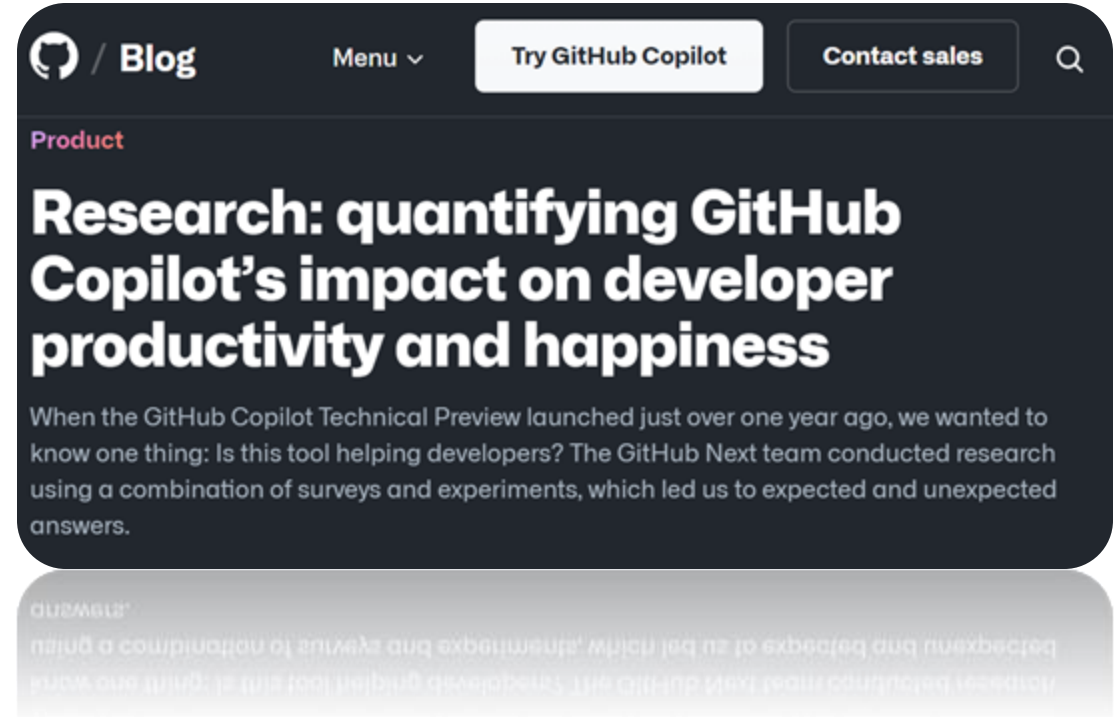
### Perceived Productivity



### Satisfaction and Well-being\*



### Efficiency and Flow\*

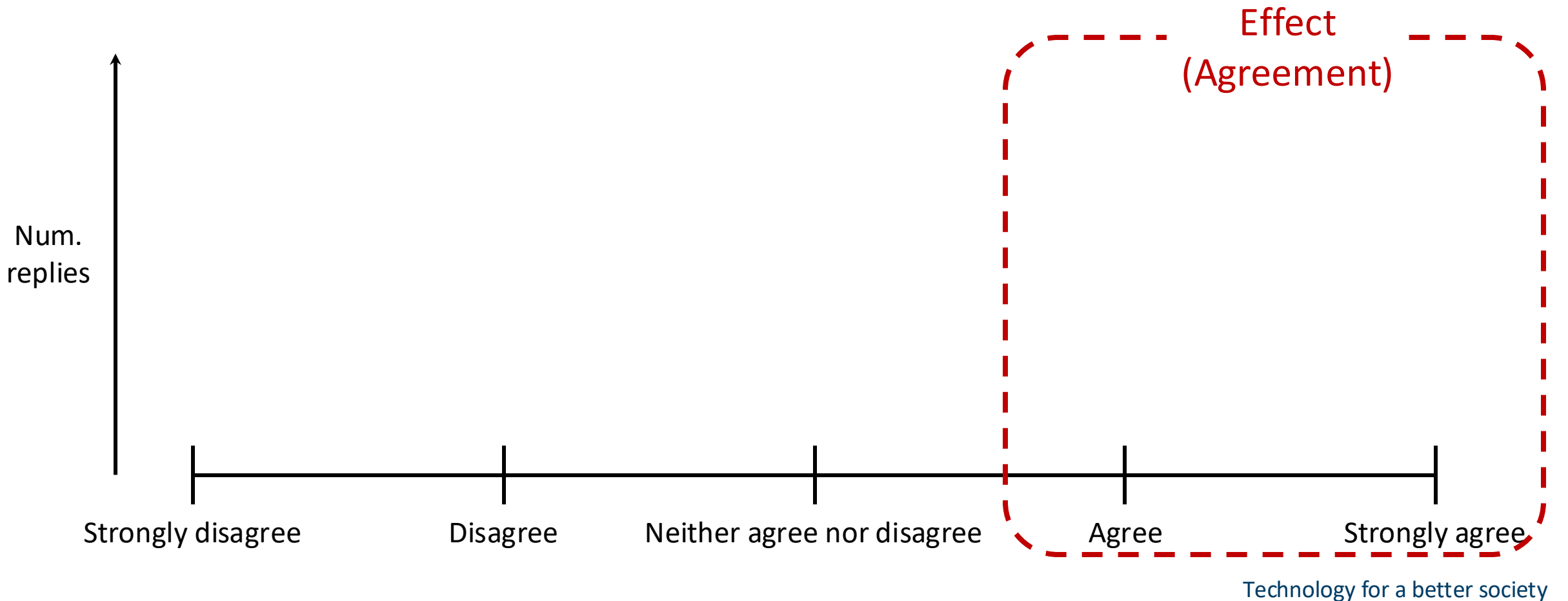


<https://github.blog/2022-09-07-research-quantifying-github-copilots-impact-on-developer-productivity-and-happiness>



# Likert scale: Agreement by users

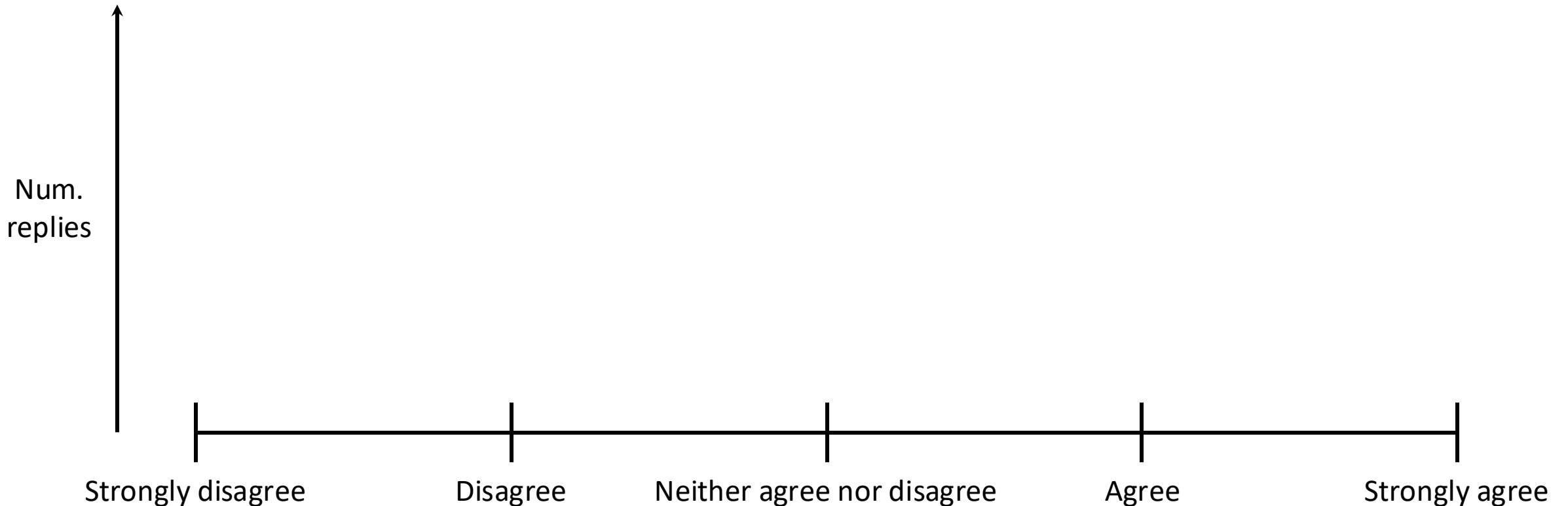
«I am more productive when using GitHub Copilot»





# Likert scale: Agreement between groups

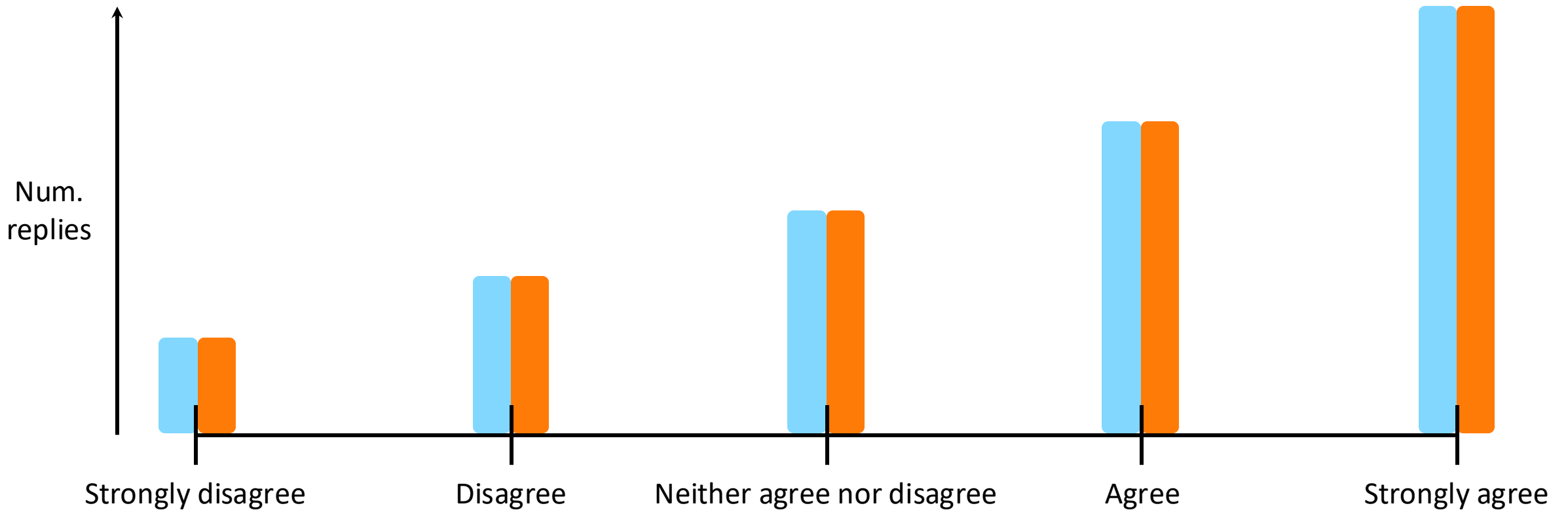
«I generally feel productive when I code»





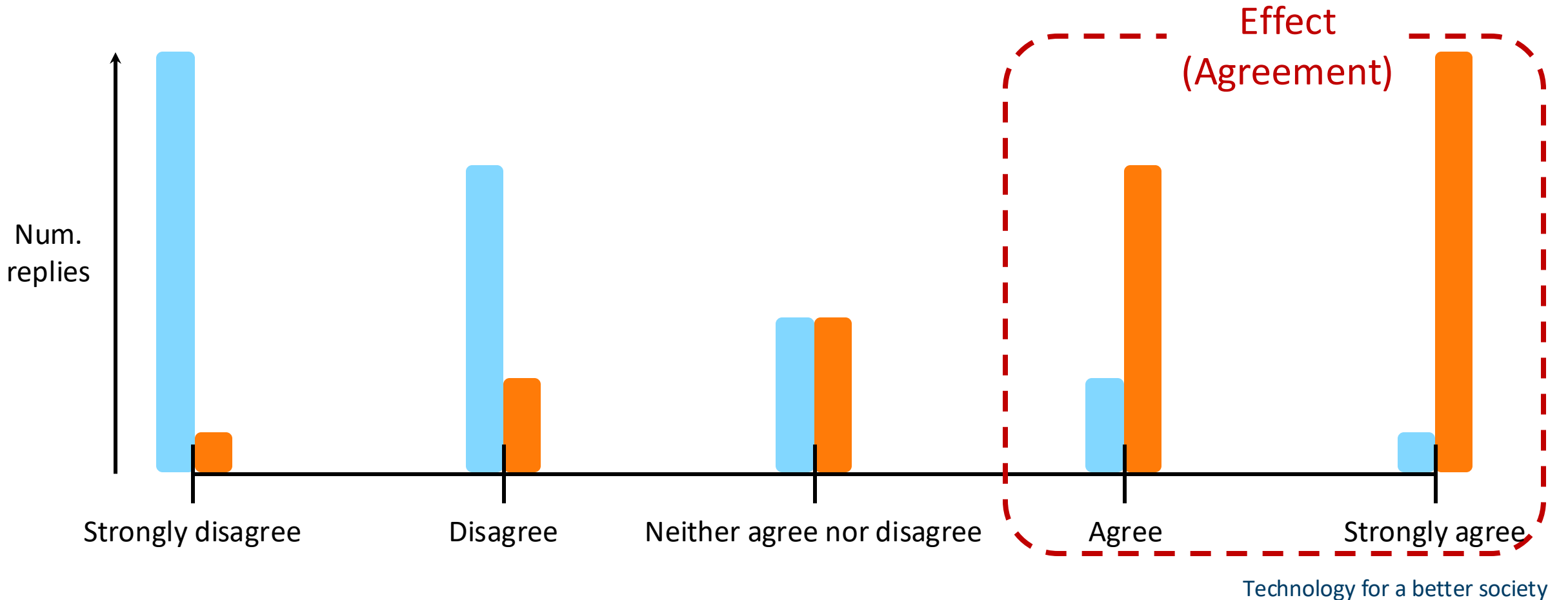
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# Likert scale: Agreement between groups

«I generally feel productive when I code»





## Perceived Productivity

"I am more productive when using GitHub Copilot"



"I feel productive when I code" ( $\Delta=5.7$  pp)



## Satisfaction and Well-being

"I find myself less frustrated during coding sessions when using GitHub Copilot"



"I [disagree that I] often feel frustrated during coding sessions" ( $\Delta=11.2$  pp)



"I feel more fulfilled with my job when using GitHub Copilot"



"I feel satisfied with my job" ( $\Delta=5.8$  pp)



"I can focus on more satisfying work when using GitHub Copilot"



"I am able to focus on satisfying work most of my work time" ( $\Delta=21.7$  pp)



## Efficiency and Flow

"Using GitHub Copilot helps me stay in the flow"



"I often find myself 'in the flow' while coding" ( $\Delta=13.9$  pp)



"I spend less time searching for information or examples when using GitHub Copilot"



"Searching for information and resources online is a central part of my job" ( $\Delta=-1.8$  pp)



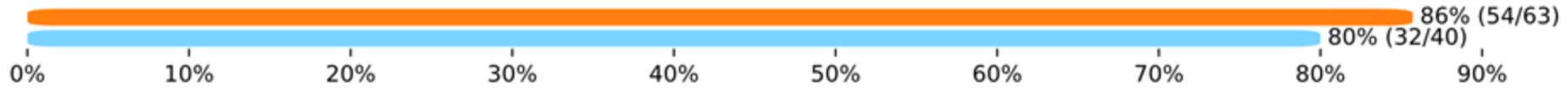
Percent agreement (or disagreement)

## Perceived Productivity

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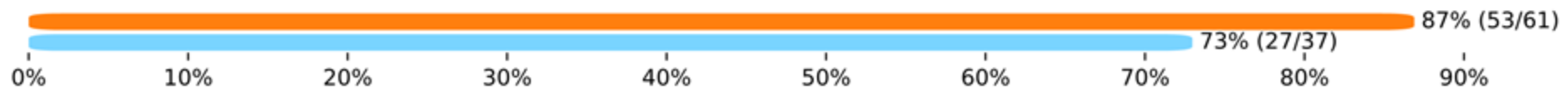


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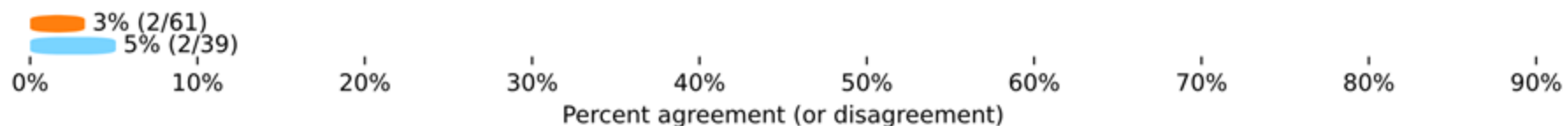
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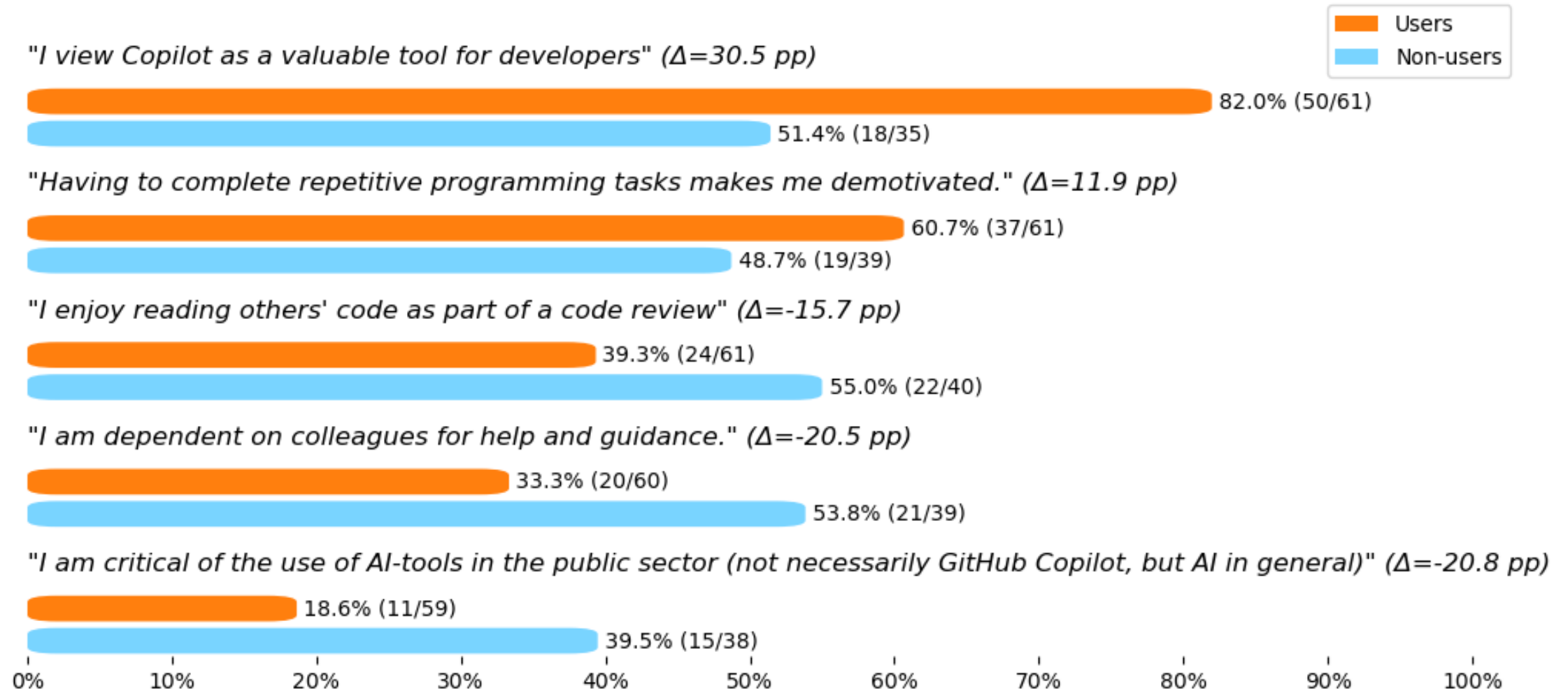


"Searching for information and resources online is a central part of my job" ( $\Delta=-1.8$  pp)





# The greatest differences



# Concern: GenAI might threaten collaboration



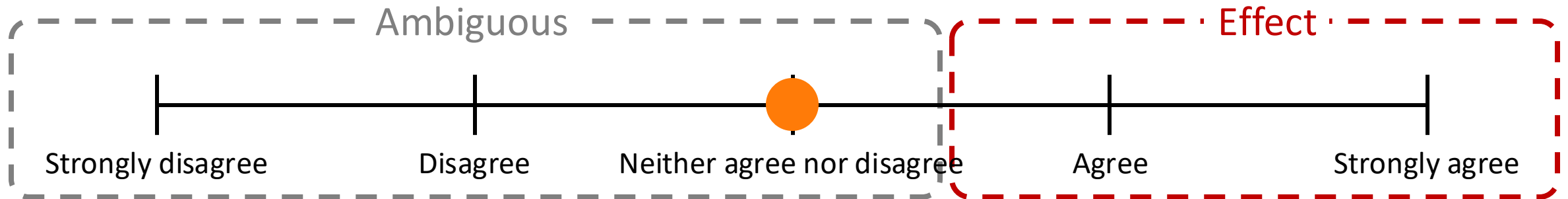
"I am dependent on colleagues for help and guidance." ( $\Delta=-20.5$  pp)



This summer, when I tried to work with one of my team members who likes to use AI, he was more interested in talking to the AI than to me. It was comical, but also very frustrating, because I felt that there was no point in us collaborating. Instead of asking me questions, he would ask ChatGPT.

# Likert scale: Agreement vs. Change

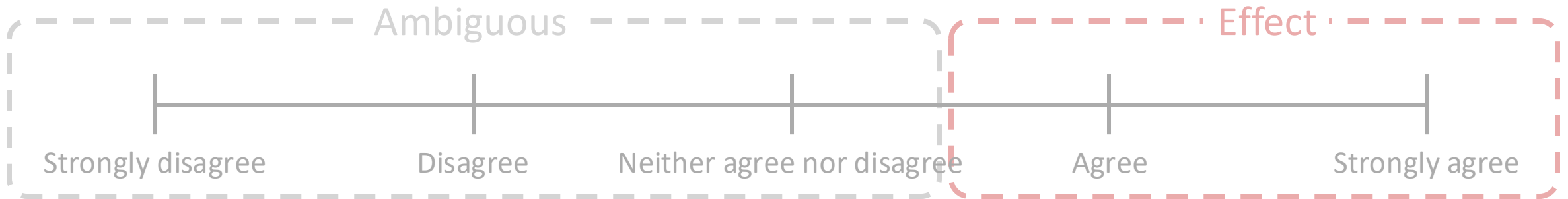
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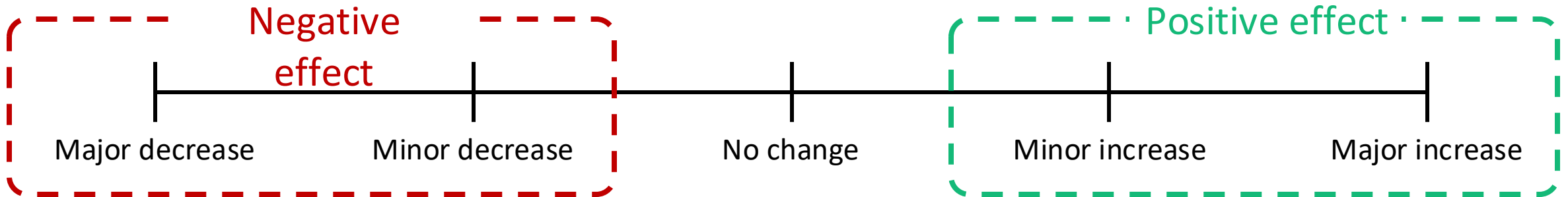


# Likert scale: Agreement vs. Change

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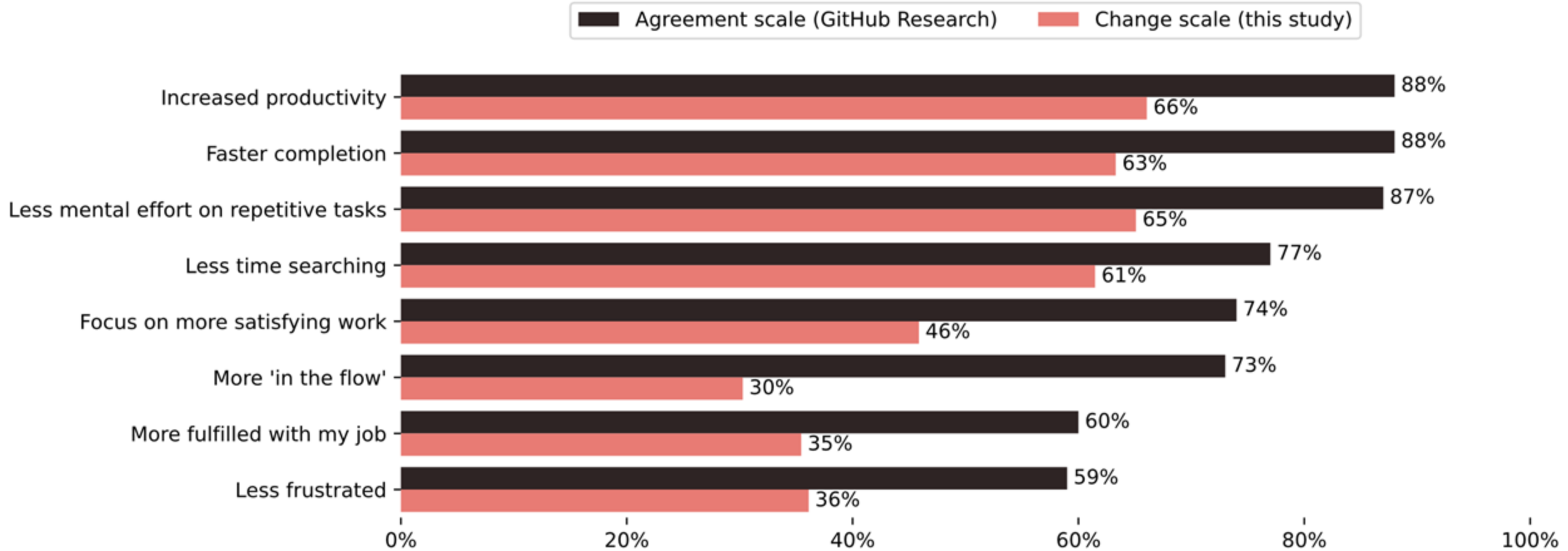


«How has GitHub Copilot changed your productivity?»





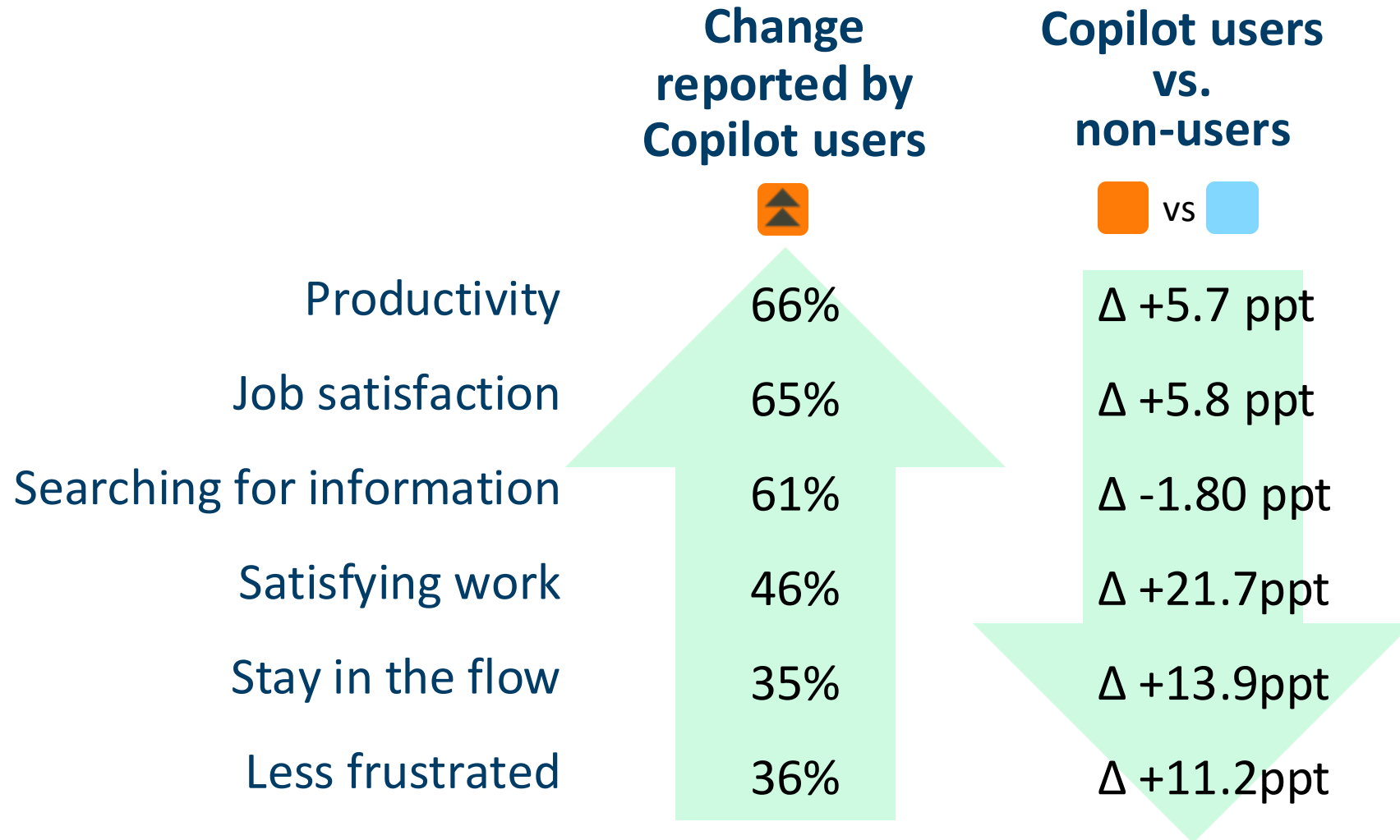
# Agreement vs. Change scale







# Now here's the kicker







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# Squaring the circle

- Copilot-users *feel* **more productive, more in the flow, and less frustrated**
- But... this is not detectable when compared to non-users



- + Satisfying work
- + Stay in the flow
- + Less frustrated



- + Increased productivity
- + Less mental effort on repetitive tasks
- + Less time searching for information



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# Implications for Practice

- **Developers who adopt Copilot report**
  1. Increased productivity
  2. Faster completion
  3. Less mental effort on repetitive tasks
  4. Less time searching for information
- **Copilot-users stands out by being able to**
  1. Focus more on satisfying work
  2. Stay more in the flow
  3. Feel less frustrated when coding
- **Less dependent on colleagues**
  1. Advantage: Do not have to disturb colleagues
  2. Disadvantage: Leave (remote) people stranded as satellites
- **SPACE misaligned with developers' definitions of productivity**

**Copilot's Island of Joy**  
Balancing Individual Satisfaction with Team Interaction in Agile Development

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<sup>1</sup> SINTEF  
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**Abstract.** This study examines the influence of perceived changes in productivity in the context of introducing AI Coding Assistants, specifically GitHub Copilot, within two large-scale agile organizations. Using a cross-sectional survey, we measured self-reported changes in productivity using the SPACE framework. A correlational analysis employed Kendall's tau test with Bonferroni correction and Partial Least Squares Regression (PLSR) with 10-fold cross-validation. Findings suggest that GitHub Copilot impacts perceived changes to productivity moderately, particularly in the areas of job satisfaction, flow, task completion speed, and ability to focus on satisfying work. However, the SPACE framework's ability to fully capture perceived productivity was challenged, indicating discrepancies in its dimensions "Performance" and "Communication and collaboration." The study further provides a conservative yet insightful perspective on the impacts of AI tools on developer productivity.

**Keywords:** Agile Adoption - Collaboration

**A journey through SPACE**  
Unpacking the Perceived Productivity of GitHub Copilot

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**Keywords:** Developer Productivity · AI Code Assistants · SPACE · GitHub Copilot

... Teknologi for et bedre samfunn



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# Business as usual – just faster?

Productivity

Efficiency

Stay in the flow

Increase test coverage

Refactor/optimize old code

Migrate code



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Technology for a better society