FFIA Frankfurter Forum für interdisziplinäre Alternsforschung

Developmental Psychology Lab

GOETHE UNIVERSITÄT FRANKFURT AM MAIN

Factors impacting on perceptions of elder robot user

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Background

- Assistive devices for elders, particularly companion type robots, are claimed to stereotype their users.
- Stereotype Content Model (Fiske et al., 2002): elders are stereotyped as low in competence and high in warmth (social abilities).
- Quantitative studies regarding stereotyping by robot use mainly lack.
- **Robot design** can play a significant role regarding user stereotyping (see Hirsch et al., 2010).
- Evaluation of robots differ according to age (Nomura et al., 2015) → **age differences** in user stereotyping can be expected.
- User stereotyping could be associated with the **general ageing stereotypes**.

Research questions:

1. How are elder users of both robots perceived?
2. Does design (robot type) matter?
2. Does age matter?
4. Do general ageing stereotypes matter?

Methods

Procedure

- Online-study
- Presentation of both robots in randomized order as follows

1. basic information of robots by text and picture

2. short films of robots in action

3. robot-specific questionnaires

- Person-specific questionnaires

- demographic data
- general ageing stereotypes

Design

2 (between: age group) x 3 (between: ageing stereotype) x 2 (within: robot type)

1. Two age groups (N = 98)	**young < 30 years (n = 59, 60%)**	**old 60 years (n = 39, 40%)**
age *(M, SD, range)*	21.97, 2.87 18-28 years	68.13, 4.84 60-79 years
female gender yes *(n (% of age group))*	45 (76%)	18 (46%)

2. Three groups of ageing stereotypes	**Age (M, SD); female gender (n, %)**
rather positive	44.88, 22.84 16 (64%)
rather neutral	40.44, 23.44 35 (67%)
rather negative	34.67. 21.97 16 (57%)

	3. Two companion-type robots	
	Paro (PARO Robots Inc.)	Zoomer (Spin Master™)
		
intended application:	assist. device → gadget	
appearance:	zoomorph → technical	

Instruments

a. *General ageing stereotypes:*
1. Two of the ageing stereotype scales by Kruse & Schmitt, 2006: age as time of development / as time of losses.
2. Difference score of the two scales.
3. Difference Score trichotomized at the 1st and the 3rd quartile → three groups: rather negative – neutral – positive stereotypes.

b. *Perception of elderly robot user regarding domains of age-related stigma (warmth & competence):*
1. Study-specific semantic differential following Gluth et al. (2010).
2. Factor analysis shows a two-dimensional structure for both robots: 25 items measuring competence (health, everyday living and psychosocial functioning), 10 items measuring warmth.

c. *Other robot-specific questionnaires*:
1. Expected application of each robot (assistive technology for the old and disabled vs. gadget for young people; 5-point Likert Scale).

funded by. BHF BANK STIFTUNG

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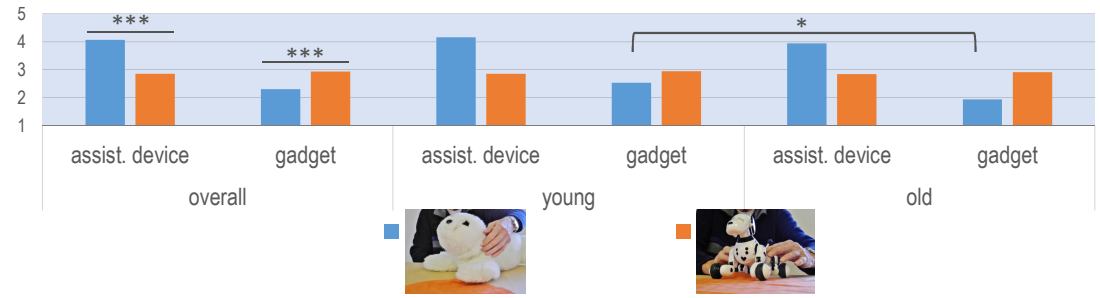
Results

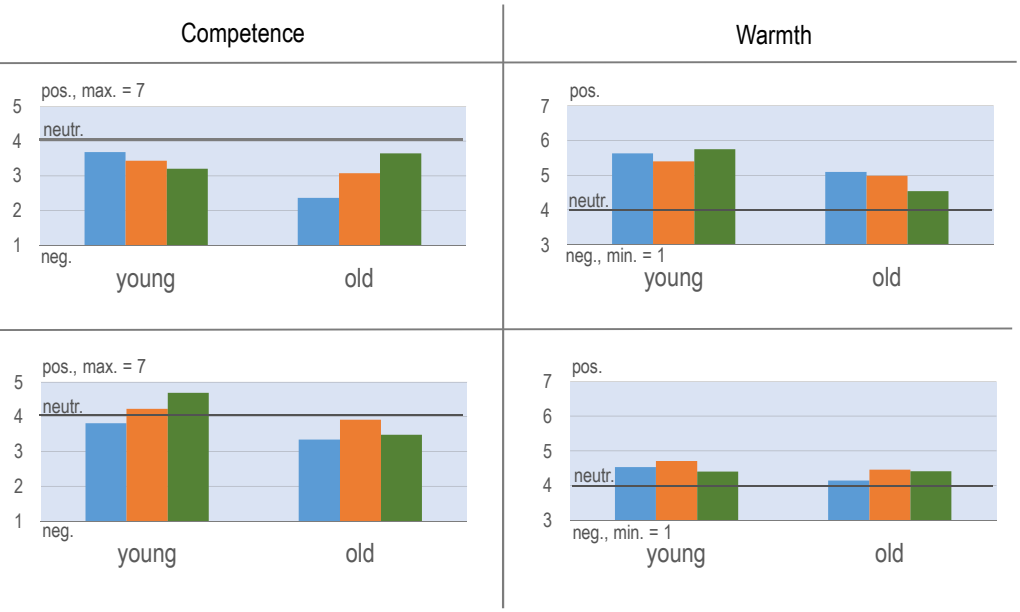


Preliminary Analysis:
What robot application do participants expect?

- Paro: assistive device > gadget.
- Zoomer: gadget > assistive device.

→ **as expected**

How are elder users of companion-type robots perceived?



1. In general

Overall, elder users are perceived as low in competence and high in warmth.

→ **Consistent with the Stereotype Content Model.**

2. Does **robot type** matter?

- competence: Paro < Zoomer.
- warmth: Paro > Zoomer.

(Main effect, $F(2, 91) = 40.00$, $p < .001$, $\eta^2 = .47$)

3. Does **age group** matter?

–competence: older < younger.
–warmth: older < younger.
(Main effect, $F(2, 91) = 8.96$, $p < .001$, $\eta^2 = .17$)

- Effect of age group is larger in Paro than in Zoomer.

(Interaction effect robot type x age, $F(2, 91) = 3.17$, $p = .047$, $\eta^2 = .07$)

4. Does **ageing stereotype** matter?

a.) Paro

- *younger people:* increasingly pos. ageing stereotypes → higher user stereotyping (decrease in competence perception).
- *older people:* increasingly positive ageing stereotypes → lower user stereotyping (decrease in warmth and increase in competence perception).

b.) Zoomer

- *younger people:* increasingly positive stereotypes → lower user stereotyping (increase in competence perception).
- *older people:* no strong differences according to stereotype; highest competence perception in neutral stereotypes.

(Three-way-interaction age x stereotype x robot, $F(4, 184) = 4.26$, $p = .003$, $\eta^2 = .09$)

Discussion

1. The results confirm that robot user tends to be stereotyped.
2. Robot design contributes to the stereotyping effect with animal-like assistive devices being more stigmatizing than technically looking gadgets.
3. Differences exist in user perception according to age with younger people making less conservative judgements.
4. Ageing stereotypes play a role in user stereotyping, but their influence differs according to robot design and age.

Limitations: Age differences in ageing stereotypes ● gender differences in age groups

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