

# A Cross-role Analysis on Security Efforts and Constraints of Software Development Projects

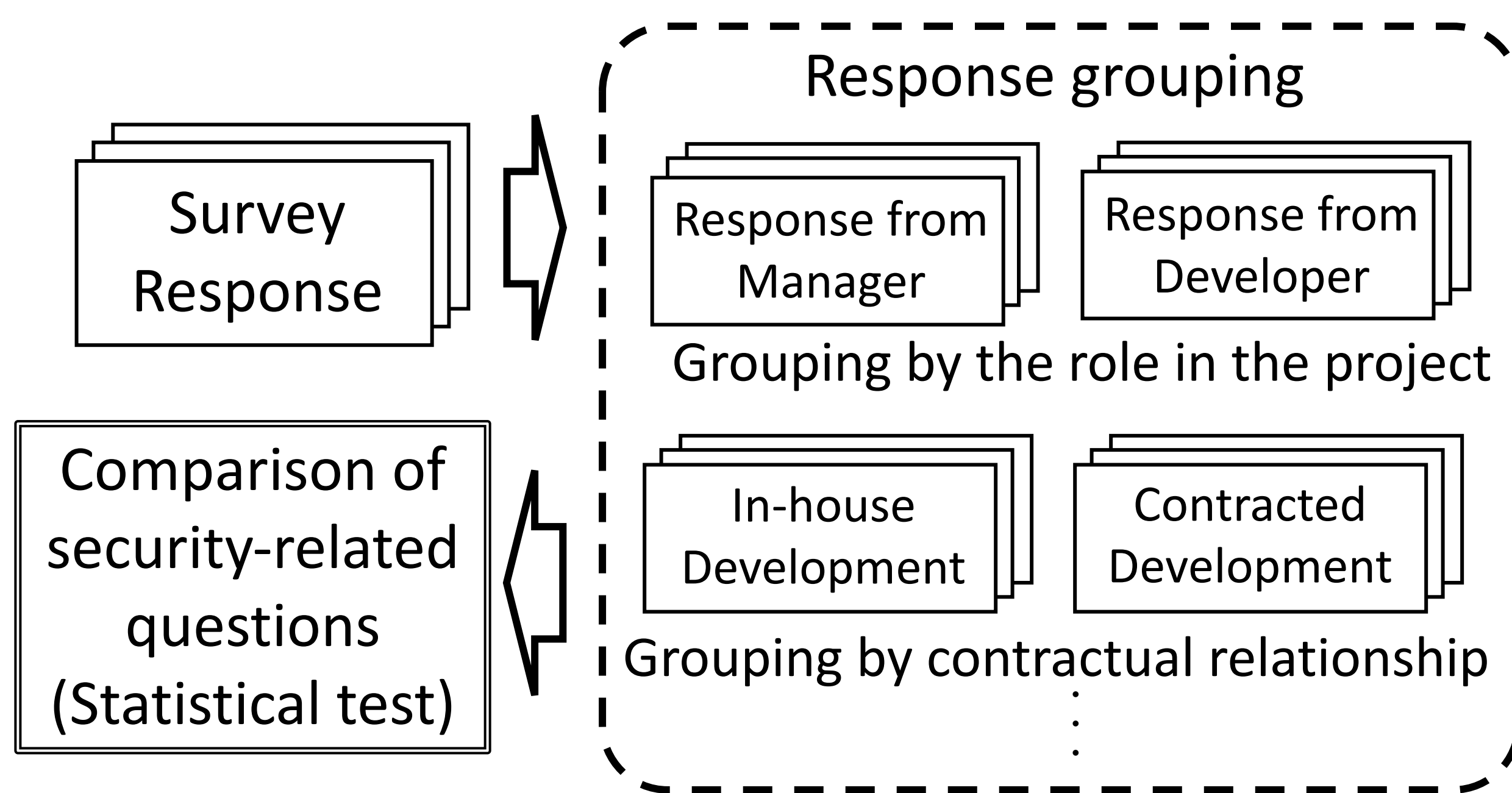
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## 1. Introduction

- **Goal:**
  - Understand the perceptions of software development professionals and clarify the problems they face  
 ⇒ Utilize the findings to design security measures that can be easily adopted in development projects.
- **RQs in this work:**
  - How the characteristics of a development project affect software security?
  - How the roles of people involved in a project development, such as developers and managers, affect security behavior and awareness?

## 2. Methodology

- **Online survey for software development professionals (developers and managers)**



### Questions about development characteristics

Type	format	Description
Contractual relationship	Choice	The contractual relationship of your projects is ... 1. In-house development/2. Contracted development
User scope	Choice	The software being developed is for use by ... 1. General public user / 2. Limited to specific users
Development method	Choice	The development method of your project is ... 1. Waterfall / 2. Agile / 3. Hybrid (e.g., Spiral)

### Questions about security behavior and awareness

Type	# of Questions	format	Example of question
Security Efforts	15	5-scale Likert	Our project uses a tool to check whether secure coding practices are incorporated.
Security Constraints	11	5-scale Likert	Our project does not have enough time to ensure software security.

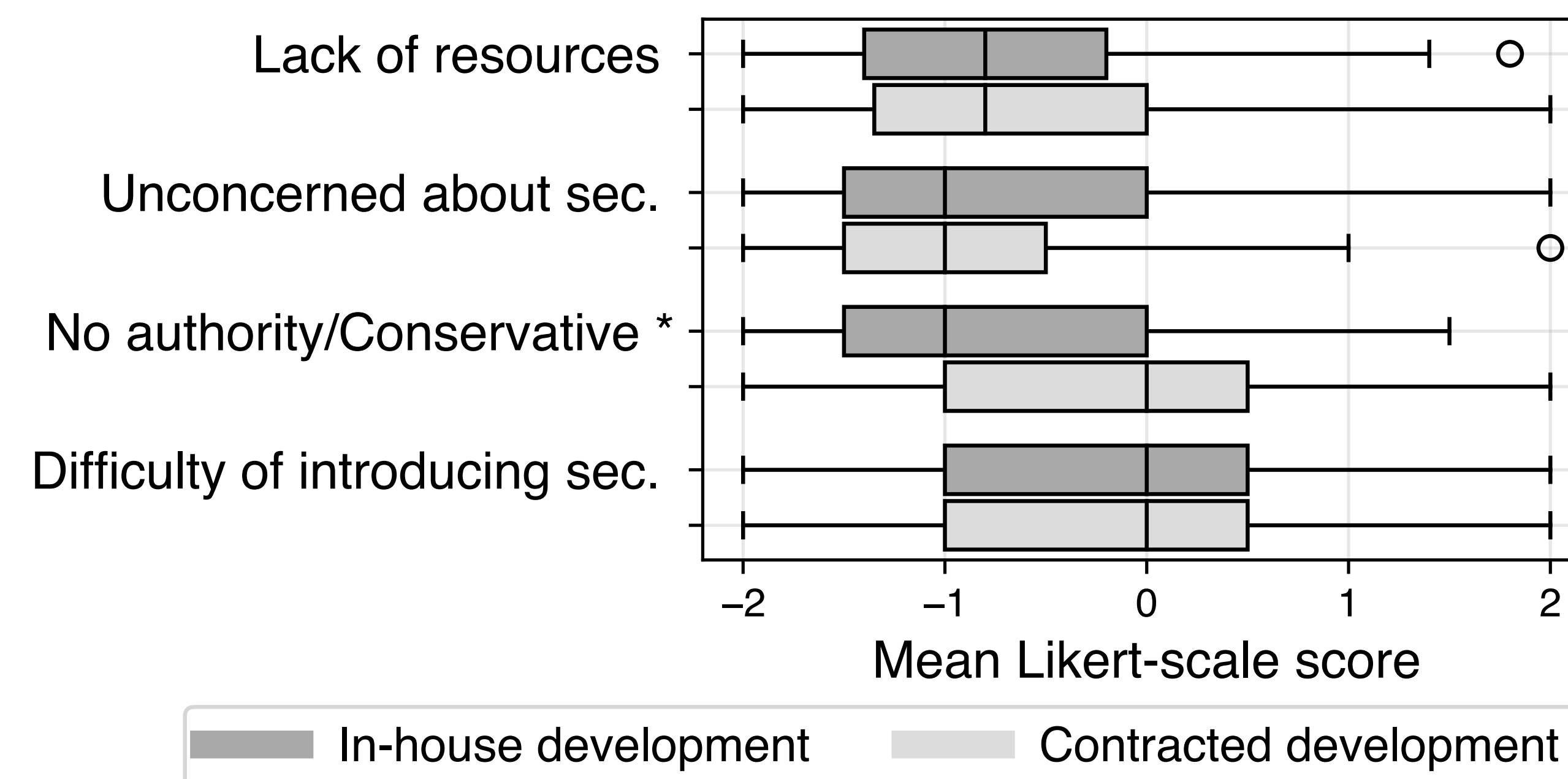
## 3.1 Factor Analysis

- Grouping questions by **exploratory factor analysis**
- The answer of questions belonging to the same factor was averaged (+2: Strongly agree to -2: Strongly disagree)

### Extracted Factors (Security constraints)

Factors	Description
<b>Lack of Resources</b>	Security constraints caused by a lack of various resources (time, budget, people, etc.)
<b>Unconcerned about security</b>	Security constraints caused by unconcern about security in development projects.
<b>No authority / Conservative</b>	Difficulty of changing the current development process and how lack of decision-making authority interferes with security
<b>Difficulty of introducing sec. measures</b>	Difficulty of introducing new security measures into the development project.

## 3.2 Comparison between contractual relationships



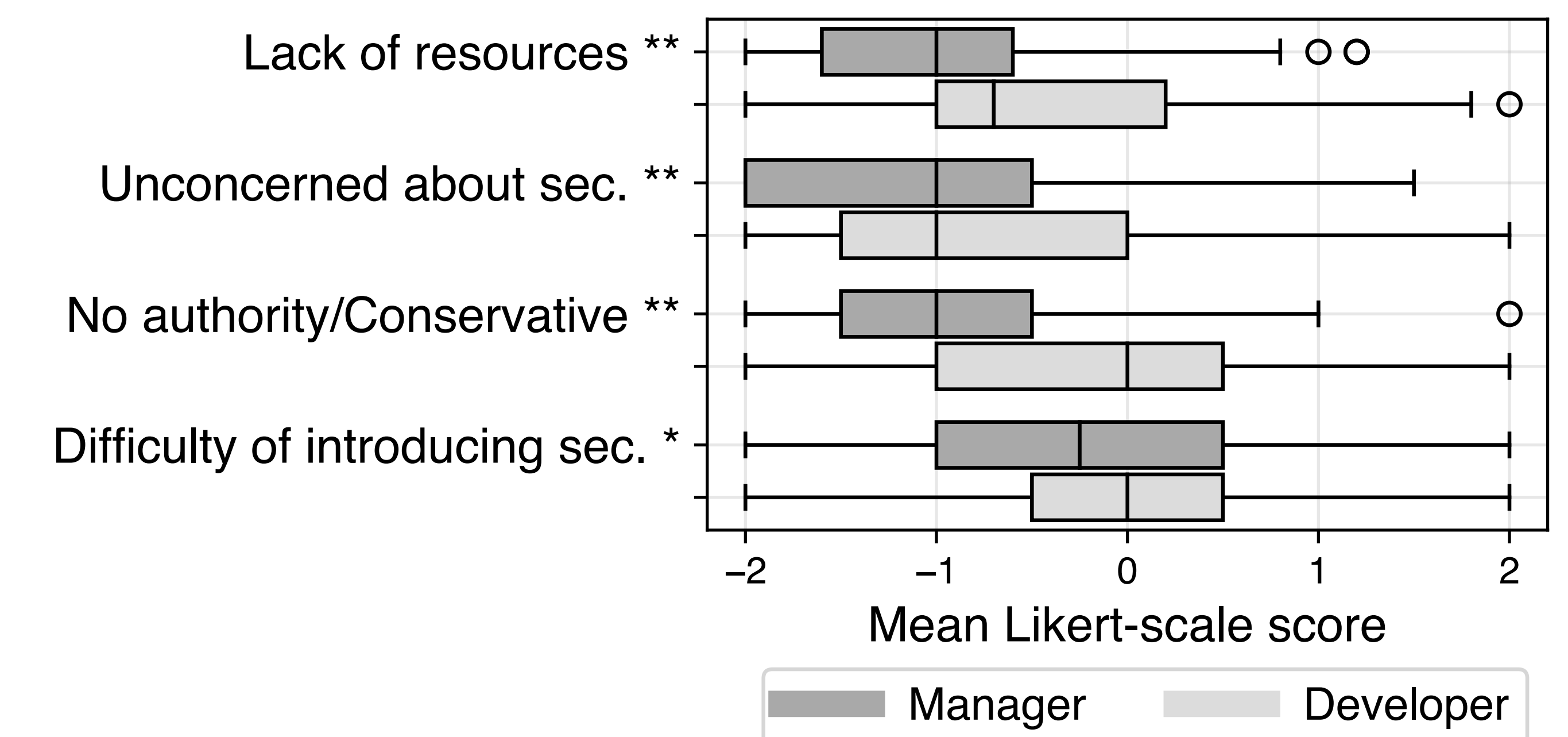
### Comparison results of security constraints, in-house dev. (N =64), contracted dev. N=242, \*w/sig diff (p<.05)

#### Findings

People in a **project located in the lower part of a contractual hierarchy** feel more constraints due to their lack of decision-making authority  
 ⇒ possibly due to requests made or priorities set by their contractor

## 3. Results

### 3.3.1 Comparison between developers and managers



### Comparison results of security constraints, Developer (N =162) Manager (N= 149), \*w/sig diff (p<.05), \*\*w/sig diff (p<.01)

### 3.3.2 Understanding of security efforts in the project

- Developers tended to answer “Not sure” to the questions about security efforts (Avg. % of “Not sure”: developer 3.5%, manager 0.1% )

#### Findings

1. **Difficulty of decision-making** (e.g., introducing new sec. measures ) is a strong security constraint for both developers and managers
2. There are **gaps in perception** between developers and managers
  - Managers tend to feel less constrained about security than developers
  - Developers tend not to know the overall security efforts of the project or have the decision-making authority to implement them.

## 4. Implications

- **Supporting security-related decision-making**
  - Decision makers need to be assisted in the decision-making process.
  - **Interventions to bridge the gaps between developers’ and managers’ perceptions** should be conducted.
    - e.g., sharing the security issues that developers are concerned about with managers
- **Designing appropriate user study**
  - Researchers must consider the characteristics of developers and managers and select appropriate participants who suit the purpose and content of a survey.