



Lab Seminar

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김기태



Creepy Assistant: Development and Validation of a Scale to Measure the Perceived Creepiness of Voice Assistants

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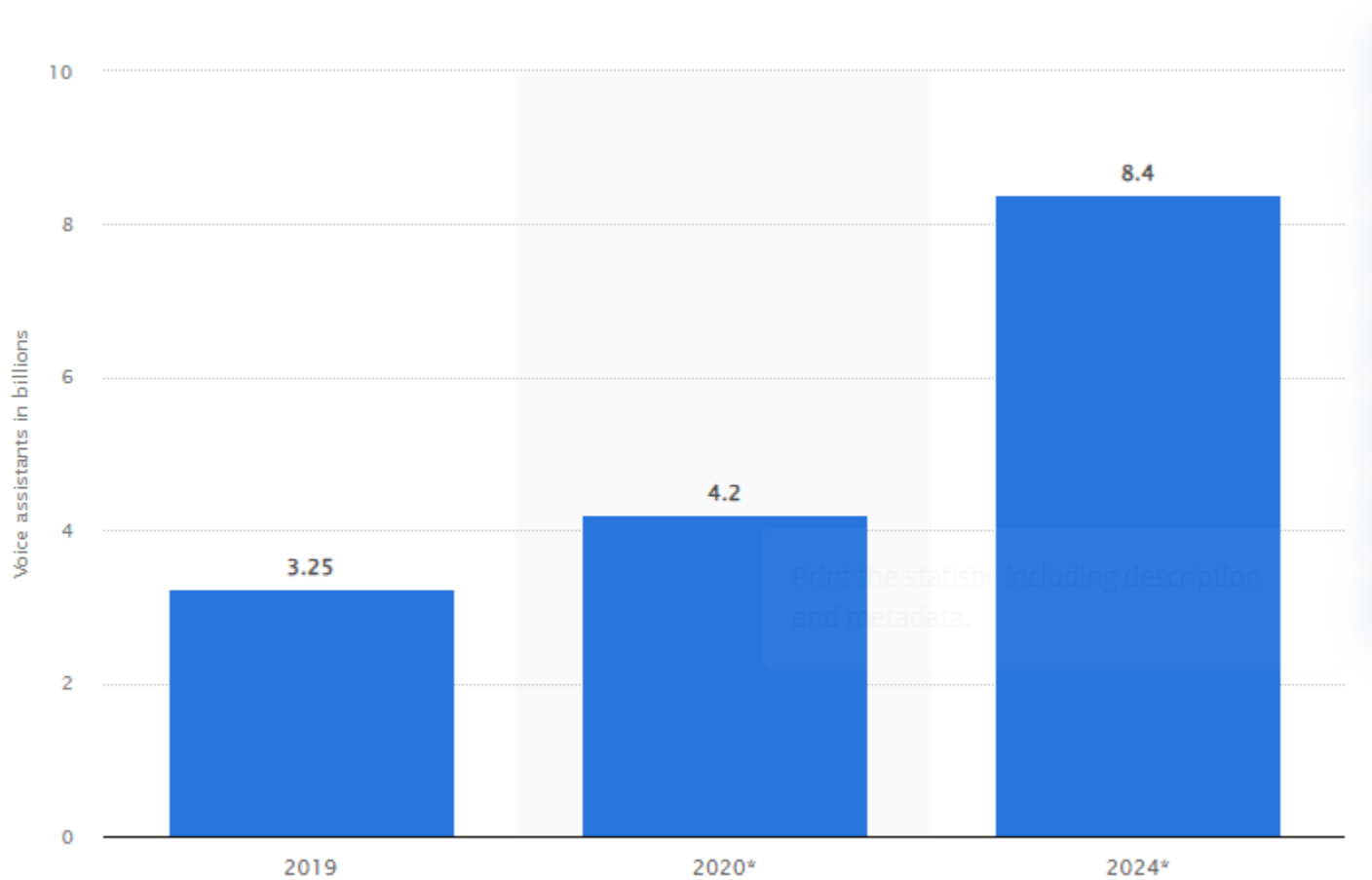
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1. Introduction (Background)



Number of Digital Voice Assistants in use worldwide (2019 ~ 2024)



1. Introduction (Background)





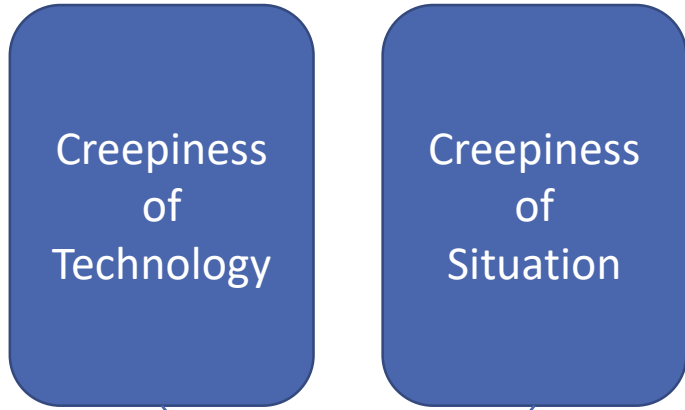
1. Introduction (Background)

The screenshot displays the Reddit interface for the r/AskReddit community. The main content area shows a post titled "What's your creepy Alexa/google home story?" which has been archived. The post has 3.8K upvotes and 1.8K comments. Below the post, there are several comments from users like "Damsell" and "FamousOhioAppleHorn". The right sidebar shows the community page for r/AskReddit, including the number of members (45M) and online users (52K). The sidebar also lists community rules and related subreddits.





1. Introduction



	Strongly Disagree						Strongly Agree
	1	2	3	4	5	6	7
1. I would be likely to use this system again.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I felt confident using this system.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. The system used everyday words.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. The system seems polite.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. The system's voice sounded natural.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. The system's voice sounded enthusiastic or full of energy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. I felt like I had to wait too long for the system to stop talking so I could respond.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. The messages were repetitive.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. The system was too talkative.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Voice Usability Scale: Voice Agent의 사용성을 평가



“Creepiness”에 대한 Scale X



PCAS (Perceived Creepy Assistant Scale)



1. Introduction (Contribution)

- 그렇다면 PCAS를 통해...
 1. 개발자와 디자이너들이 현존하는 Voice Assistant에 대해 평가할 수 있는 기준 제공
 2. Creepiness를 유발하는 Factor에 대한 확인
 3. 앞으로 새롭게 Voice Assistant를 제작할 때, Creepiness를 줄일 수 있는 가이드라인 제공



2. Related Work

1. Understanding the Construct of Creepiness

- Unpredictability
- Privacy Concern
- Violation of Social Norm

2. Measuring Creepiness

- CRoSS (Creepiness of Situation Scale)
- Perceived Creepy Technology Scale (PCTS)

3. Voice Assistant User Experience

- GUI와의 다르게 인간적인 특성을 지님
- 더 개인적이고 똑똑하며 효율적으로 인식되는 경향



3. Scale Development Methodology

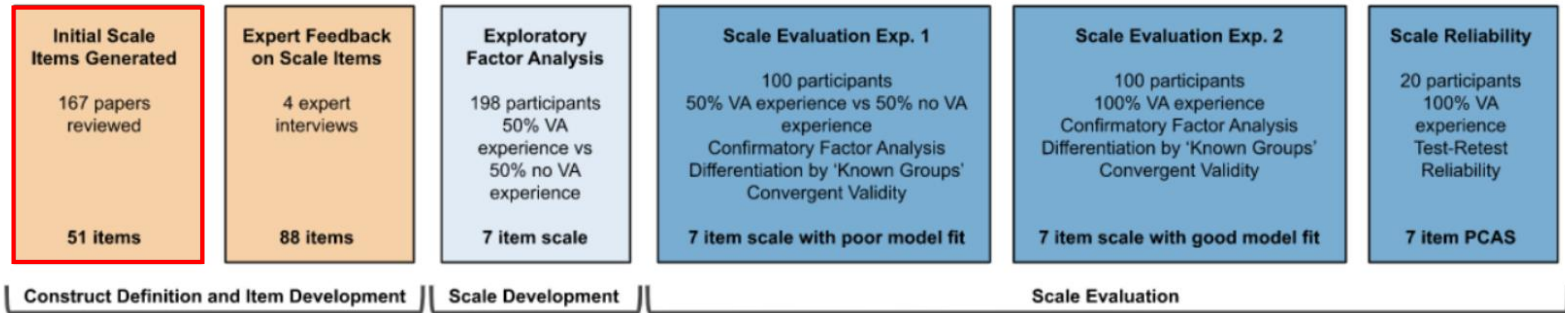


Figure 1: Overview of the scale development process used to produce the PCAS, which was based on Boateng et al.'s scale development process [9].

PHASE 1: Construction of Definition and Item Generation

- Creepiness
- Voice Assistant

-> Literature Review, Open Coding

➔ Voice Assistant를 Creepy하게 느끼게 하는 Item Scale 9개로 정리



3. Scale Development Methodology

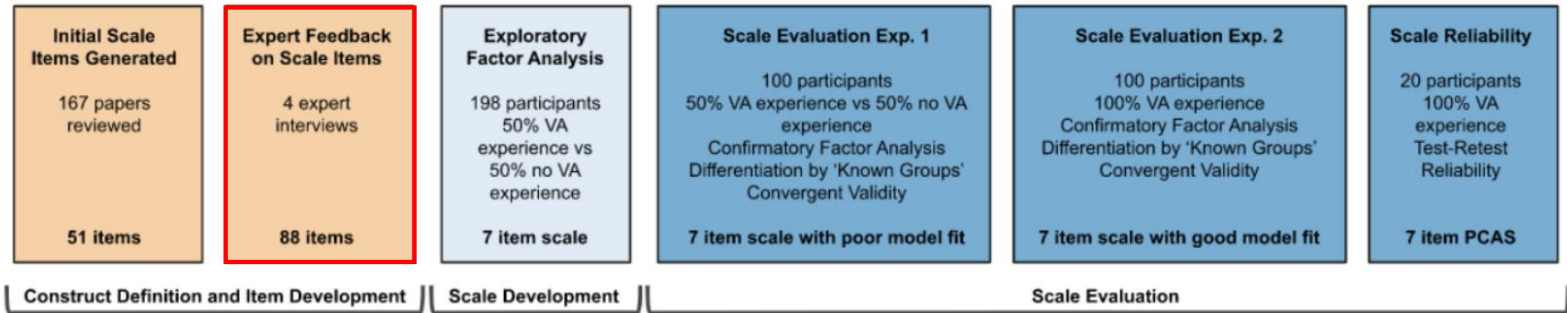


Figure 1: Overview of the scale development process used to produce the PCAS, which was based on Boateng et al.'s scale development process [9].

PHASE 1: Construction of Definition and Item Generation

- Expert 4명의 조언
- ➔ Item(설문지 항목): 51개 → 88개
- Creepiness 유발하는 Item Scale 8개



3. Scale Development Methodology

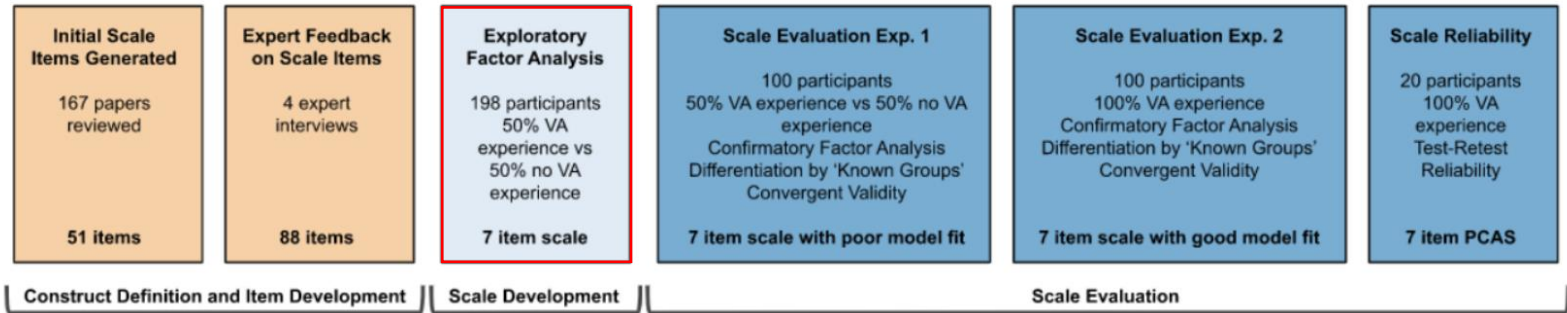


Figure 1: Overview of the scale development process used to produce the PCAS, which was based on Boateng et al.'s scale development process [9].

PHASE 2: Scale Development (Exploratory Factor Analysis)

- 88 개의 Items (설문지 개별 질문)의 구조 파악
- 각 8개의 Factor에 대해 Item 그룹화
- ➔ 7개의 Item Scale로 변경



3. Scale Development Methodology

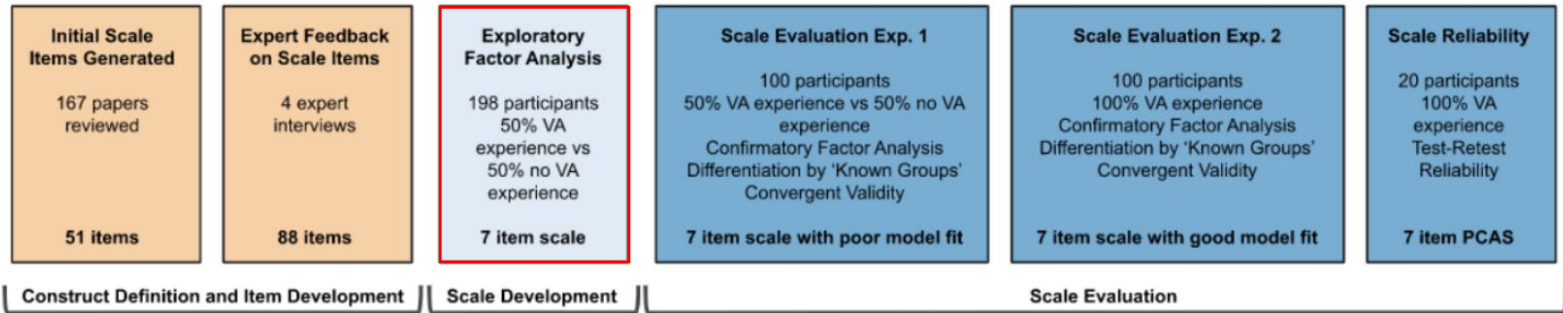


Table 2: The PCAS is a unidimensional scale with seven items. The factor loadings for the items and Cronbach’s Alpha for the scale were calculated using the results from the Scale Development Survey.

Scale Items	Loading
Q1: I have minimal control when I use this voice assistant.	0.766
Q2: This voice assistant does things that are not in my best interest.	0.814
Q3: This voice assistant behaves in deceptive ways.	0.777
Q4: This voice assistant could be accidentally or unintentionally harmful towards users.	0.854
Q5: This voice assistant is collecting too much data about me.	0.774
Q6: The way this voice assistant behaves doesn’t follow social norms.	0.787
Q7: This voice assistant does not provide enough benefits to me to justify me using this voice assistant.	0.791
Scale Overall	$\alpha = 0.903$



3. Scale Development Methodology

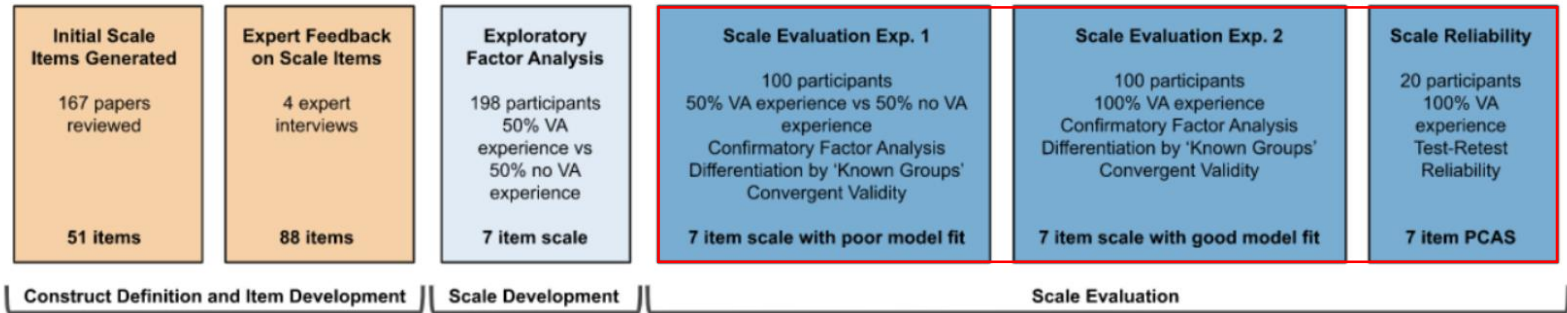


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PHASE 3: Scale Evaluation

- 2x3 Between Subject

(Voice Assistant 경험 유무 x 3가지 Creepy Voice Assistant Scenario)

→ Voice Assistant 경험이 없는 실험자들이 모두 Creepy하다고 반응

→ 재실험



4. Discussion (Design Guideline)

1. Control: User들이 VA를 Control하고 있다는 인식
 - 다른 환경에서는 다른 방식으로 VA를 Control할 수 있도록
2. Intention: 처음에는 제공하는 기능을 투명하게 제공
 - 불키기 기능 + 소리 -> 소리만
 - 추천내용에 대한 이유/설명 제공
3. Behavior: social norm을 따르는지 확인



4. Discussion (Design Guideline)

4. Privacy: User의 Privacy를 보존할 수 있는 전략 제공

- Incognito Mode
- 외부 앱/기기를 통해 Public Info와 Private Info에 대한 구분

5. Value

6. Designing for Creepiness

- 특정 목적을 위해 (오락/실험 등) Creepy한 VA를 제작하려 한다면 PCAS에서 낮은 점수를 받을 수 있는 방식으로 Creepiness 제공



5. Ideas

- Private / Public Information에의 구분
 - > 기억하고 싶지 않은 대화 내역은 제거할 수 있는 앱 (Conversational Web 형태 활용)
 - OR 선택적으로 장기기억화
- Incognito Mode에서의 대화
- 대화 위치 -> 대화 상대에 따른 구분 (음성 인식을 통한 대화 상대의 구분)