Ambiguity in Repair Service Offers: A Significant Barrier to Consumer Engagement in Product Repair

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Introduction

Why repair electronic devices?
- Repair extends product lifespans, reducing the need for new devices and addressing the growing e-waste problem (EU, 2014; Laitala et al., 2021).
- Lower environmental impact than replacement (Alejandre et al., 2022).
- Preserves natural resources by minimizing the extraction and use of raw materials.

Although 77% of consumers preferring repair over replacement (EU, 2014), actual repair rates remain low (Jaeger-Erben et al, 2021).

Barriers to repair
- Consumer desire for the newest devices and features ("psychological obsolescence") (Magnier & Mugge, 2022).
- Perceived high repair costs relative to replacement (Jaeger-Erben et al., 2021); WTP for repair around one-third of the replacement cost.
- Inconvenience of the repair process (Güsser-Fachbach et al., 2023).

➡ **Even if consumers attempt repairs, success isn't guaranteed. They may still need to replace the product, which results in additional costs.**

Uncertainty complicates the decision to repair or replace a product and the choice among various repair service providers.

While it is hardly possible for repair services to eliminate uncertainties entirely, there are ways to reduce them.

Research question
How and to what extent do varying degrees of uncertainty in repair service offers affect consumers' preferences for repair?
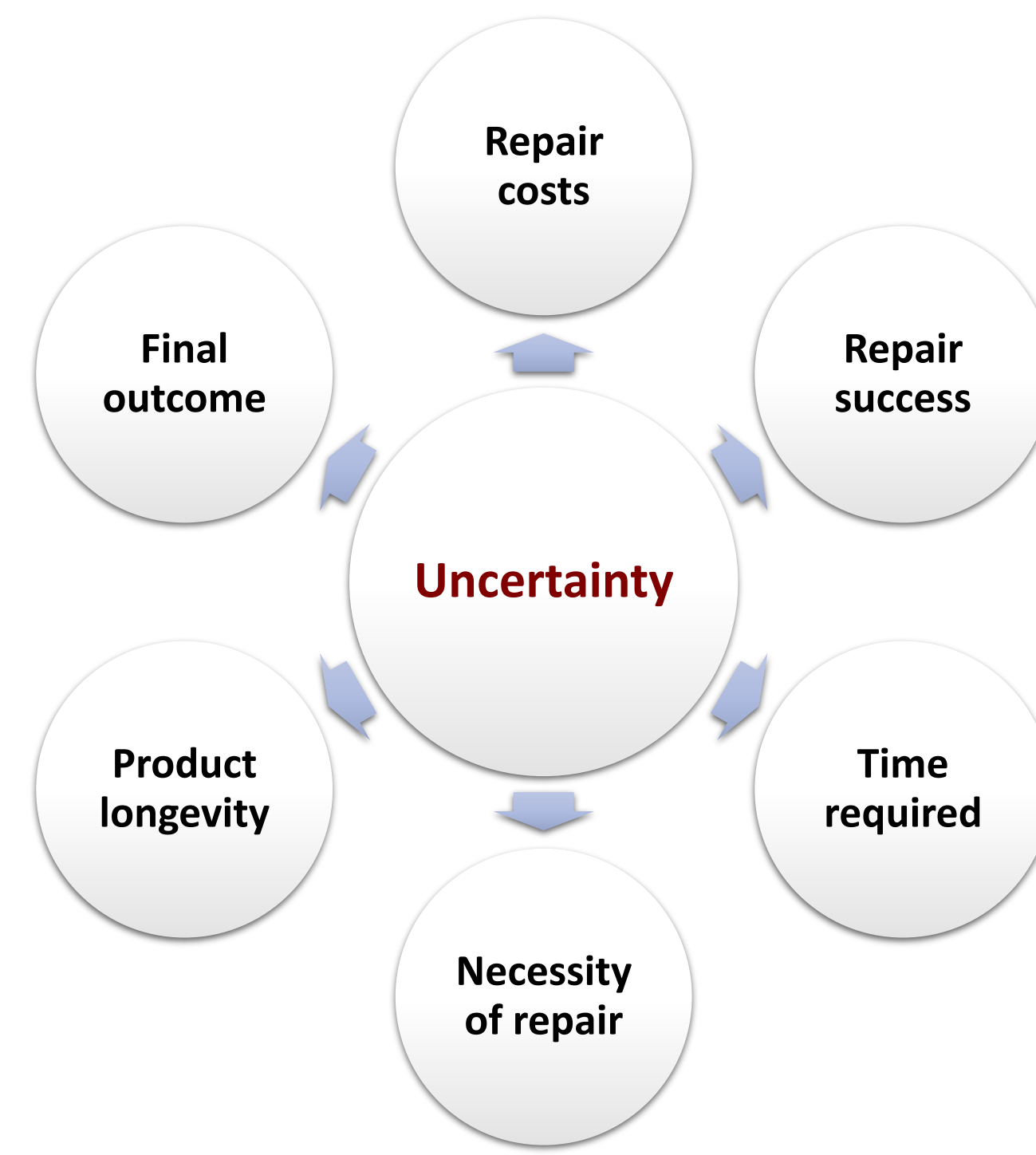
Methods and Materials

Study design
Dual-Response Choice-Based Conjoint (DR-CBC) design with 7 random tasks and 1 fixed task, each with 3 alternatives and a second-stage question.
- **Stage 1**: Traditional CBC
  - Participants choose their preferred option from multiple alternatives
  - Alternatives differ in attribute levels
- **Stage 2**: Confirmation
  - Choice between previously selected option and "no-choice option"
- ➡ **Key advantages**
  - Combines benefits of free and forced choice
  - Improves predictive accuracy of model estimates

Scenario
  - Malfunctioning washing machine (3 years old, original cost: €500; exact issue is unknown)
  - Reached out to various repair services to obtain offers differing in the following attributes:

Attributes	Levels
Repair service provider	(1) Freelance technician; (2) Regional repair service; (3) Manufacturer-certified service; (4) Nationwide service network; (5) Electronics retailer repair service;
Repair time	(1) 0.5 days; (2) 1 day; (3) 2 days; (4) 3 days; (5) 7 days
Warranty	(1) None; (2) 6 months; (3) 1 year; (4) 2 years; (5) 3 years
Repair success rate	(1) No information; (2) 65% to 95%*; (3) 75% to 85%*; (4) 80%; (5) 100%
Total repair costs	(1) No information; (2) Starting from €99; (3) €99 plus cost of spare parts; (4) €49 to €349; (5) €99 to €299; (6) fixed price of €199

*"Depending on the defect, 65% (75%) to 95% (85%) of the washing machines were successfully repaired."

### Additional Survey Items
  - Ellsberg urn experiment with 3 choice options:
    1. Box K (known probabilities)
    2. Box U: (unknown probabilities)
    3. Indifferent
  - Maximum willingness to pay for repair of the washing machine presented in the scenario and estimated current value of the washing machine
  - Demographic information
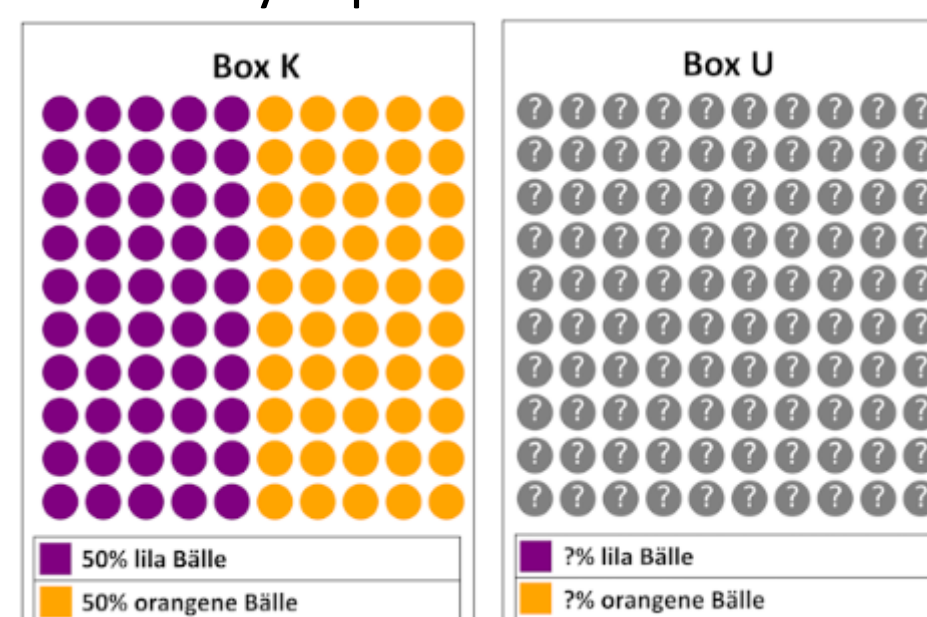
Sample: N = 237; M_{age} = 39.16; female = 47.26%; past repair experience = 37.6%

Results

The chart below depicts the part-worths of the levels of *repair success rate* (third highest importance, M = 19.40) and *total repair costs* (highest importance, M = 32.86).
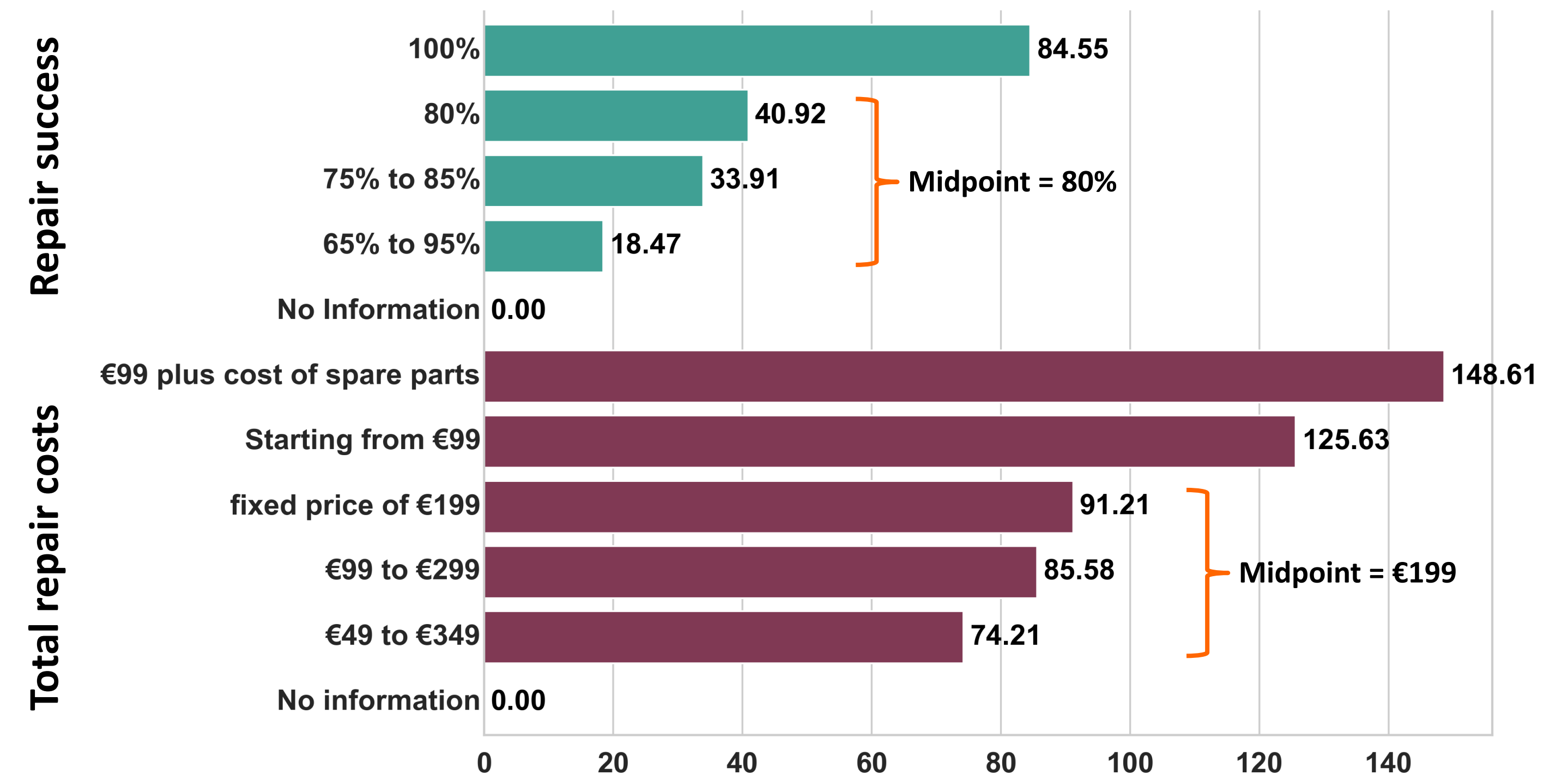
- "No information" is the least preferred level.
- **Point estimate (80%; €199) > narrow range > wide range.**
- **Total repair costs**: levels with open upper limit (e.g., *from €99*) preferred over cost ranges and fixed price

Market simulation
- Simulated scenarios with varying levels of information on repair success rates (**A**) and total repair costs (**B**)
- Other attributes were held constant at most preferred levels.
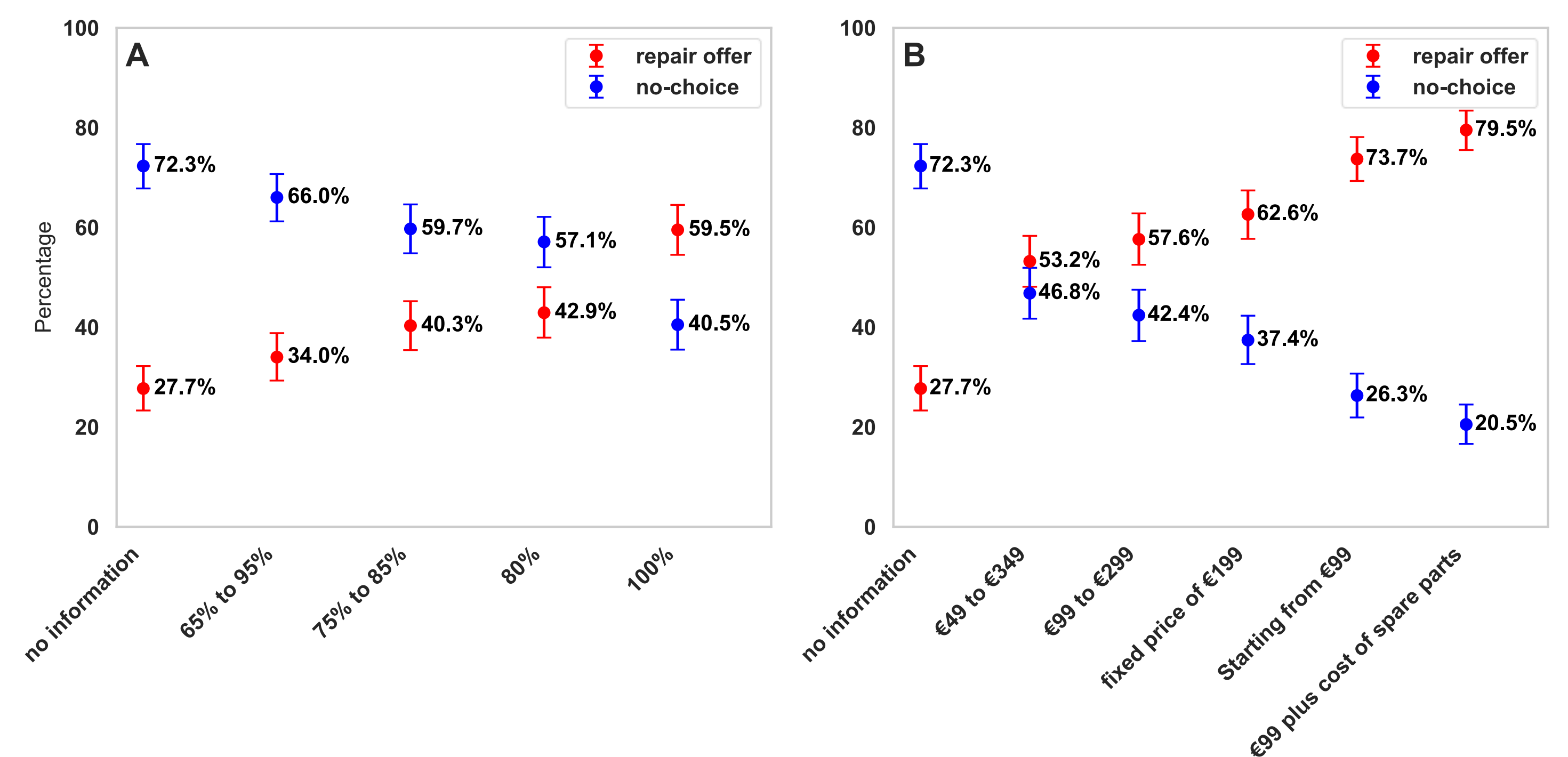
Impact of ambiguity aversion
Ambiguity-averse participants demonstrate significantly
- Stronger aversion to the "no information" level for both costs and success rates
- Higher preference for narrow cost and success rate ranges over wide ranges
- Stronger inclination toward extended warranty periods

Discussion

Key findings
- ➡ Providing even vague information about repair costs and success rates substantially increases consumer preferences compared to no information.
- ➡ Consumers may accept some uncertainty if it offers potential cost advantages.
- ➡ Most preferred cost format: "€99 plus spare parts"
  - Variable costs seem more justifiable when linked to actual parts
  - May be perceived as less susceptible to being skewed against oneself
- ➡ Ambiguity-averse consumers: stronger preferences for uncertainty-reducing features: narrower ranges and extended warranty periods

Anchoring effect
- Could explain high preference for price formats with open upper limit ("Starting from €99," "€99 plus cost of spare parts")
  - Initial value (€99) might serve as cognitive anchor
  - Could lead consumers to insufficiently adjust expectations upward
  - Ranges: Consumers anchor their expectations to the upper limit (i.e., €299).

Repair services should
  - Provide cost information - **any information is better than none**, but *starting price* or *base price plus parts* work best
  - Communicate past repair success rates
  - Offer longer warranty periods

Policymakers should
  - Promote transparency in repair service offers
  - Encourage better diagnostic information in manuals
  - Support remote diagnostics capabilities

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