

# Designing Agents Building User Interfaces

**Cole Nelson**

Make a copy of today's ICA and share it with your group members!

# Learning Objectives

1. Be able to understand computers as social actors
2. Be able to thoughtfully design character speech
3. Be able to give artificial agents a sense of personality.

## Pareidolia<sup>°</sup>



The tendency to perceive a specific, often meaningful image in a random or ambiguous visual pattern.

What do you see?

<sup>°</sup>Image from HowStuffWorks

# Computers as Social Actors

## Computers as Social Actors (CASA)<sup>1</sup>

**Definition:** A paradigm that states that humans *mindlessly* apply the same social heuristics used for human interactions to computers and treat them as social agents.

**Mindlessness** is an inactive state of mind that is characterized by reliance on distinctions drawn in the past.

<sup>1</sup> Nass & Moon, 2000, Machines and Mindlessness: Social Responses to Computers

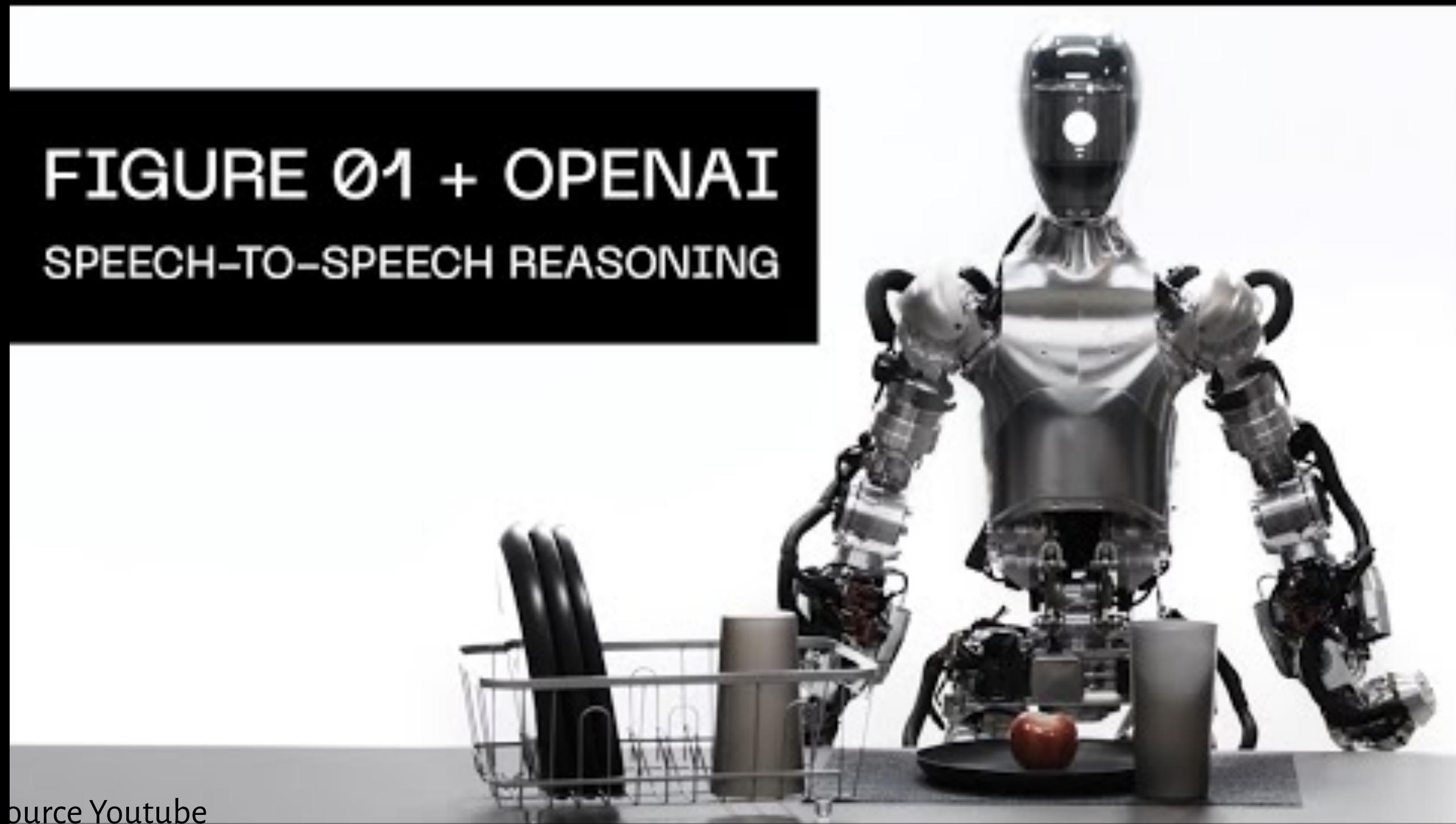
**60**  
MINUTES  
AUSTRALIA

**WORLD'S  
SMARTEST  
AI ROBOT**

ource Youtube



# FIGURE 01 + OPENAI SPEECH-TO-SPEECH REASONING



source Youtube

# ICA J: Designing Agents

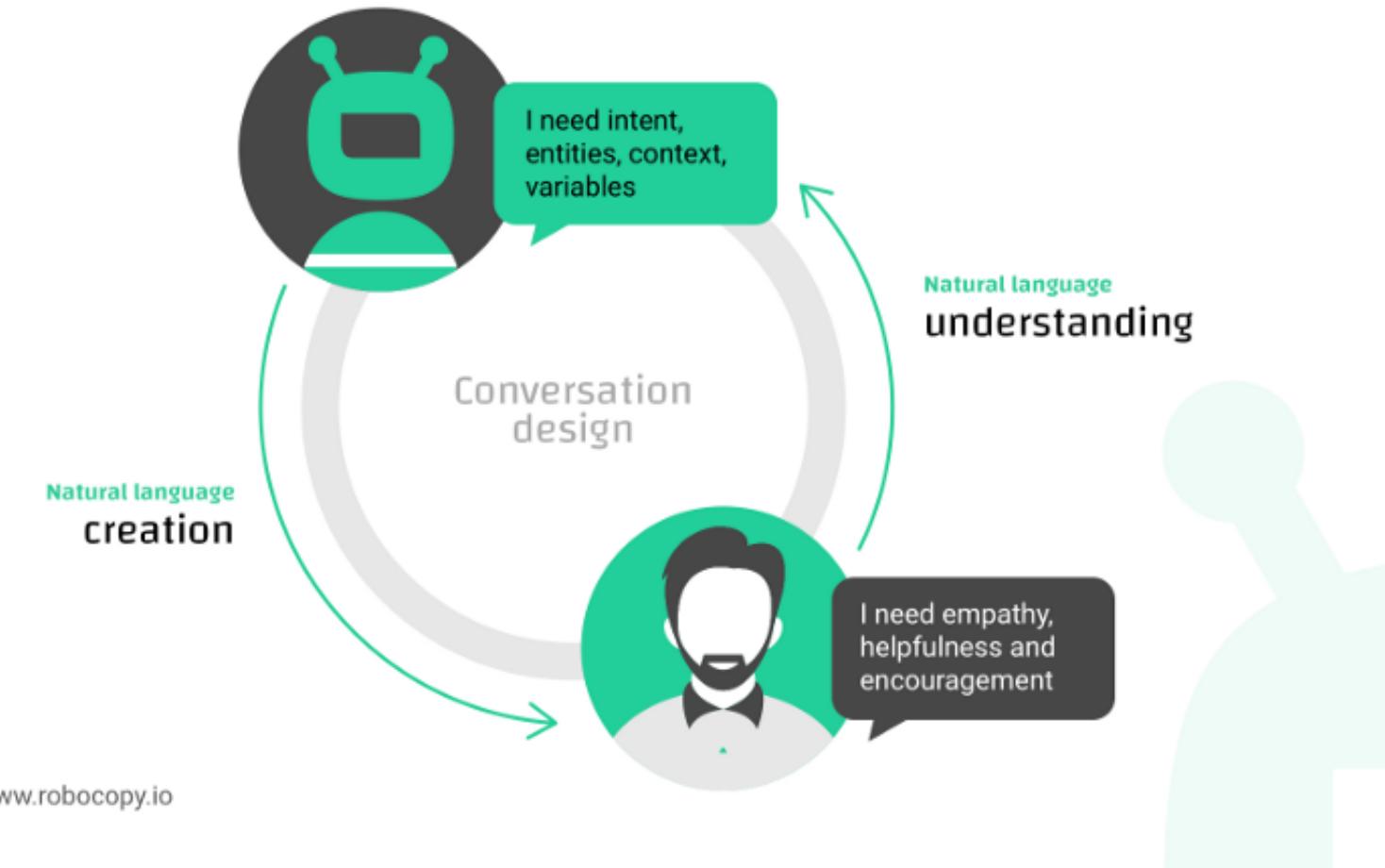
What are your initial impressions?

# Conversational Design

We can often get caught up in the **technical implementation**, but what about the **pyschology** of the interaction?

The natural language **generation** is just as important as the natural language **understanding**!

Image Source



# CASA extends to many social-psychological concepts.<sup>1</sup>

| <b>Concept</b>   | <b>Evidence</b>   |
|------------------|---|
| Gender           | People mindlessly gender-stereotype computers.                          |
| Ethnicity        | People favor computers with similar ethnicity cues.                     |
| Group membership | People are more collaborative with computers that are in their team.    |
| Politeness       | People show politeness toward computers that socially engage with them. |
| Reciprocity      | People help a computer that was helpful to them.                        |
| Personality      | People are attracted to computers with similar personality.             |

<sup>1</sup> Nass & Moon, 2000, Machines and Mindlessness: Social Responses to Computers

## Similarity-Attraction Theory<sup>2</sup>

**Definition:** A social-psychological theory that posits that people like and are attracted to agents that are similar, rather than dissimilar, to themselves.

*Likeness begets liking*

<sup>2</sup> Byrne et al, 1967, Attraction and similarity of personality characteristics.

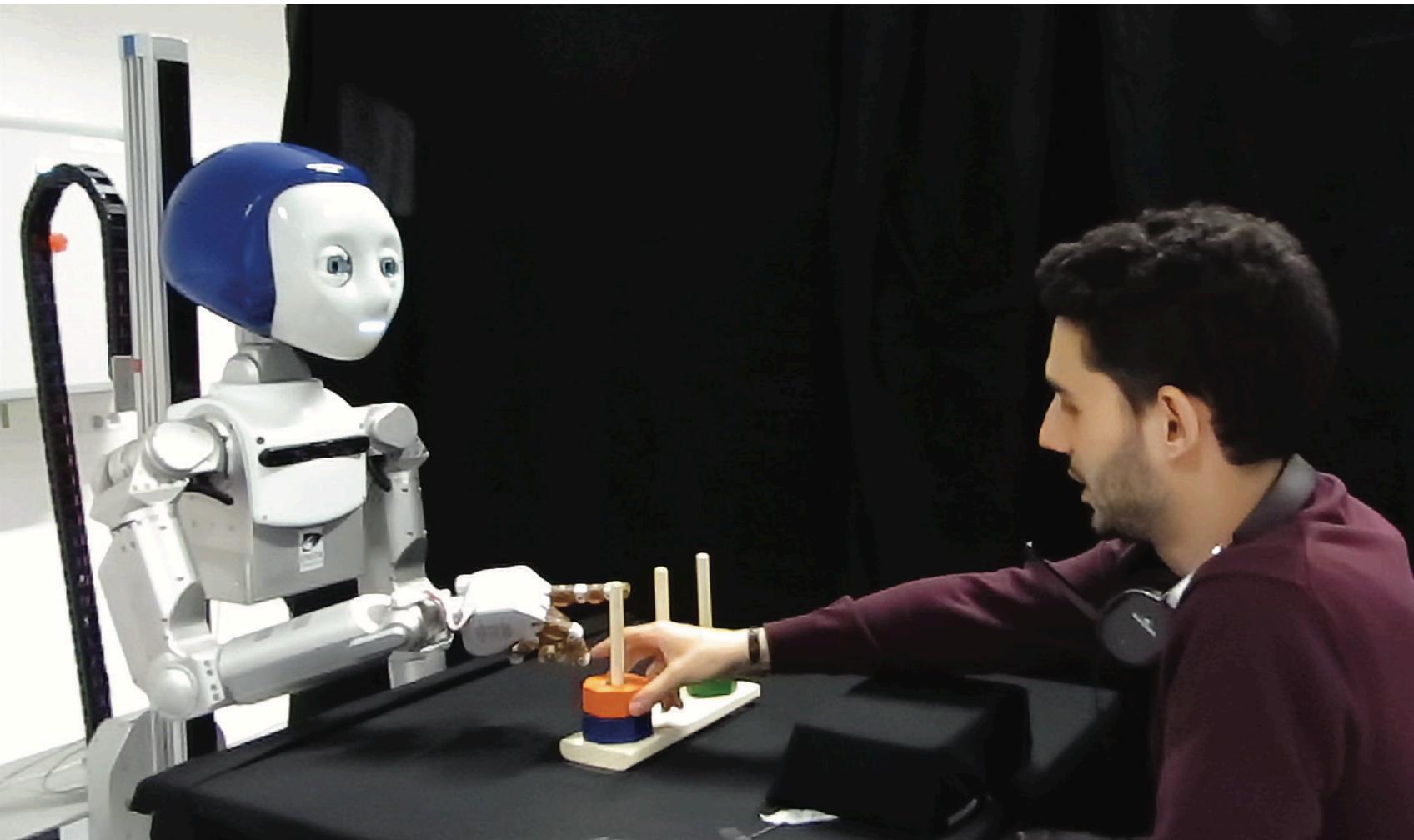
## Similarity-Attraction in Character Design

- Matching the user in explicit characteristics
  - **Visible:** age, gender, clothing
  - **Behavioral:** language, accent
- Matching the user in implicit characteristics
  - **Personality:** extroversion, agreeableness
  - **Interaction style:** formal, informal
- Matching user preferences

## Example of Similarity-Attraction<sup>3</sup>

A robot coach matched the personality of its user purely by increasing/decreasing eye contact.

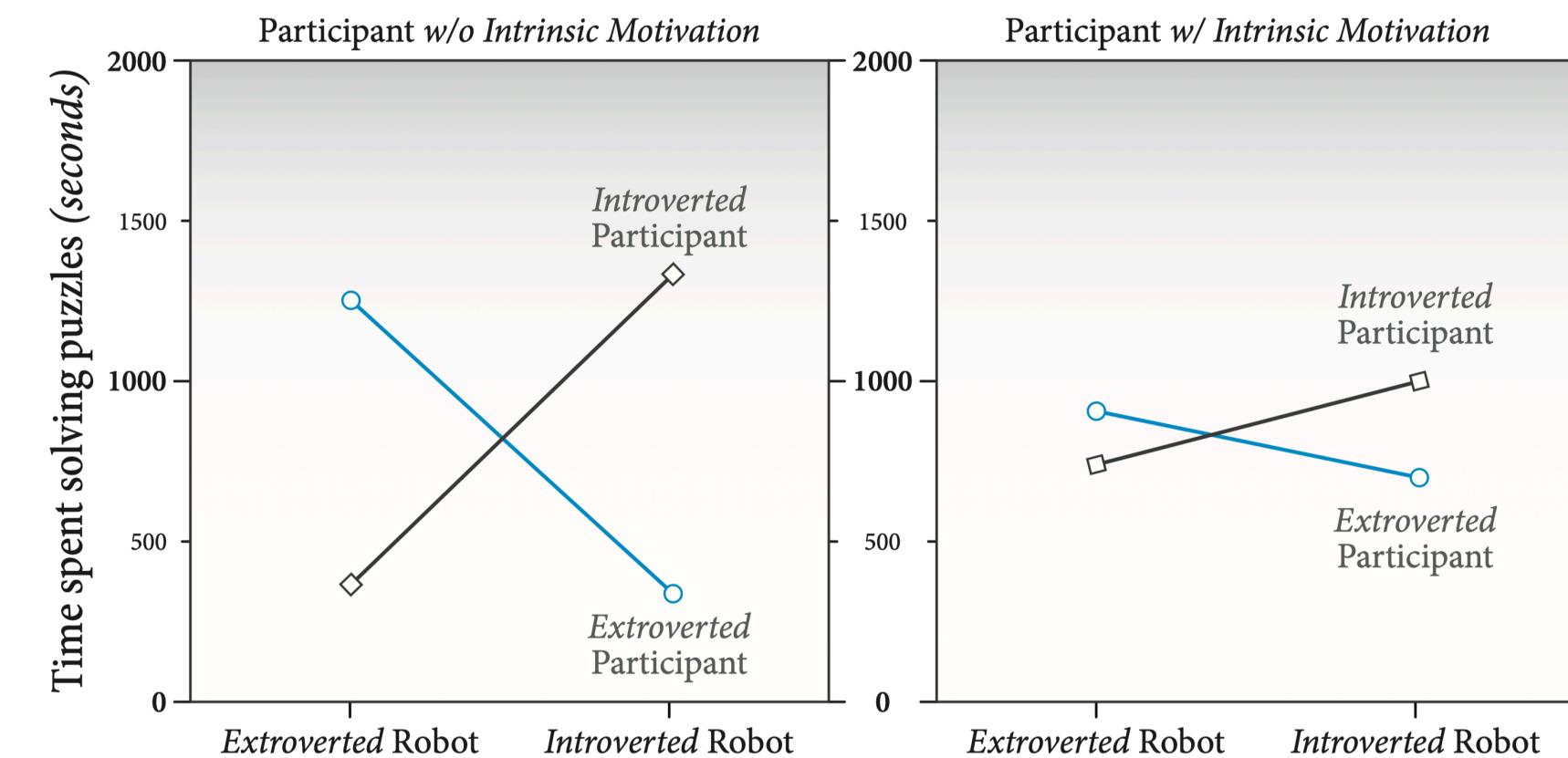
- Extroverts build more eye contact; introverts build less eye contact.



<sup>3</sup> Andrist et al., 2015, Look Like Me...

Results support similarity-attraction theory: people were motivated by a robot with a similar personality.<sup>3</sup>

- Although intrinsic motivation trumps any motivation that an agent can provide.



<sup>3</sup> Andrist et al., 2015, Look Like Me...

## Consistency-Attraction Theory<sup>4</sup>

**Definition:** People prefer to interact with agents that behave consistently, rather than inconsistently. Consistency reduces cognitive load, makes it easier to predict what will happen next.

**Internal consistency:** The behaviors, appearance, function, and so on are consistent with each other.

**External consistency:** The design is consistent with the expectations and preferences of the user.

<sup>4</sup> Nass & Lee, 2001, Does computer-synthesized speech manifest personality?

## Consistency-Attraction Example<sup>5</sup>

To create *believable* characters:

- following a dramatic structure with rich backstory and evolving story line
- utilizing verbal and nonverbal social behaviors
- expressing culture



<sup>5</sup>Simmons, 2011, Believable robot characters

# Designing Character Speech

## Politeness Theory<sup>6</sup>

**Definition:** *Politeness theory* posits that individuals utilize communication strategies that express concern for others and minimize threats to self-esteem.

<sup>6</sup> Brown & Levinson, 1987, Politeness: Some universals in language usage.

**Positive face** is the need for self-image to be accepted, appreciated, and approved of by others.

**Negative face** is the need to be independent, to have freedom of action, and not to be imposed on by others.

**Positive politeness:** avoiding offense through friendliness.

**Negative politeness:** avoiding offense through deference.

**Face saving:** showing deference, prioritizing the other's time or concerns, and including an apology for imposition, when oriented toward negative face; and showing solidarity and sharing of goals, when oriented toward positive face.

**Face threatening:** opposing to the wants/desires of the other.

# Strategies for *Positive Politeness*<sup>6</sup>

<sup>6</sup> Brown & Levinson, 1987, Politeness: Some universals in language usage.

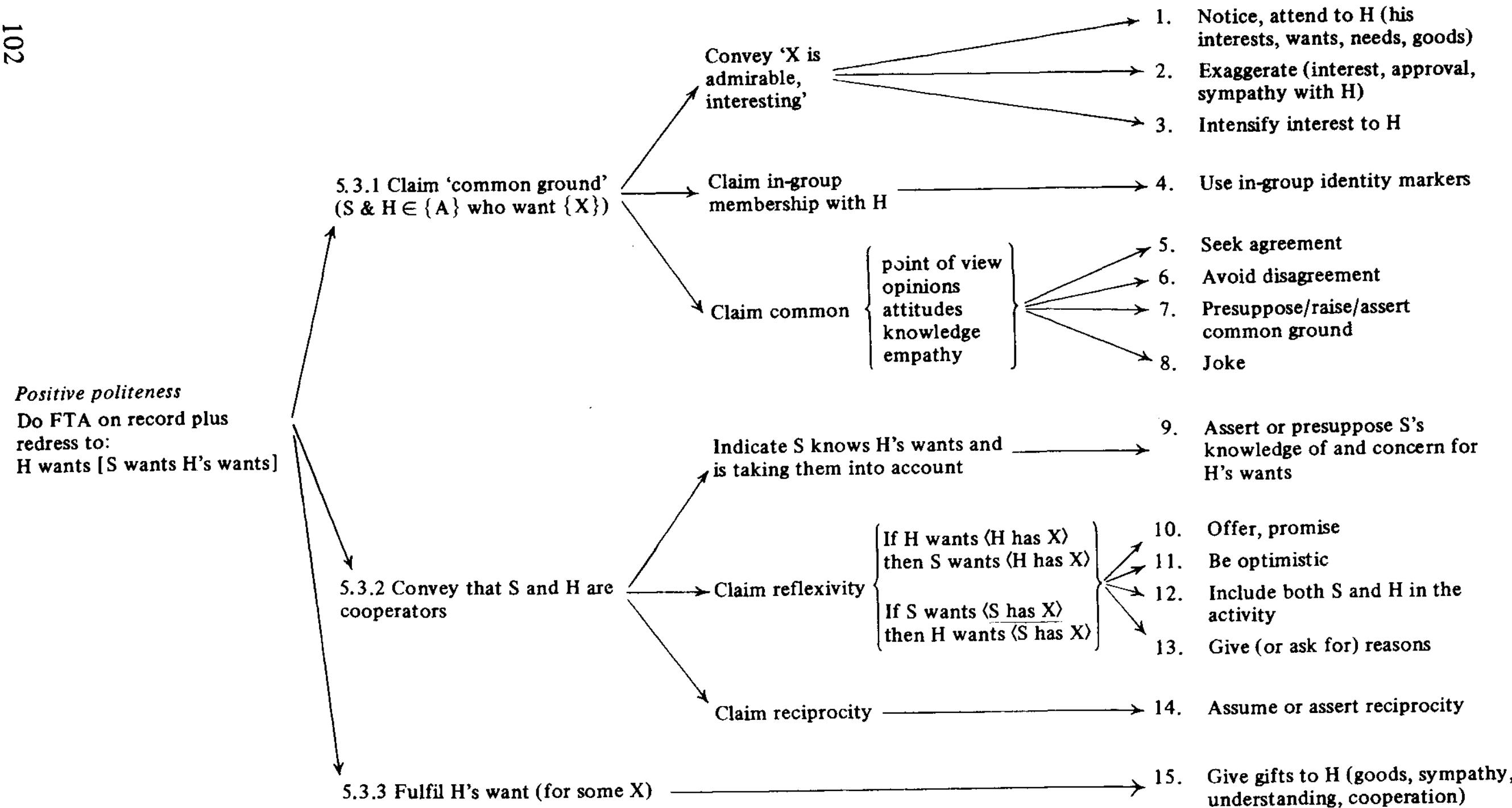
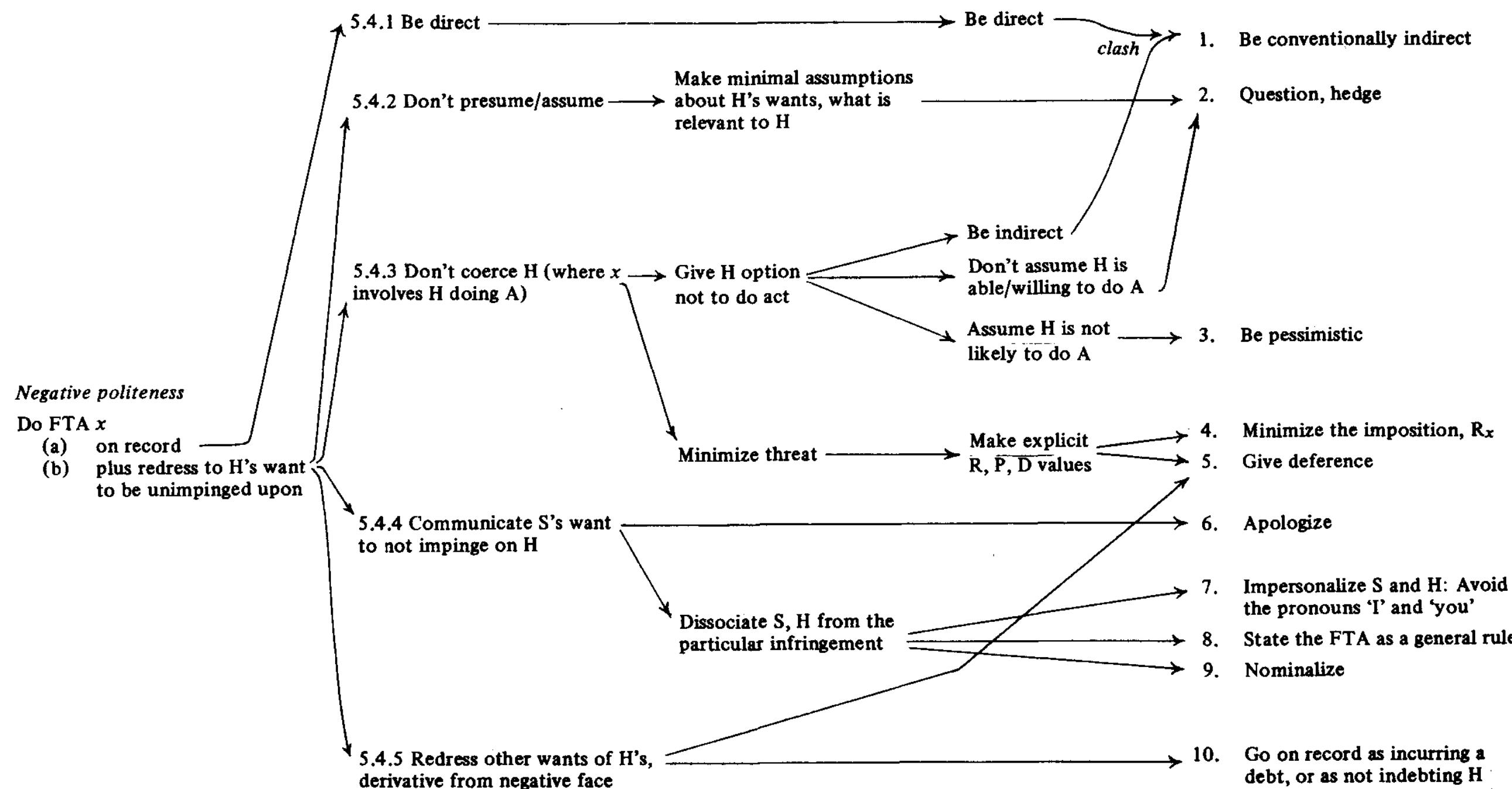


Fig. 3. Chart of strategies: Positive politeness

# Strategies for *Negative Politeness*<sup>6</sup>

<sup>6</sup> Brown & Levinson, 1987, Politeness: Some universals in language usage.



## Hedging<sup>6</sup>

---

Less hedging

---

## Example

---

Lend me your car.

---

May I borrow your car please?

---

I'd like to borrow your car, if you wouldn't mind.

---

Would you have any objections to my borrowing  
your car for a while?

---

Could you possibly by any chance lend me your car  
for just a few minutes?

---

More hedging

---

There wouldn't I suppose be any chance of your  
being able to lend me your car for just a few  
minutes, would there?

<sup>6</sup> Brown & Levinson, 1987, Politeness: Some universals in language usage.

# Which Strategies Are Most Effective?<sup>7</sup>

Danescu-Niculescu-Mizil and colleagues modeled the relationship between speech strategies and politeness.

| Strategy                 | Politeness | In top quartile | Example   |
|--------------------------|------------|-----------------|---|
| 1. Gratitude             | 0.87***    | 78%***          | I really <b>appreciate</b> that you've done them. |
| 2. Deference             | 0.78***    | 70%***          | Nice <b>work</b> so far on your rewrite.          |
| 3. Greeting              | 0.43***    | 45%***          | Hey, I just tried to ...                          |
| 4. Positive lexicon      | 0.12***    | 32%***          | Wow! / This is a <b>great</b> way to deal...      |
| 5. Negative lexicon      | -0.13***   | 22%**           | If you're going to <b>accuse</b> me ...           |
| 6. Apologizing           | 0.36***    | 53%***          | Sorry to bother you ...                           |
| 7. Please                | 0.49***    | 57%***          | Could you <b>please</b> say more...               |
| 8. Please start          | -0.30*     | 22%             | <b>Please</b> do not remove warnings ...          |
| 9. Indirect (btw)        | 0.63***    | 58%**           | By the <b>way</b> , where did you find ...        |
| 10. Direct question      | -0.27***   | 15%***          | What is your native language?                     |
| 11. Direct start         | -0.43***   | 9%***           | So can you retrieve it or not?                    |
| 12. Counterfactual modal | 0.47***    | 52%***          | Could/Would you ...                               |
| 13. Indicative modal     | 0.09       | 27%             | Can/Will you ...                                  |
| 14. 1st person start     | 0.12***    | 29%**           | I have just put the article ...                   |
| 15. 1st person pl.       | 0.08*      | 27%             | Could we find a less complex name ...             |
| 16. 1st person           | 0.08***    | 28%***          | It is my view that ...                            |
| 17. 2nd person           | 0.05***    | 30%***          | But what's the good source you have in mind?      |
| 18. 2nd person start     | -0.30***   | 17%**           | You've reverted yourself ...                      |
| 19. Hedges               | 0.14***    | 28%             | I suggest we start with ...                       |
| 20. Factuality           | -0.38***   | 13%***          | In fact you did link, ...                         |

<sup>7</sup> Danescu-Niculescu-Mizil et al., 2013, A computational approach to politeness with application to social factors

## Guidelines for Character Design<sup>7</sup>

Most effective *politeness* strategies (do these):

| Strategy             | Examples   |
|----------------------|--|
| Gratitude            | I really <b>appreciate</b> that you've done them |
| Deference            | <b>Nice work</b> so far on your rewrite.         |
| Indirect (btw)       | <b>By the way</b> , where did you find...        |
| Please (not start)   | Could you <b>please</b> say more...              |
| Apologizing          | <b>Sorry</b> to bother you...                    |
| Counterfactual modal | <b>Could/Would</b> you...                        |
| Greeting             | <b>Hey</b> , I just tried to ...                 |

<sup>7</sup> Danescu-Niculescu-Mizil et al., 2013, A computational approach to politeness with application to social factors

# Most effective *rudeness* strategies (don't do these):<sup>7</sup>

| Strategy         | Examples                                |
|------------------|---|
| Direct start     | <b>So</b> can you retrieve it or not?   |
| Factuality       | <b>In fact</b> you did link...          |
| 2nd person start | <b>You've</b> reverted yourself...      |
| Please start     | <b>Please</b> do not remove warnings... |
| Direct question  | <b>What</b> is your native language?    |
| Negative lexicon | If you're going to <b>accuse</b> me...  |

<sup>7</sup> Danescu-Niculescu-Mizil et al., 2013, A computational approach to politeness with application to social factors

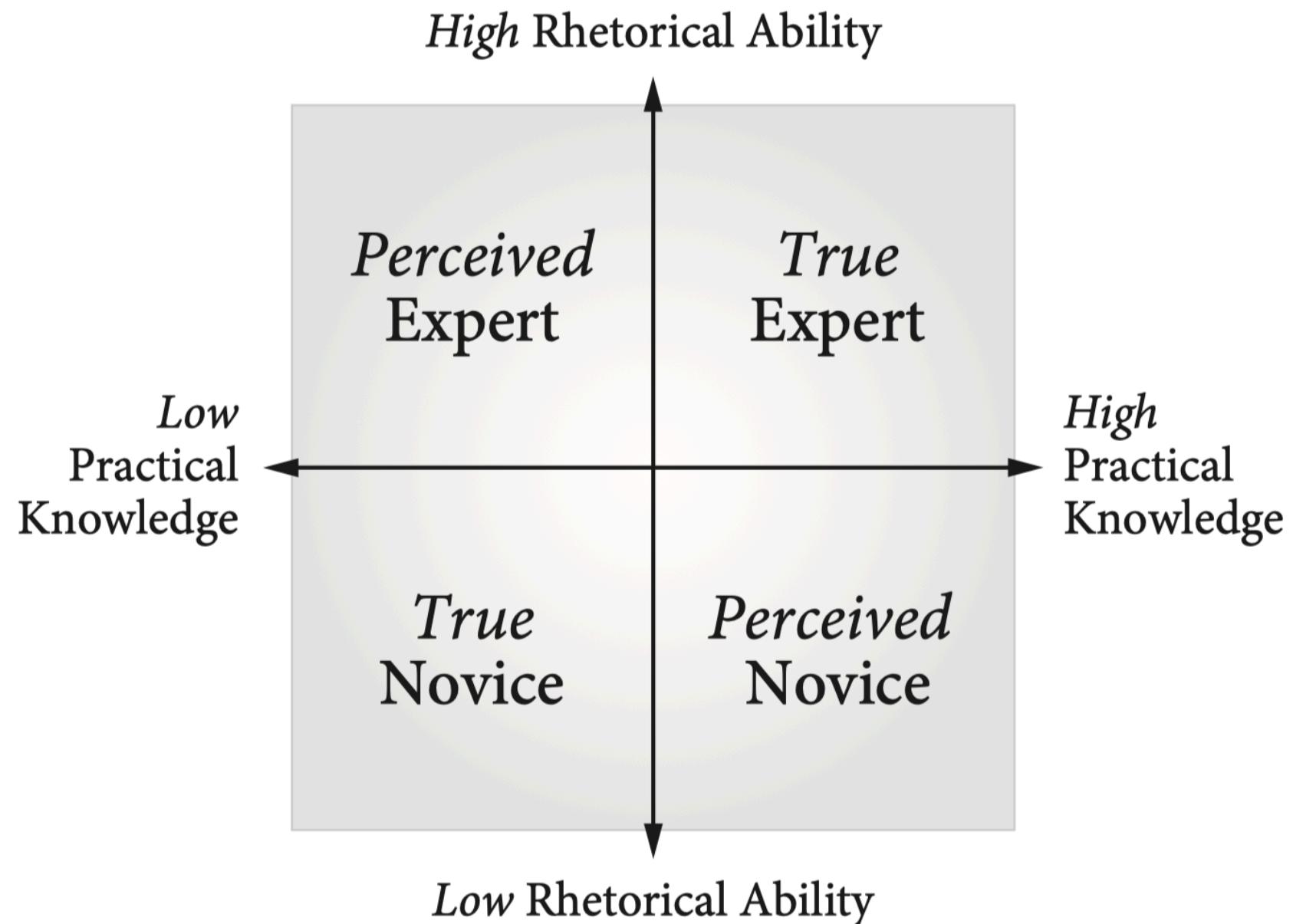
## Expressing Expertise<sup>8</sup>

**Definition:** Convincing users that the agent is an expert on its subject matter.

Expertise has two dimensions:

**Rhetorical ability:** speaking prowess.

**Practical knowledge:** prior knowledge and experience on the topic.



<sup>8</sup> Andrist et al., 2013, Rhetorical robots

## Expertise Cues<sup>8</sup>

---

### Goodwill

*Wanting the best for the listener.*

### Examples

---

**Expert:** “This cafe is a great place to go for lunch to get out of the hot sun.”

**Novice:** “This cafe is a great place to go for lunch.”

---

### Prior expertise

*References to past helping experience.*

**Expert:** “I send a lot of visitors to this museum each year.”

**Novice:** “A lot of visitors go to this museum each year.”

---

### Organization

*More natural organization of information.*

**Expert:** “At 1000 years old, the castle is the the oldest landmark in the city. It has Gothic architecture.”

**Novice:** “The castle is 1000 years old. It has Gothic architecture. It's the oldest landmark in the city.”

---

### Metaphors

*Making descriptions more accessible.*

**Expert:** “Stepping onto the sunny beach is like wrapping yourself in a towel from the dryer.”

**Novice:** “The sunny beach is quite hot.”

---

### Fluency

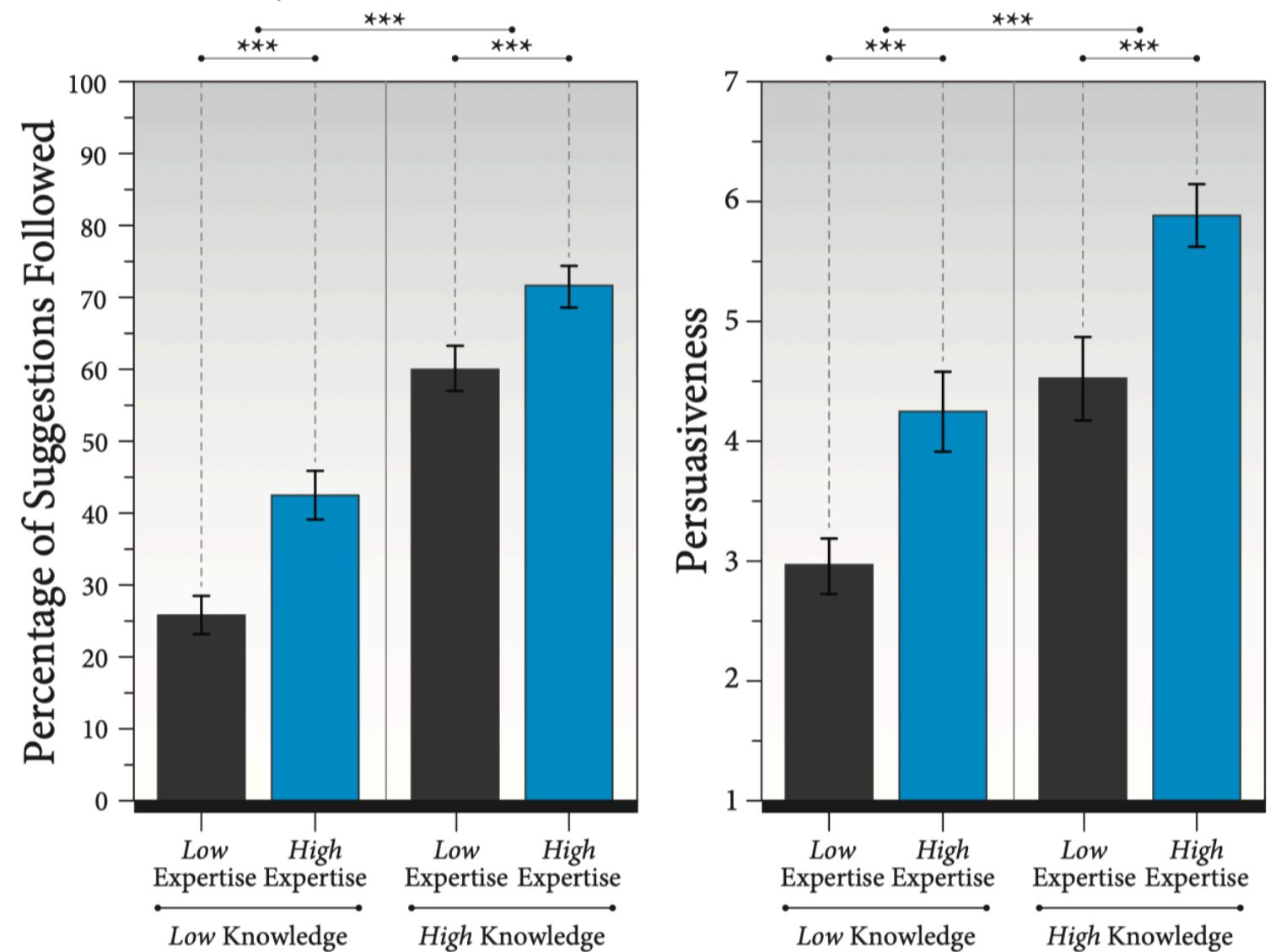
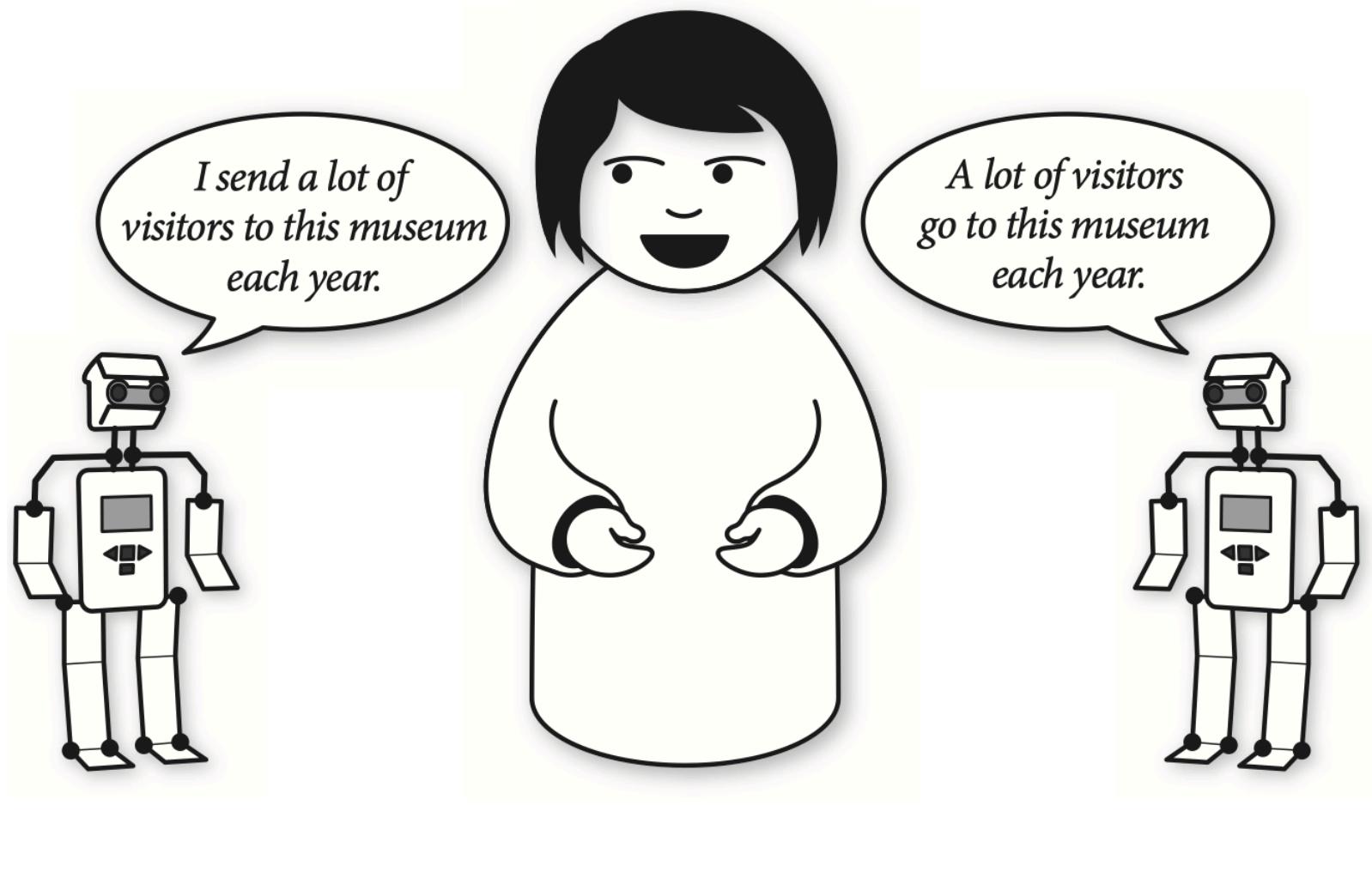
*Reduced pauses and confidence in speech.*

**Expert:** “The statue is 200 years old. [A 300 ms. pause] It was built to honor the King.”

**Novice:** “The statue is 200 years old. [A 1200 ms. pause] It was built to honor the King.”

---

<sup>8</sup> Andrist et al., 2013, Rhetorical robots



# ICA J: Designing Agents

Have a conversation with an agent!

# Personality in Artificial Agents

## What is personality?

**Definition:** *Personality* refers to individual differences in characteristic patterns of thinking, feeling, and behaving.<sup>9</sup>

There are two prevailing models of personality:

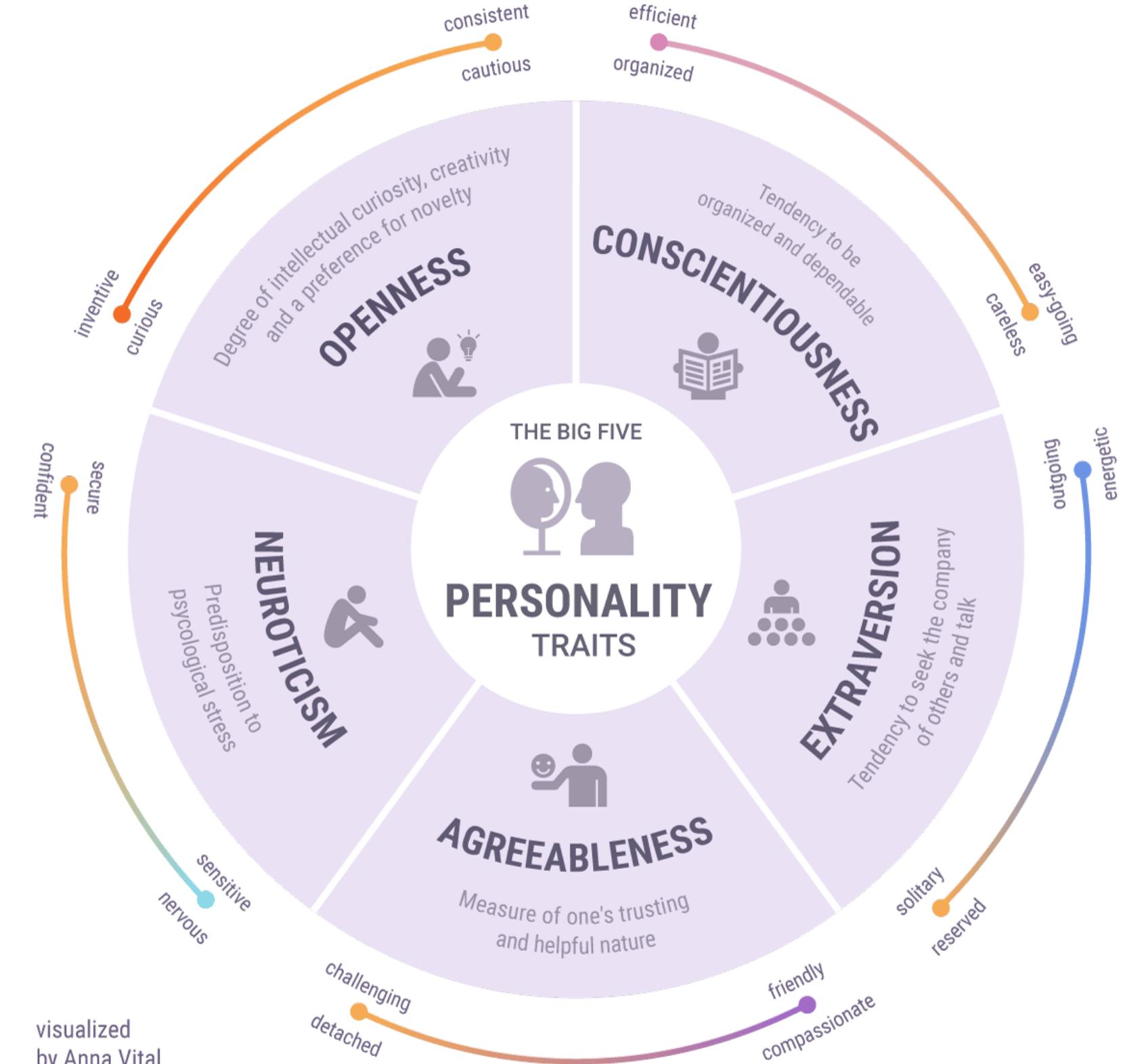
1. Personality traits
2. Personality types

<sup>9</sup> APA

# Personality Traits<sup>10 11</sup>

The most commonly accepted set of traits are the Big Five:

1. Openness
2. Conscientiousness
3. Extraversion
4. Agreeableness
5. Neuroticism



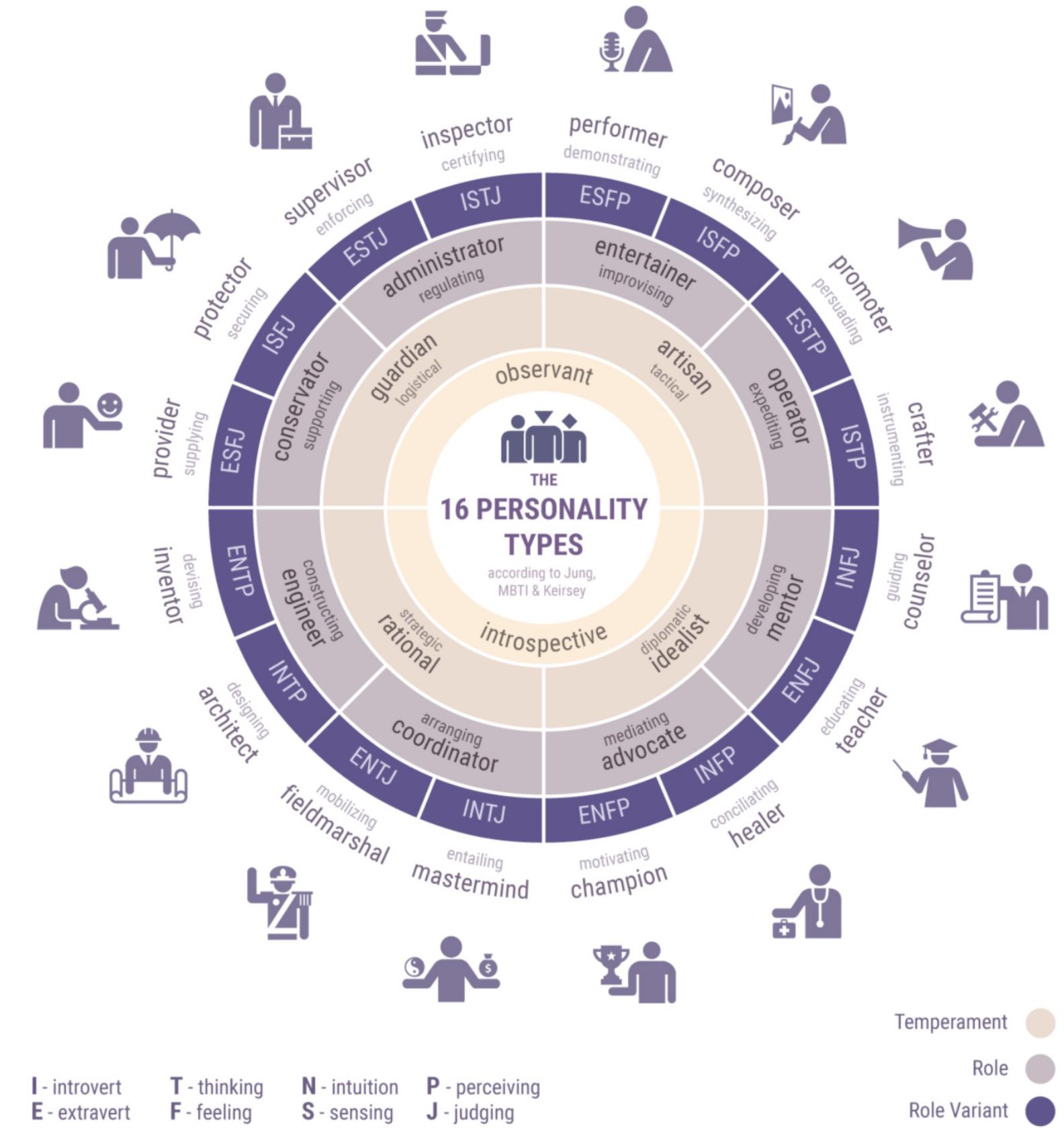
<sup>10</sup> [Image source](#)

<sup>11</sup> [Live Science](#)

# Personality Types<sup>12</sup>

The Myers-Briggs theory, the most commonly accepted set of personality types, posits that there are 16 distinct personalities that vary across four dimensions:

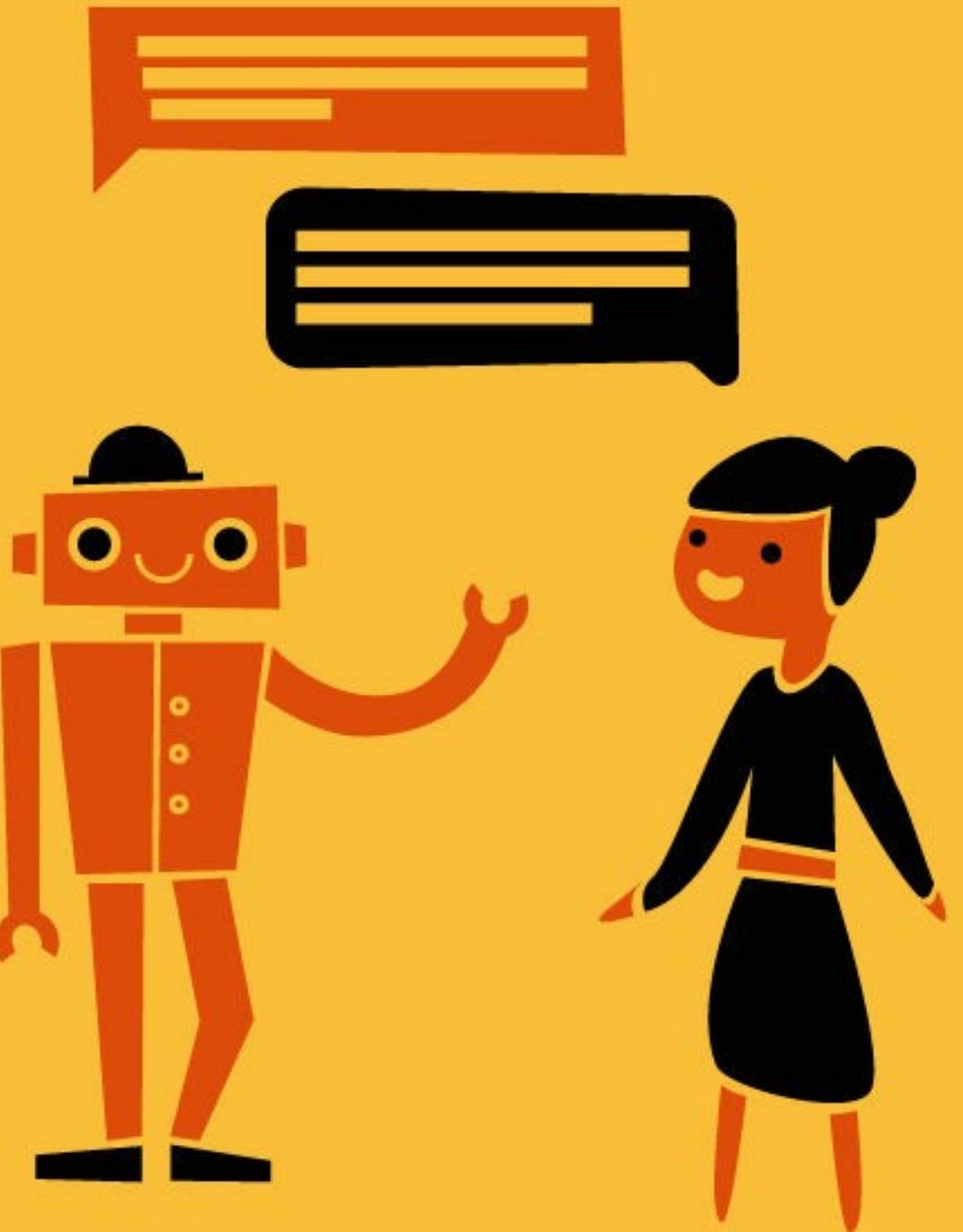
1. Extraversion and introversion
2. Sensing and intuition
3. Thinking and feeling
4. Judgment and perception



<sup>12</sup> [Image source](#)

## Personality Design Strategies<sup>13</sup>

- Personality matching
- Personality expression
- Persona development



<sup>13</sup> Image source

## Personality Matching

There are two methods for matching the personality of the agent with the personality of the user:

1. The agent and the user have the *same* personality

***Similarity-attraction theory would suggest that users will favor agents that have the same personality.***

2. The agent and the user have *complementary* personalities

***E.g., an agent can be designed to express the ISTP (crafter) personality to work with an INTJ (mastermind) user.***

## Personality Expression

- *Language use*, e.g., politeness cues, expert speech
- *Visible cues*, e.g., gaze, gesture, facial expressions, appearance
- *Marketing*, e.g., target audience, branding
- *Specialization*, e.g., domain knowledge, expertise

# Persona Development<sup>14 15</sup>

CF

**Definition:** Personas are fictional characters, which you create based upon your research in order to represent the different user types that might use your service, product, site, or brand in a similar way.

<sup>14</sup> [Image source](#)

<sup>15</sup> [Interaction Design Foundation: Personas](#)

## Janet - The Family Planner



### Janet's Vital Statistics

- Janet is a 38 year old married female living in Berlin, Germany.
- Janet is the mother of 4 children, aged 1 to 10.
- Janet lives a busy life, and is often on the go.

*"I'm so busy with everything, but I really feel like I should take the kids on a family trip to give them some great memories!"*

### Janet's Goals and Needs

- Janet wants to plan a trip full of positive memories for her children.
- She feels like she can plan the logistics, but that she needs help with figuring out what family activities to do once she reaches her destination.
- She needs something easy to use, she doesn't feel like she has time to work with complex apps.

### Janet's Motivations

- Her main motivation is to create memories for her family.
- To get ideas for family activities while on an upcoming family vacation.
- To find activities that will keep her children busy and happy.

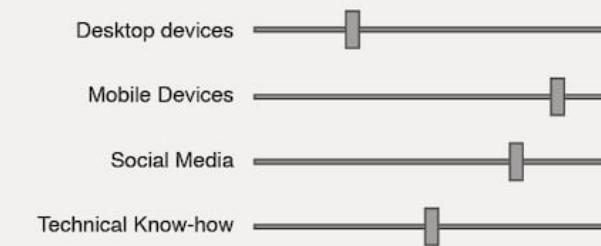
### Janet's Frustrations

- Janet always feels like she has very little time to spend on planning.
- Janet is rarely home and needs a solution that will allow her to easily work while on the go.
- She doesn't want to spend time looking up guides when she gets to her destination, they should be easily available when she needs them.

### Janet's Everyday Activities

- Get the kids out of bed and get them ready for school in the morning.
- Run errands with the non school-aged kids, shopping, lessons, and pre-school.
- Scheduling playdates and meetings with other parents and friends.
- Changing diapers, cleaning, making lunch, and tons of other small tasks!

### Janet's Device and Internet Usage



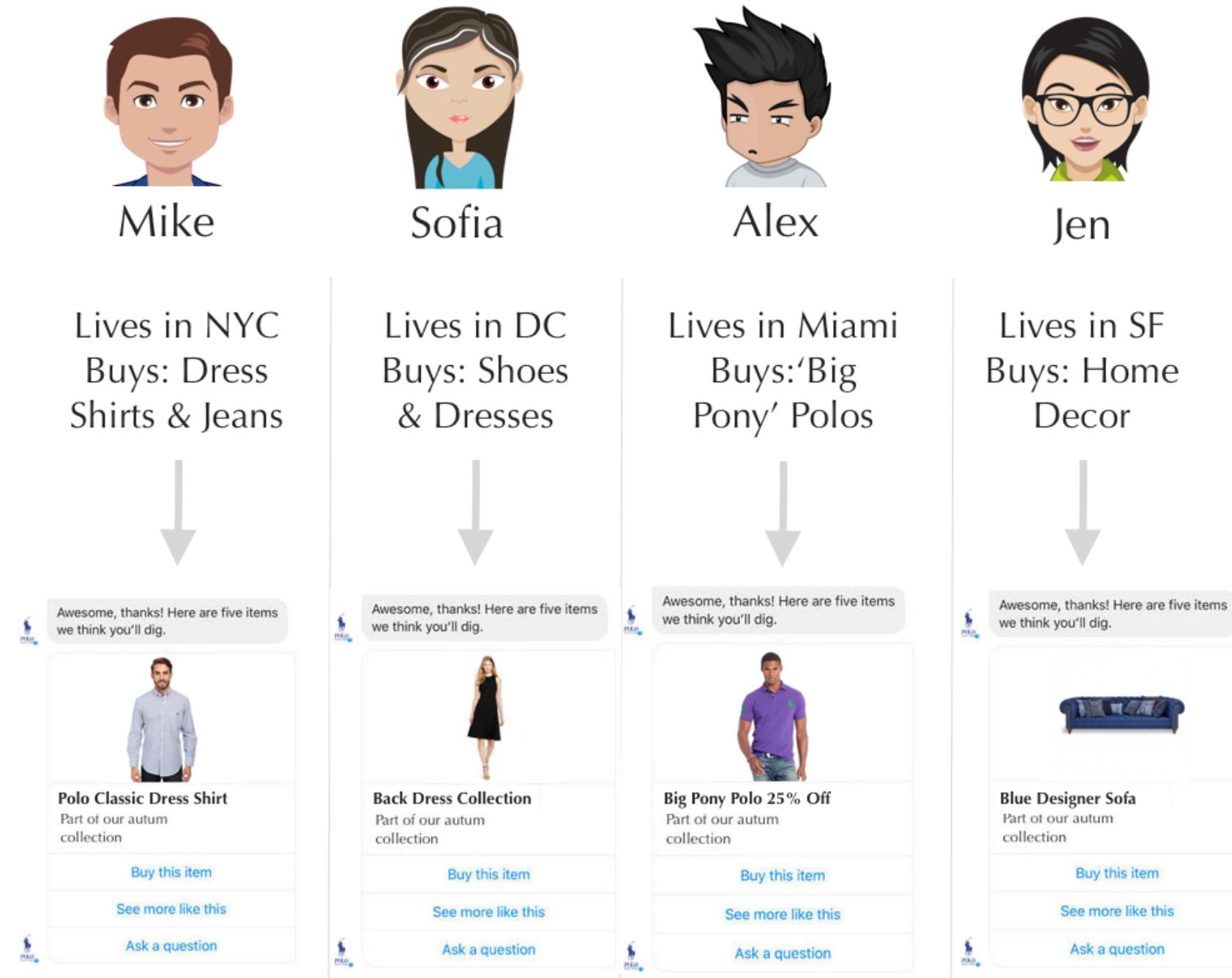
### Janet's Notable Quotes

- "I would really love to take a vacation from all of this, especially one where I can spend a little along time with my husband!"*
- "I've tried things like TripAdvisor, but it doesn't have enough information about activities we can take part in at our destination."*
- "It would be great to have something I can just keep on me for the whole trip and refer to whenever I want."*

Agents and characters can be matched with users at the persona level (as opposed to low-level characteristics or personality).<sup>16</sup>

**Right:** example use of persona in chatbot behavior

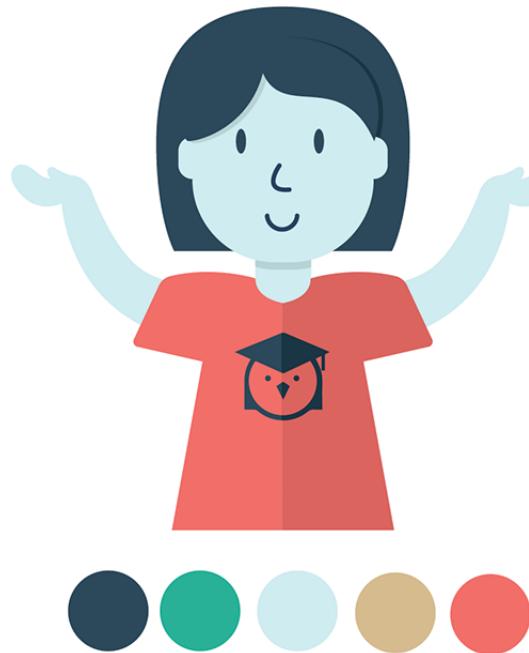
## Personalized Bot Flows



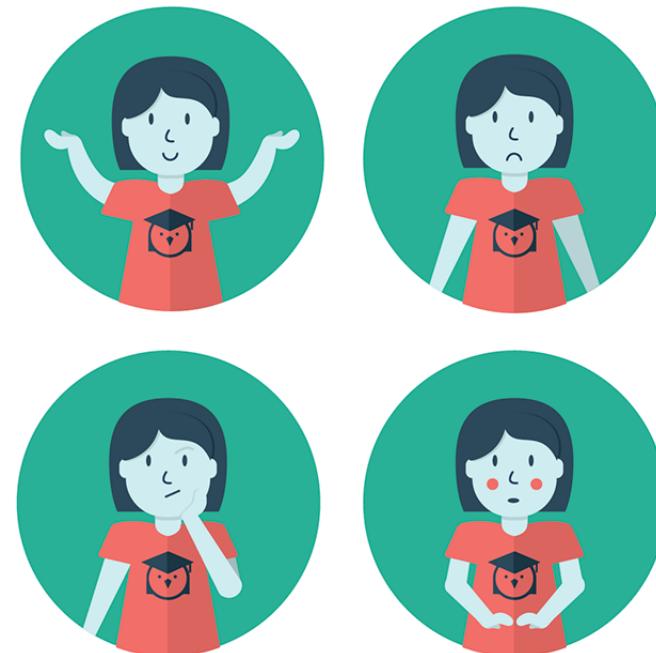
<sup>16</sup> [Image source](#)

## Linn | Linux Character Bot Illustration

Linn Main Illustration & Color Palette:

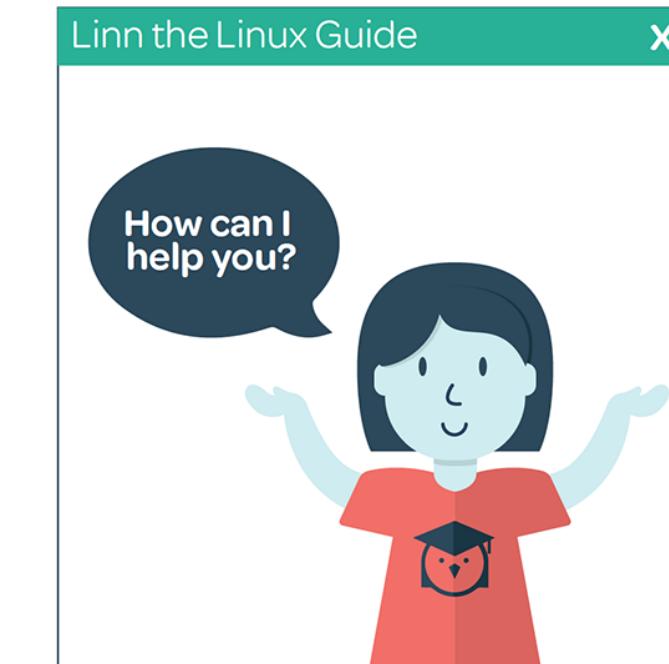


Linn Expressions:

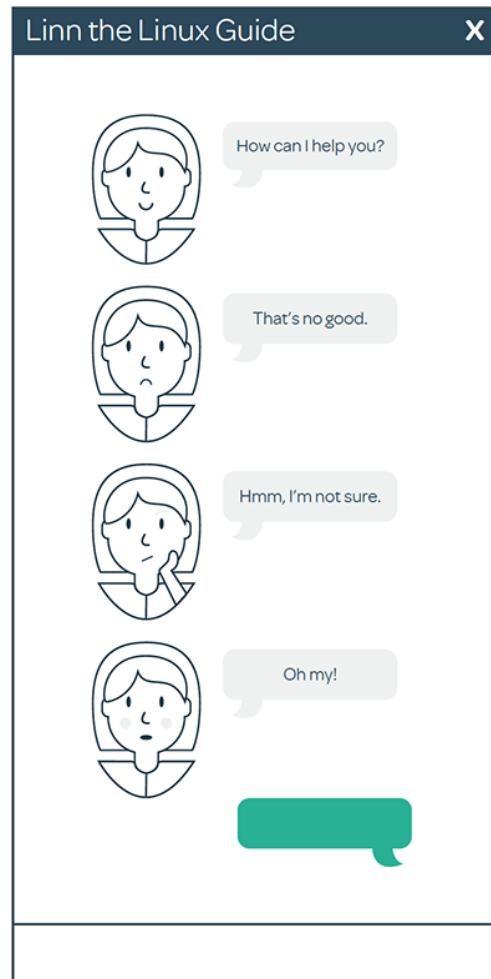


## Linn | Chat Examples

Linn Detailed Chat Examples:



2



4

<sup>17</sup> Images source

# ICA J: Designing Agents

Design Bucki, your HW12 agent!

# Questions?