

# Smart Home Ambient Intelligence: voice assistants

a new limit for our freedom

Stefano Brandoli

Politecnico di Milano  
Computer Ethics 2017/2018

December 12, 2017

# Presentation Outline

## **Smart Home Ambient Intelligence: voice assistants a new limit for our freedom**

### ① Introduction

- Technological Mediation
- Definitions

### ② Case Study: Google Home - Google Assistant Actions

- Applied concepts of Technological Mediation limiting our freedom
- Ethical concerns arising from loss of freedom

### ③ Possible Remedies

# Introduction

# Technological Mediation

*While fulfilling their function, technologies do much more: they **give shape to what we do** and how we experience the world. And in doing so they **contribute actively** to the ways we live our lives (Verbeek 2011, 12)*

- ▶ Technologies are not **neutral intermediaries**
- ▶ Technologies play an **actively mediating role**
- ▶ Artifacts are **bearers of morality** (Latour 1992)
- ▶ Morality is a matter of **human-technology associations** (Verbeek 2011)
- ▶ Two perspectives of **technological mediation**:
  - ▶ Perception
  - ▶ **Action**: I will consider **human freedom**

# Definitions I

## Ambient Intelligence

***Ambient Intelligence** is an approach that combines two major technologies: **Ubiquitous Computing** and **Intelligent User Interfaces (IUIs)** (Brey 2005, 158)*

## Intelligent User Interface (IUI)

*Interfaces that allow combining mixed and **possibly ambiguous or imprecise input** (Brey 2005)*

## Voice Assistant

*A **voice assistant** is a digital assistant that uses **voice recognition, natural language processing** and speech synthesis to provide aid to users through phones and voice recognition applications (WhatIs 2017)*

# Definitions II

## Freedom

Two forms (Brey 2005, 2006):

- ▶ Negative Freedom:
  - ▶ act without obstruction or interference by others
  - ▶ absence of limits and **external constraints**

example: artifact refusing to perform an action

- ▶ **Positive Freedom (Human Autonomy):**
  - ▶ mastery over your own life
  - ▶ **think freely, make your own decisions** to act

**I will consider freedom as human autonomy**

# Case Study: Google Home - Google Assistant Actions



# Case Study: Google Home - Google Assistant Actions

## Examples

- ▶ Order a pizza
- ▶ Control devices in your home
- ▶ Many others ...

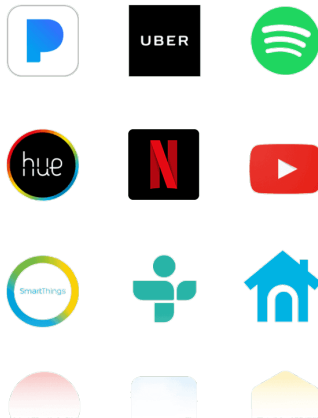
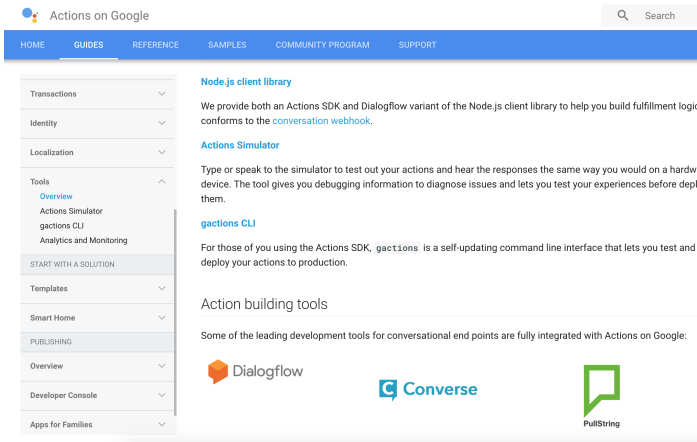


Figure: Google Assistant Actions



# Google Assistant Actions



Actions on Google

HOME GUIDES REFERENCE SAMPLES COMMUNITY PROGRAM SUPPORT

Transactions ▾

Identity ▾

Localization ▾

Tools ▴  
Overview  
Actions Simulator  
gactions CLI  
Analytics and Monitoring

START WITH A SOLUTION

Templates ▾

Smart Home ▾

PUBLISHING

Overview ▾

Developer Console ▾

Apps for Families ▾

### Node.js client library

We provide both an Actions SDK and Dialogflow variant of the Node.js client library to help you build fulfillment logic conforms to the [conversation webhook](#).

### Actions Simulator


Type or speak to the simulator to test out your actions and hear the responses the same way you would on a hardware device. The tool gives you debugging information to diagnose issues and lets you test your experiences before deploying them.


### gactions CLI


For those of you using the Actions SDK, `gactions` is a self-updating command line interface that lets you test and deploy your actions to production.

### Action building tools

Some of the leading development tools for conversational end points are fully integrated with Actions on Google:

 Dialogflow

 Converse

 PullString

Starting from the **Actions on Google documentation** I will show:

1. **Applied concepts** of Technological Mediation **limiting freedom**
2. **Ethical concerns** arising from **loss of freedom**

Applied concepts of Technological Mediation  
limiting our freedom

# Script: make your own decisions

## Script

*A **script** is a **prescription of how to act** when using the artifact (Verbeek 2011)*

Assistant Actions can be built (Google 2017):

### 1. With templates

- ▶ build apps **without writing a single line of code**
- ▶ build apps quickly **without worrying about designing conversations**
- ▶ **Google decides** which interactions are good or not

### 2. Without templates

- ▶ **Dialogflow**
  - ▶ machine learning
  - ▶ natural language understanding
  - ▶ extract parameters (data) from the user vocal input
- ▶ **developers can decide** the whole conversational interaction

# Script: make your own decisions

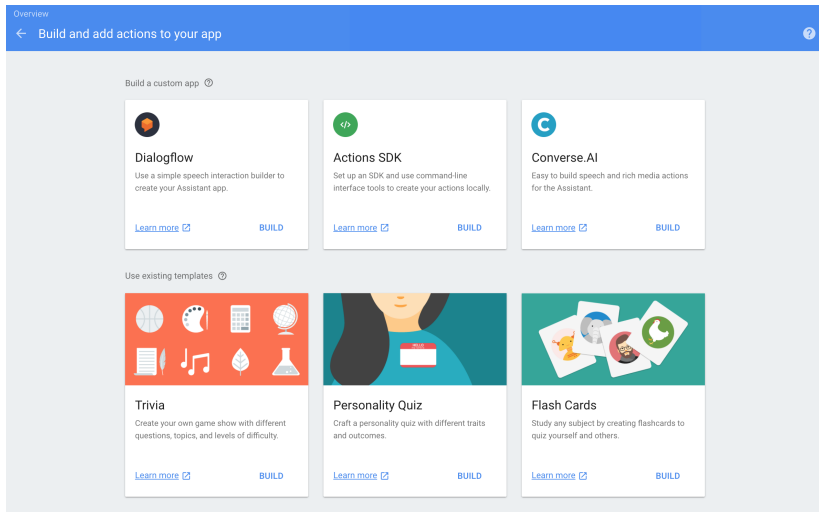


Figure: Actions On Google Console

# Invitation/Inhibition: make your own decisions

## Invitation/Inhibition

*The scripts of artifacts **suggest specific actions** and **discourage others** (Verbeek 2011, 21)*

For the **Google Assistant Actions**:

- ▶ Developers while creating the application logic **enable some interactions** and **disable some others**
- ▶ The **conversational interaction doesn't go on** if the user hasn't answered with **all the required parameters**

# Invitation/Inhibition: make your own decisions

● make\_name

SAVE

⋮

---

Contexts ▼

User says Search in user says 🔍 ^

” Add user expression

” the luckiest number i have is 12

” 23

” My lucky number is 23

” My lucky number is 23

PARAMETER NAME	ENTITY	RESOLVED VALUE	
number	@sys.number	23	×

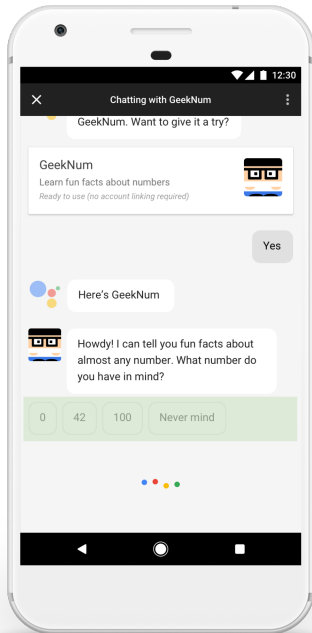
Figure: DialogFlow interactions

# Behaviour Steering: think freely I

## Suggestion Chips

*Use suggestion chips to  
hint at responses to  
continue or pivot the  
conversation  
(Google 2017)*

- ▶ This happens in vocal interactions
- ▶ Can be more easily visualized on mobile phones



## Behaviour Steering: think freely II

*Smart objects could become **intermediaries between businesses and consumers**, using their intelligence to **persuade customers to buy products** ... Such influence could already be **exerted at the design stage** ...*  
(Brey 2005, 163)

### Advertisements

- ▶ Google Assistant **advertised "Beauty and the Beast"** film, but Google claimed it was not an ad (AndroidPolice 2017)
- ▶ In future **Google Assistant will include ads**
  - ▶ make money by **promoting e-commerce from partners** (Recode 2017)
  - ▶ forecasted ad-spend of **19 billions globally by 2022** (Juniper 2017)
  - ▶ what if developers shape mediations based on **ads analytics**?



## Behaviour Steering: think freely III

***Agent-based dialogue systems** can be included in **IUI's** to monitor users and **make assumptions about their intentions and the task they are trying to perform***  
(Brey 2005, 159)

### Implicit Invocation

*The Assistant opts to invoke an app because it can fulfill the user's intent, **without users calling it by name***  
(Google 2017)



# What about Technological Mediation?

The screenshot shows the Google Actions on Google website. At the top, there's a navigation bar with 'HOME', 'GUIDES', 'REFERENCE', 'SAMPLES', 'COMMUNITY PROGRAM', and 'SUPPORT'. Below this is a sidebar menu with categories like 'Tools', 'START WITH A SOLUTION', 'Templates', 'Smart Home', 'PUBLISHING', 'Overview', 'Developer Console', 'Apps for Families', and 'Policies and Terms'. The 'Policies and Terms' section is expanded, showing 'General Policies' (highlighted in blue), 'Branding Policies', 'Privacy Policy Guidance', 'Terms of Service', 'Terms Explanation', and 'Apps for Families Addendum'. The main content area is titled 'Policies for Actions on Google' with a star rating of four stars. It contains two paragraphs of text and a section titled 'Content Restrictions' with a subsection 'Sexually explicit' that lists three types of prohibited content: pornographic, sexual acts/toys, and escort services for compensation.

Actions on Google

HOME GUIDES REFERENCE SAMPLES COMMUNITY PROGRAM SUPPORT

Tools

START WITH A SOLUTION

Templates

Smart Home

PUBLISHING

Overview

Developer Console

Apps for Families

Policies and Terms

- General Policies
- Branding Policies
- Privacy Policy Guidance
- Terms of Service
- Terms Explanation
- Apps for Families Addendum

## Policies for Actions on Google

☆☆☆☆

This policy is designed to provide guidance to developers building on the Actions on Google platform, including Assistant Apps that will be published in the Directory. Some partners may have access to additional APIs and be subject to varying policies.

This policy applies to all aspects of apps and actions, including their content, advertising content (where permitted), behavior, and listing information in the Directory.

### Content Restrictions

#### Sexually explicit

We don't allow actions that facilitate or promote sexual gratification or sexually explicit content. This includes:

- Pornographic, sexually explicit, or erotic content.
- Content that describes sexual acts or sex toys.
- Escort services or other services that may be interpreted as providing sexual acts in exchange for compensation.

**Google Actions Policies** are designed towards: privacy, content, branding . . .

- ▶ following the **Guidance For Conversation Design** is enough?

Ethical concerns arising from loss of freedom

# Fear of Technocracy

- ▶ **Experts** will shape our mediations
  - ▶ **Antidemocratic**
    - ▶ How to make it more democratic?
  - ▶ **Unforeseen mediations**
    - ▶ Not humans but **technologies are in control**  
(Verbeek 2011, 102)
- ▶ **Opposite problem:** people without enough technical background may design **Google Assistant Actions** and publish them
  - ▶ today are very limited mediations
  - ▶ **what about the future?**

# Moral Laziness

- ▶ Immorality or **amorality**
- ▶ People may **delegate all moral decisions to machines** (Verbeek 2011, 134)
- ▶ **Commodification of morality** (Borgmann 1984)
  - ▶ Things that used to **require effort** to acquire have become available with the push of a button
  - ▶ today we don't even need buttons . . .
  - ▶ **voice assistants** are a new step in this process of commodification?

# Moral Responsibility

- ▶ Designing is **"materializing morality"** (Verbeek 2011, 101)
- ▶ To what extent **can designers be held morally responsible for undesirable forms of mediation?**  
(Verbeek 2011)
  - ▶ The responsibility should not be left to designers alone  
(Verbeek 2011)
  - ▶ Google Actions Policies: **developers are the solely responsible for determining the legality** of their Actions
    - ▶ What about their **moral responsibility?**

## Possible Remedies

# Possible Remedies

- ▶ Make the **design process more democratic** (Verbeek 2011)
  - ▶ Anticipate Mediation
  - ▶ Assess Mediation
  - ▶ Design Mediation
- ▶ Teach managers and voice assistants' developers to **think about Technological Mediation and the limits to our freedom**
- ▶ Re-think the **moral responsibility of designers** of voice assistant actions



# References I



AndroidPolice (2017). *Google Assistant promoting "Beauty and the Beast"*. URL:

<http://www.androidpolice.com/2017/03/16/google-assistant-promoting-beauty-and-the-beast/> (visited on 11/12/2017).



Borgmann, Albert (1984). *Technology and the Character of Contemporary Life: A Philosophical Inquiry*. University of Chicago Press.



Brey, Philip (2005). "Freedom and privacy in ambient intelligence". In: *Ethics and Information Technology* 7.3, pp. 157–166.





Brey, Philip (2006). "Ethical aspects of behavior-steering technology". In: *User Behavior and Technology Development*, pp. 357–364.



Google (2017). *Actions On Google Developers Documentation*. URL: <https://developers.google.com/actions/> (visited on 11/12/2017).

## References II

-  Juniper (2017). *Amazon Echo & Google Home To Reside In Over 50% Of US Households By 2022*. URL: <https://www.juniperresearch.com/press/press-releases/amazon-echo-google-home-to-reside> (visited on 11/12/2017).
-  Latour, B. (1992). "Where Are the Missing Masses? The Sociology of a Few Mundane Artifacts". In: *Shaping Technology-Building Society: Studies in Sociotechnical Change*. Ed. by Wiebe Bijker and John Law, pp. 225–258.
-  Recode (2017). *Google Assistant e-commerce revenue*. URL: <https://www.recode.net/2017/5/23/15681596/google-assistant-ecommerce-revenue> (visited on 11/12/2017).
-  Verbeek, Peter-Paul (2011). *Moralizing technology: Understanding and designing the morality of things*. University of Chicago Press.
-  WhatIs (2017). *Definition: voice assistant*. URL: <http://whatis.techtarget.com/definition/voice-assistant> (visited on 11/12/2017).