At Your Service: Designing Voice Assistant Personalities to Improve Automotive User Interfaces

Braun, M., Mainz, A., Chadowitz, R., Pfleging, B., & Alt, F. (2019, May). At your service: Designing voice assistant personalities to improve automotive user interfaces. In Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (pp. 1-11).

Aim: To investigate personalized voice assistants for driving scenarios

Collect	Collect requirements for personality traits of in-car assistants.
Design	Design a set of assistants.
Evaluate	Evaluate them in a real-world driving study.

Pre-study: Character Design

- Adapted from Argyle's two-dimensional 'Model of Attitudes towards Others'
- Results from the MeCue and Acceptance Scale questionnaires and personal interviews identify unfriendly behaviour and excessive talking as negative traits, while assistants with a perceived friendly attitude were liked by most participants.

Results: A revised model for the study

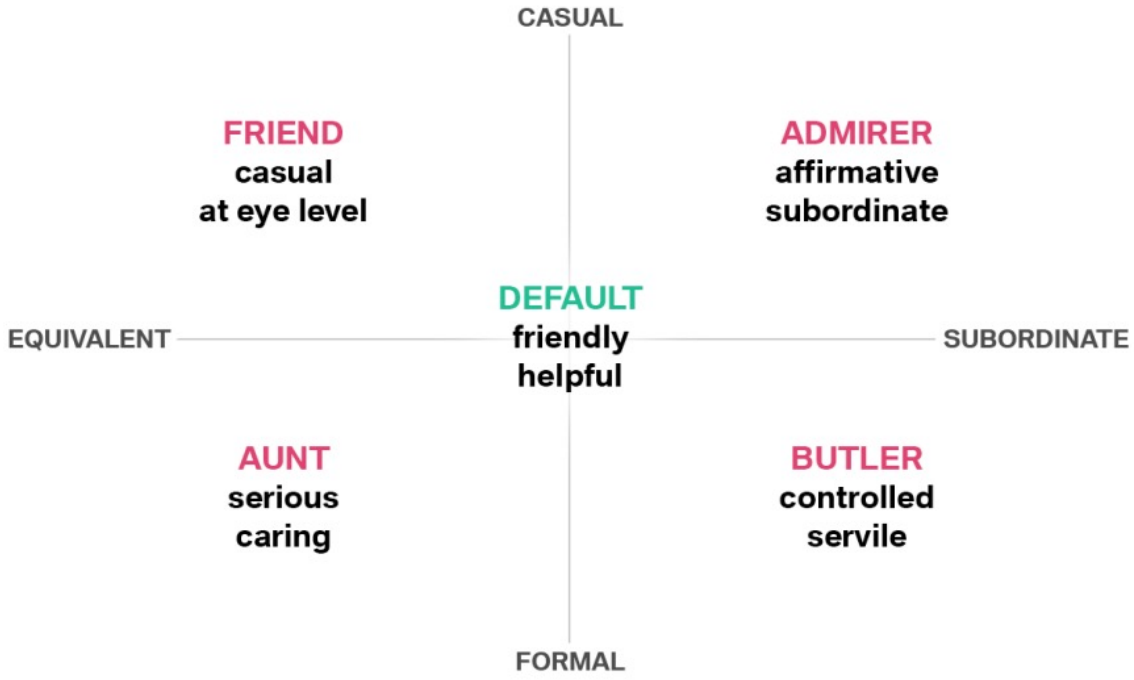
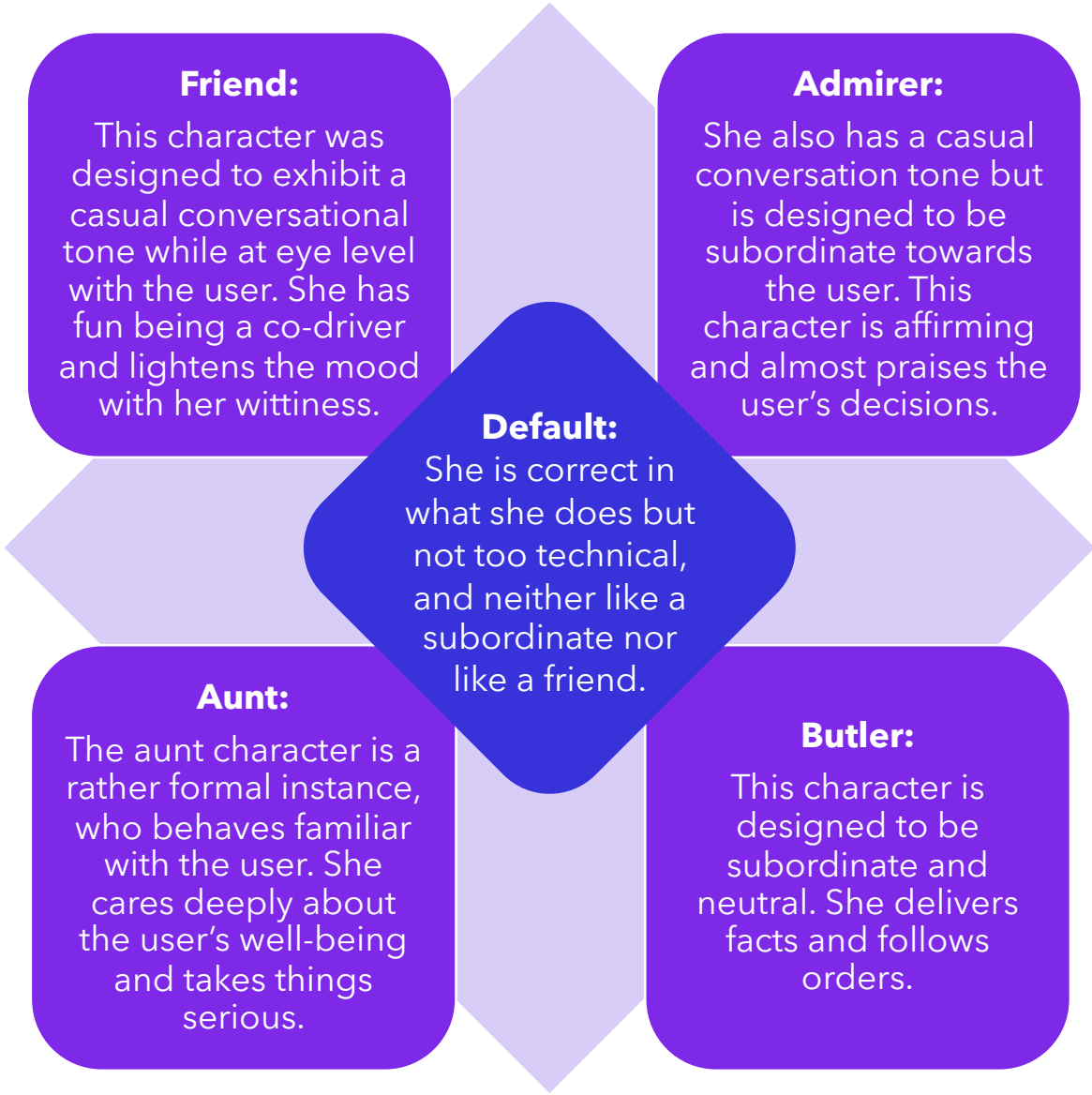


Figure 2: We derived a two-dimensional model from prior work and our pre-study. Each one assistant was designed to match the four dimensions.

Final Assistant Characters



Hypotheses

H1: A default one-fits-all character is generally accepted by users

H2: A personalized character scores higher ratings for trust and user experience, compared to the default assistant

H3: A personalized character leads to more expressions of positive emotions compared to the default assistant.

H4: A less serious character leads to higher workloads than a serious character

H5: Users would pick the character adapted to their personality over other characters or the Default

H6: Users prefer less emotional characters for driving-related tasks, and emotional ones for non-driving-related tasks

H7: User extraversion correlates with the estimation of extraversion of their preferred character

Study Design

Independent Variables

- Personality type: Friend, Admirer, Aunt, Butler Vs. Default
  - Matched vs. Mismatch personality type
- Use case types: Driving related, Proactive Assistant, Connected Car

Dependent Variables

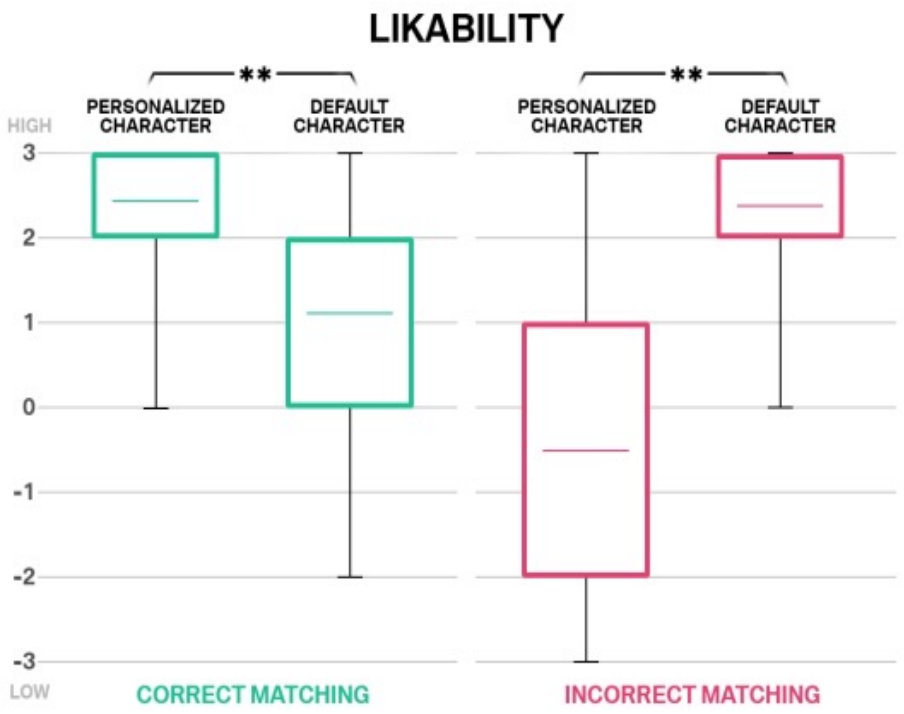
- User personality traits (Big Five Inventory)
- UX ratings (UEQ modules Attractiveness and Stimulation, one item likeability scale)
- Acceptance (Acceptance Scale)
- Trust (one item)
- Workload (Driving Activity Load Index)
- Driver facial expressions (Affdex SDK)

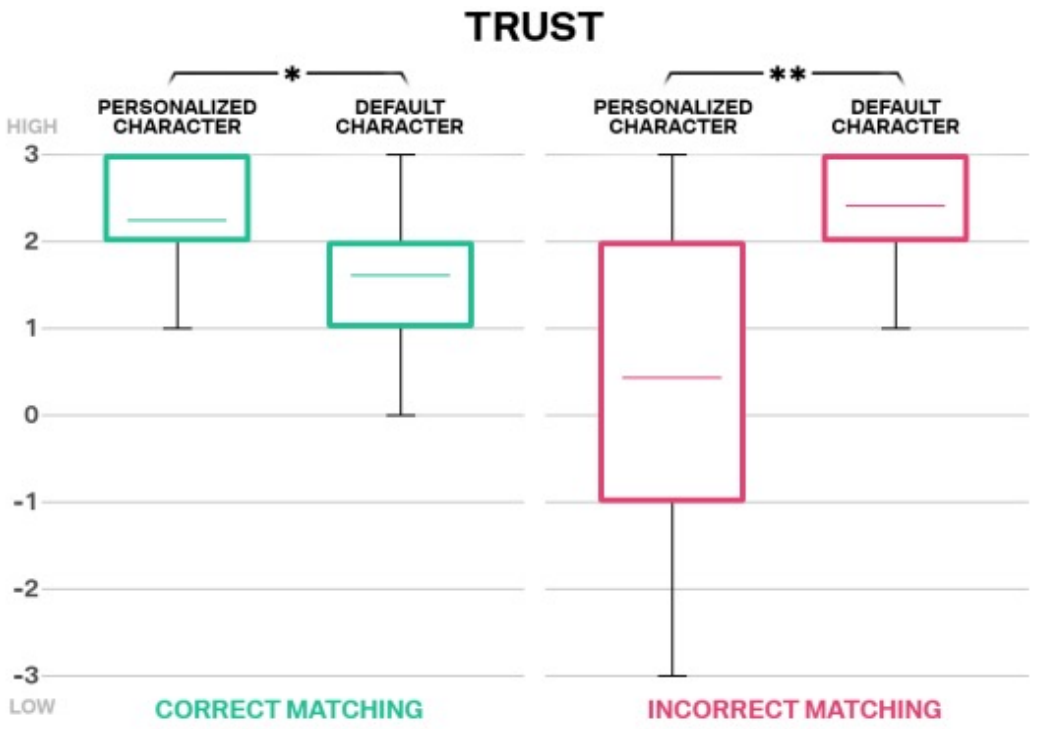
A Wizard of Oz Study

1. Participants answered the Big Five Inventory to be matched with a fitting assistant character based on a decision tree analysis (a matching algorithm). Then they experienced the personalised assistant and the default assistant
2. On the road, 12 use cases were triggered by the operator at certain locations.
3. After each use case the participants rated the interaction (good, neutral, bad)
4. After each ride, participants answered the questionnaire and gave feedback
5. After the final ride, participants chose their preferred character and answered interview questions

Main Results

- Personalisation has a positive effect on trust and likeability if the voice assistant character matches the user's personality.





Additional findings

- **Acceptance scale**: personalization has no benefit on usefulness or satisfaction when characters are correctly matched but when mismatched, personalised characters were significantly less useful than default.
- **Workload**: personalized characters were perceived as comparably suitable for in-car use cases as the Default voice assistant.
- **Emotion Recognition**: low engagement, high variation, no conclusion.
- **Personality Interplay**: Extraverted people chose the most extraverted character (Friend).
- Use Cases
  - **Driving related tasks**: Default preferred then Aunt preferred. Affirmative and minimal feedback
  - **Connected car tasks**: Wanted a co-driver who can answer quick questions in a pragmatic way.
  - **Proactive assistant tasks**: If appropriate, personalized characters were preferred.

Points for Discussion

- Should users choose their preferred personality character?
  - The matching algorithm only matched with user preferences correctly 29% of the time.
- Will non-driving activities increase with a more interactive assistant?
  - If so, how can we design a more natural interaction on situational awareness for eventual takeover requests.