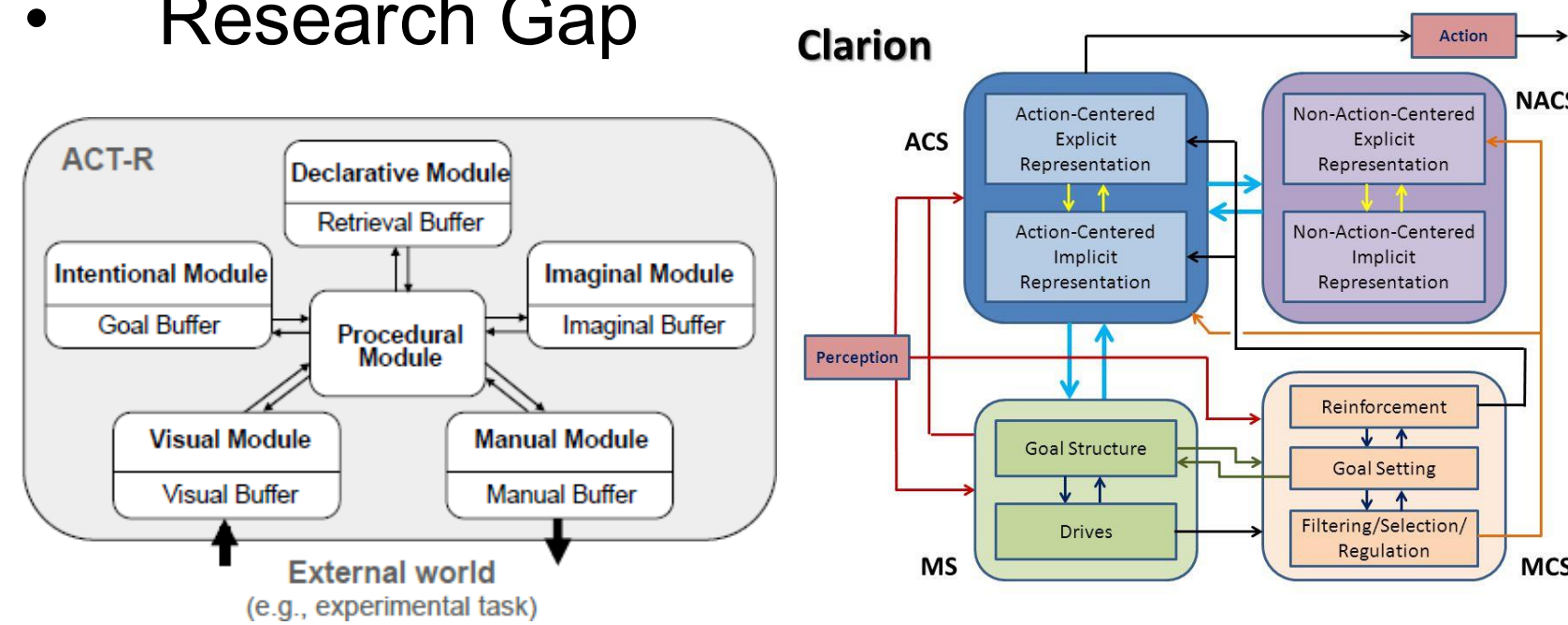


ANALYSIS OF ACT-R AND CLARION REPRESENTING HEURISTIC STRATEGIES IN CONSUMER DECISION-MAKING

Student: Willem van de Sanden (w.j.p.l.vandesanden@student.tudelft.nl) Supervisor: Chenxu Hao, Responsible Professor: Bernd Dudzik

1. Background

- Heuristic strategies
- Consumer decision-making
- ACT-R & CLARION
- Implicit vs. Explicit cognition
- Research Gap



2. Research Question

How do ACT-R and CLARION represent heuristic strategies in consumer decision-making?

Subtopics used to answer the main question:

- What heuristics are represented?
- How are the heuristics represented?
- Differences between architectures in that they represent specific heuristics and not the other
- Motivation behind heuristic coverage
- Strengths and weaknesses in representations

3. Methodology

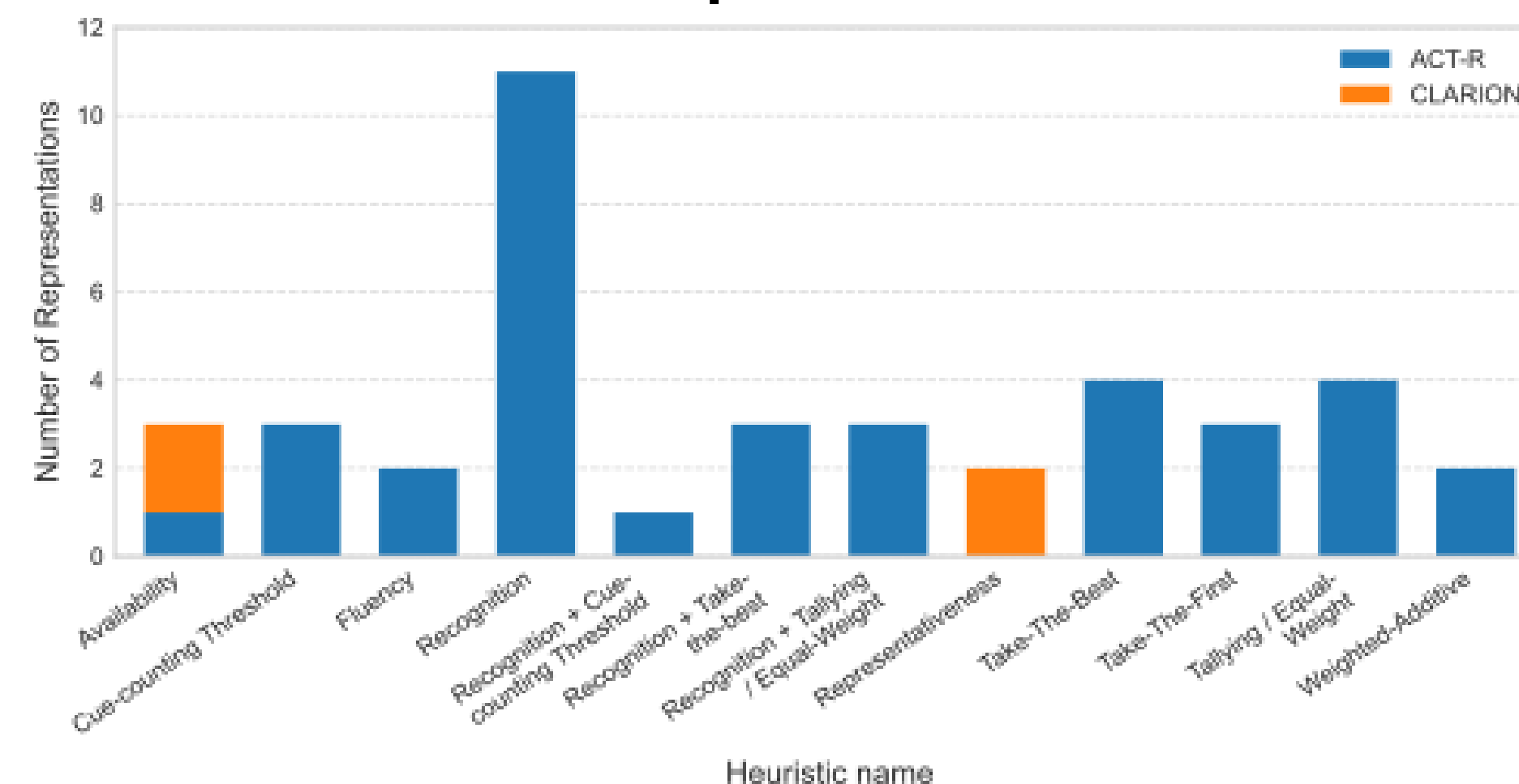
- Systematic Literature Review
- This study is structured according to the PRISMA guidelines
- Search engines: Scopus, IEEE Xplore, Web of Science and ACM Digital Library
- This review includes papers in English that represent consumer-relevant heuristics in ACT-R or CLARION
- Key terms literature search: **ACT-R/CLARION, heuristic*, decision***

4. Results

Literature search results:

- 92 records obtained (34 duplicates removed).
- 58 title and abstracts screened (24 excluded and 1 full-text not retrieved)
- 33 full-text records assessed (21 excluded)
- 12 studies included (10 on ACT-R and 2 CLARION)

What heuristics are represented?



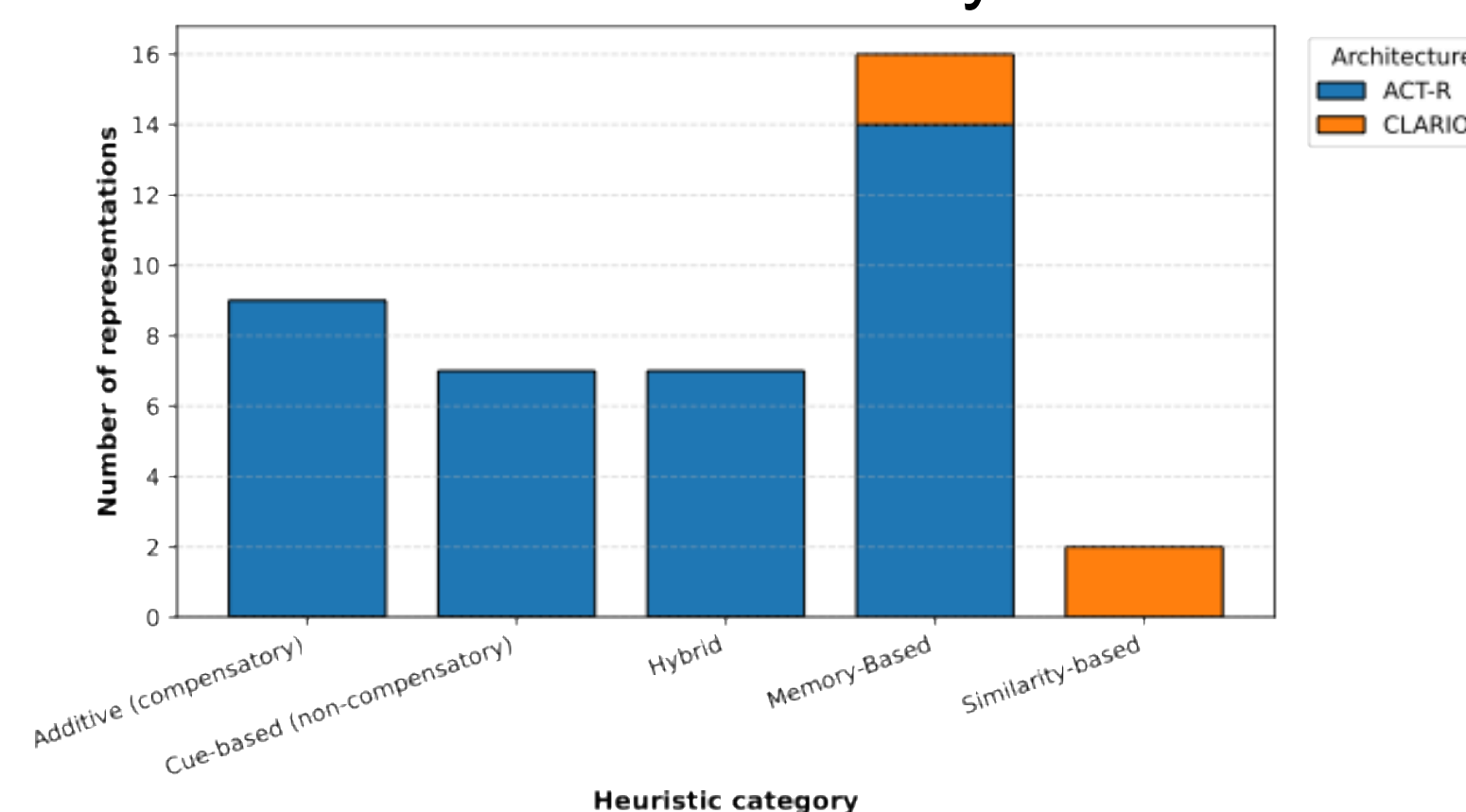
Example Availability/Fluency heuristic (How)

- In ACT-R: Declarative Memory (chunks), Procedural Memory (production rules), Retrieval Buffer (timing)
- In CLARION: Implicit Declarative Memory, Explicit Declarative Memory, Procedural Memory

5. Discussion

5.1 Difference in heuristic coverage

- ACT-R focuses on rule-based heuristics
- CLARION focuses on similarity-based heuristics



5.2 Strengths and Weaknesses

Strengths ACT-R:

- Sequentially chained production rules
- Explicit memory retrieval timing

Weaknesses ACT-R:

- No intuitive method providing similarity
- Only serial execution of procedural rules

Strengths CLARION:

- Dual process structure (Implicit/Explicit cognition)
- Implicit layer provides similarity value

Weaknesses CLARION:

- Lacks sequential production system
- No explicit memory retrieval timing

5.3 Motivation heuristic coverage gaps

- Architectural structure ACT-R/CLARION
- Strengths and weaknesses
- Literature coverage (10 on ACT-R, 2 on CLARION)

5.4 Limitations

- Research sample limits statistical power
- External validity: Heuristics in literature use simple tasks instead of real consumer scenarios.
- Only consumer-relevant heuristics included
- Publication bias

Conclusion and Future Work

- Results confirm that the architectural structure mainly determines which heuristic strategies have been represented
- CLARION similarity-based heuristics
- ACT-R rule-based heuristics

Future work:

- ACT-R: Representing parallel execution and similarity reasoning
- CLARION: Representing explicit memory retrieval timing and sequentially chained production rules