Gender Bias in Chatbot Design

CONVERSATIONS 2019, Amsterdam
Jasper Feine, Ulrich Gnewuch, Stefan Morana, and Alexander Maedche
An UNESCO report reveals a gender bias in the design of voice-based CAs

- Report investigated the gender of popular voice-based conversational agents (CAs) (West et al. 2019).

- Most voice-based CAs are designed to be “female exclusively or female by default”.
  - They often female names and female voices
  - They are advertised as being female (e.g., “Alexa lost her voice”)

**RQ:** How are gender-specific cues implemented in the design of chatbots?
Method - Automated gender analysis approach

Investigated Chatbot Sample

1,375 chatbots listed on chatbots.org

Investigated Cues

Name

Microsoft Azure's face recognition API

Avatar

Text mining of gender specific pronouns

Gender Analysis Methods

gender-api.com and node.js package “gender-detection”

Description

Investigated Chatbot Sample

Example

SOphiA

„[...] She answers questions about her…”
Results (1) - Gender Bias in Chatbot Design

- **No Gender**: 501 chatbots (36.44%)
- **Only Name Gender**: 199 chatbots (14.47%)
- **Only Avatar Gender**: 65 chatbots (4.72%)
- **Only Description Gender**: 141 chatbots (10.25%)
- **Name & Avatar Gender**: 113 chatbots (8.22%)
- **Name & Description Gender**: 187 chatbots (13.60%)
- **Avatar & Description Gender**: 48 chatbots (3.50%)
- **Name & Avatar & Description Gender**: 121 chatbots (8.80%)

2/3 of the analyzed chatbots are gendered.
Gender bias in the design of chatbots.
<table>
<thead>
<tr>
<th>Application Domain</th>
<th>Names</th>
<th>Avatars</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Branded conversations</td>
<td>Female: 257</td>
<td>Female: 137</td>
<td>Female: 162</td>
</tr>
<tr>
<td></td>
<td>Male: 54</td>
<td>Male: 32</td>
<td>Male: 38</td>
</tr>
<tr>
<td>Campaign</td>
<td>Female: 9</td>
<td>Female: 13</td>
<td>Female: 4</td>
</tr>
<tr>
<td></td>
<td>Male: 11</td>
<td>Male: 6</td>
<td>Male: 8</td>
</tr>
<tr>
<td>Customer service</td>
<td>Female: 251</td>
<td>Female: 137</td>
<td>Female: 164</td>
</tr>
<tr>
<td></td>
<td>Male: 55</td>
<td>Male: 22</td>
<td>Male: 33</td>
</tr>
<tr>
<td>Knowledge management</td>
<td>Female: 30</td>
<td>Female: 13</td>
<td>Female: 16</td>
</tr>
<tr>
<td></td>
<td>Male: 3</td>
<td>Male: 1</td>
<td>Male: 4</td>
</tr>
<tr>
<td>Market research</td>
<td>Female: 6</td>
<td>Female: 3</td>
<td>Female: 6</td>
</tr>
<tr>
<td></td>
<td>Male: 0</td>
<td>Male: 0</td>
<td>Male: 0</td>
</tr>
<tr>
<td>Sales</td>
<td>Female: 106</td>
<td>Female: 61</td>
<td>Female: 81</td>
</tr>
<tr>
<td></td>
<td>Male: 16</td>
<td>Male: 9</td>
<td>Male: 10</td>
</tr>
<tr>
<td>Clone</td>
<td>Female: 3</td>
<td>Female: 5</td>
<td>Female: 2</td>
</tr>
<tr>
<td></td>
<td>Male: 14</td>
<td>Male: 20</td>
<td>Male: 11</td>
</tr>
<tr>
<td>E-Learning</td>
<td>Female: 4</td>
<td>Female: 2</td>
<td>Female: 7</td>
</tr>
<tr>
<td></td>
<td>Male: 0</td>
<td>Male: 1</td>
<td>Male: 6</td>
</tr>
<tr>
<td>Proof of concept</td>
<td>Female: 52</td>
<td>Female: 28</td>
<td>Female: 45</td>
</tr>
<tr>
<td></td>
<td>Male: 18</td>
<td>Male: 6</td>
<td>Male: 28</td>
</tr>
</tbody>
</table>

Gender bias is particular present in some domains.
Discussion and Conclusion

Our findings mirror the results of the UNESCO report and therefore, creates awareness for a gender bias in the design of chatbots.

To avoid such a bias, clear guidelines are lacking and many questions remain open: e.g.,
- “Should a chatbot have a specific gender?”
- “Is it even possible to avoid gender attributions?”

---

Starting points towards a gender equal design of chatbots

1. Diverse composition of chatbot development teams
2. Leverage tool-support for identifying gender biases in chatbot design
3. Avoid “female-by-default” chatbot designs
4. Promote ethical considerations in organizations