A new form of learning with social robots and tangible toys

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The problem

- **Learning English is very “painful” for many Asian students**

- **Learning Chinese is very “painful” for many Western students**

The idea

- **Robot for language development**
- **Toys for cognition development**
- **Brain and body should work together to maximize effective learning effect**
- **→ Embodied cognition**

The solution

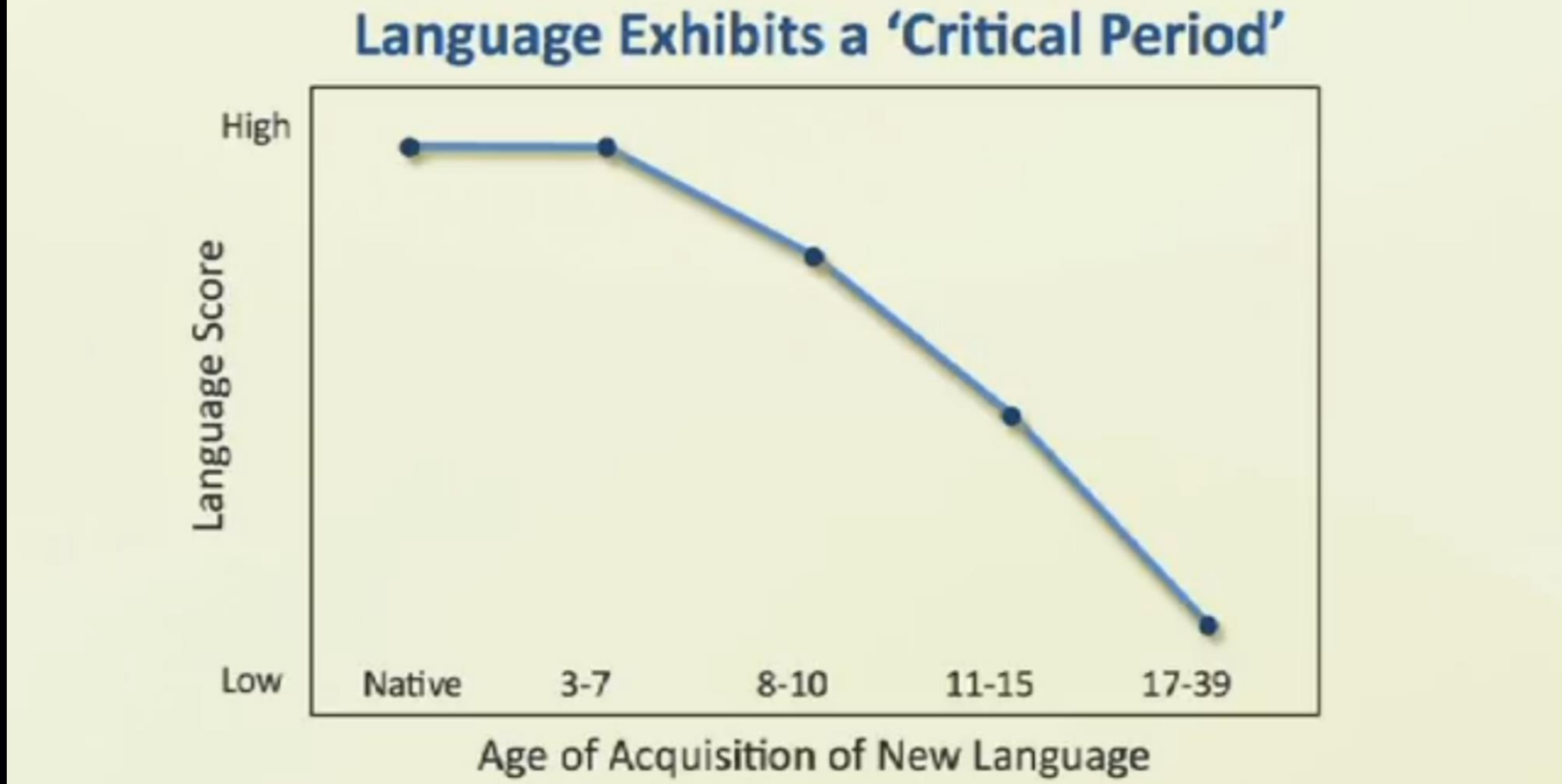
- **A mixed-race baby would naturally speak two different first languages**
- **A robot mother speaks another language different from a baby's mother tongue language**
- **Solving L2 and FL learning problems "indirectly" but effectively**

The theory (1)

- Age matters a lot

- Godden window for learning first languages
- 0 to 3 years old
- 18 – 36 months (Critical)

The theory (1)


Language Exhibits a 'Critical Period'
High
Low
Language Score
Native
3-7
8-10
11-15
17-39
Age of Acquisition of New Language

The theory (2)

- 30 million word problem
- 30,000 words a day, 30000 x 30 = 900,000 words each month, 900000 x 12 x 3 = 32,400,000 words

The **30 million word gap** between children in a **language-rich** home environment, and children in a **language-deficient** home environment was first identified in the **1995 Hart & Risley Study**, and later examined in the two **LENA Studies**.

Hart & Risley Study (1995)

30 Million Word Gap

"The more parents talk with their child from birth to age three, the more likely their child will excel academically later in life. In fact, even disadvantages attributed to socioeconomic status can be overcome."

Todd Risley, Ph.D.

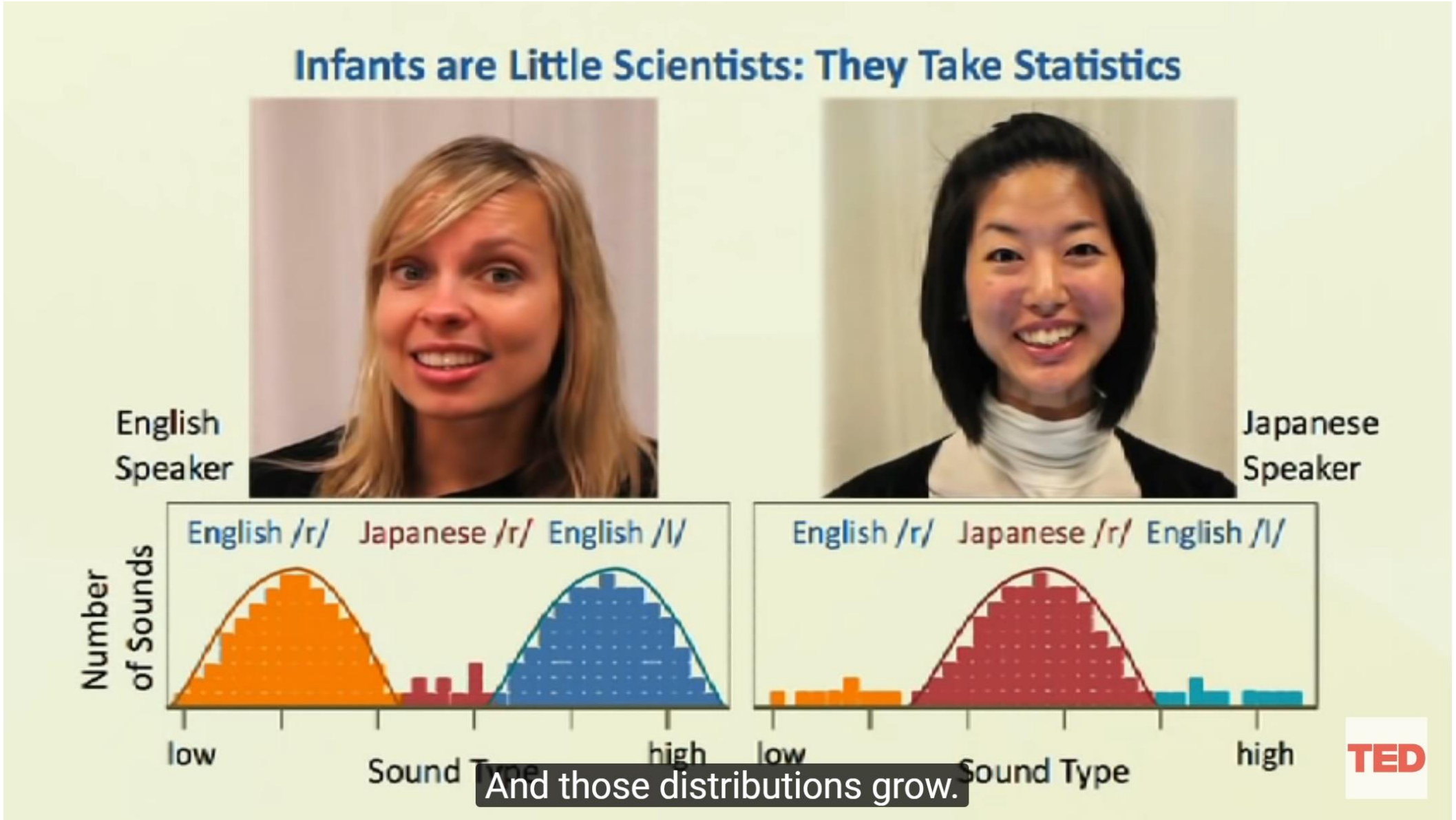
Co-Author, Hart & Risley Study

The theory (3)

- The linguistic genius of babies | Patricia Kuhl
- https://www.youtube.com/watch?v=G2XBIkHW954 (6:15min)

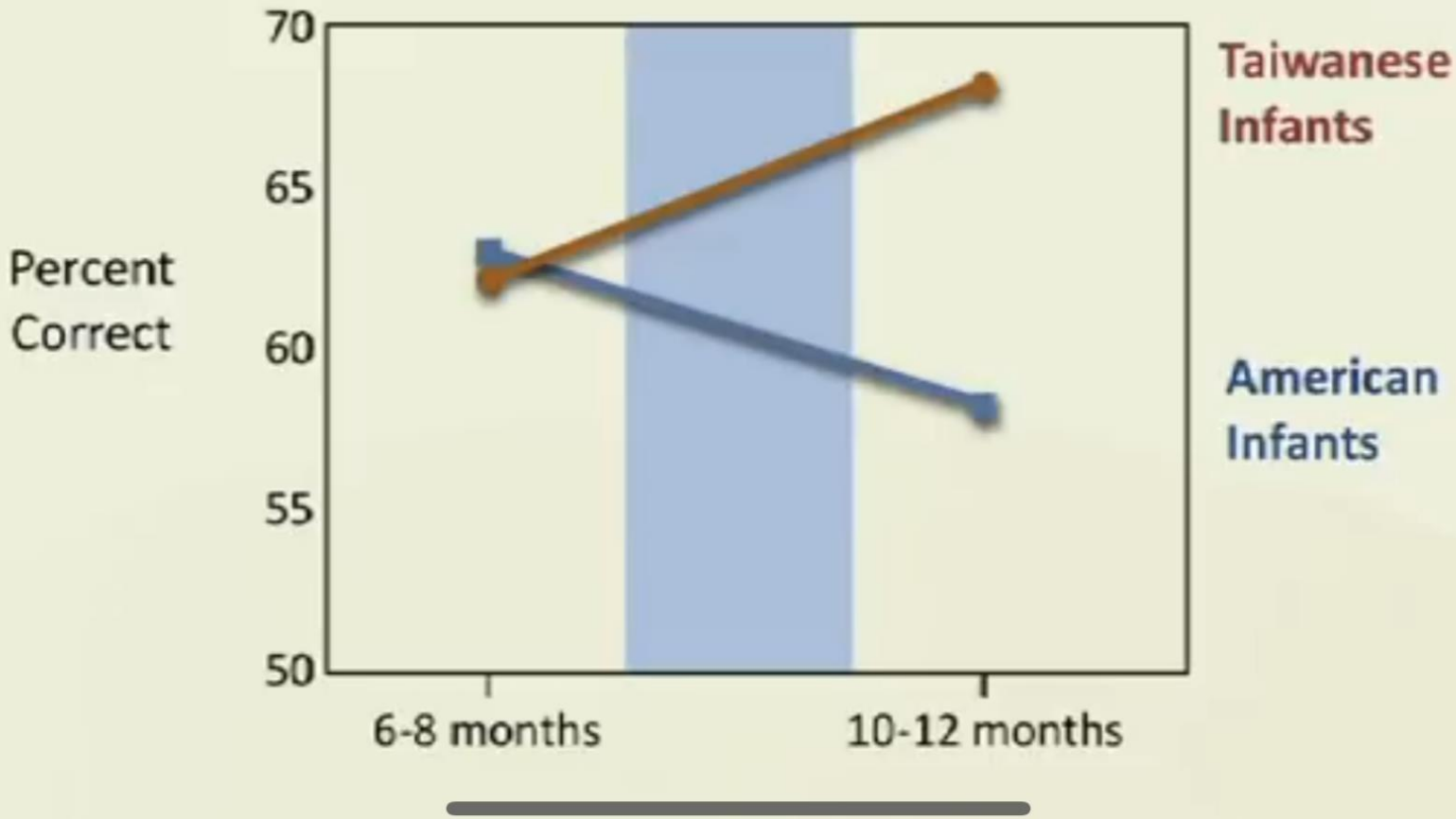
- The sounds from mother's pronunciation and intonation have a great impact on baby's language learning
- Babies are taking statistics everyday

- Real human matters a lot
- No effect on watching video
- No effect on listening to audio



And those distributions grow.

Performance on Mandarin $tɕ^h$-$ɕ$ Sounds



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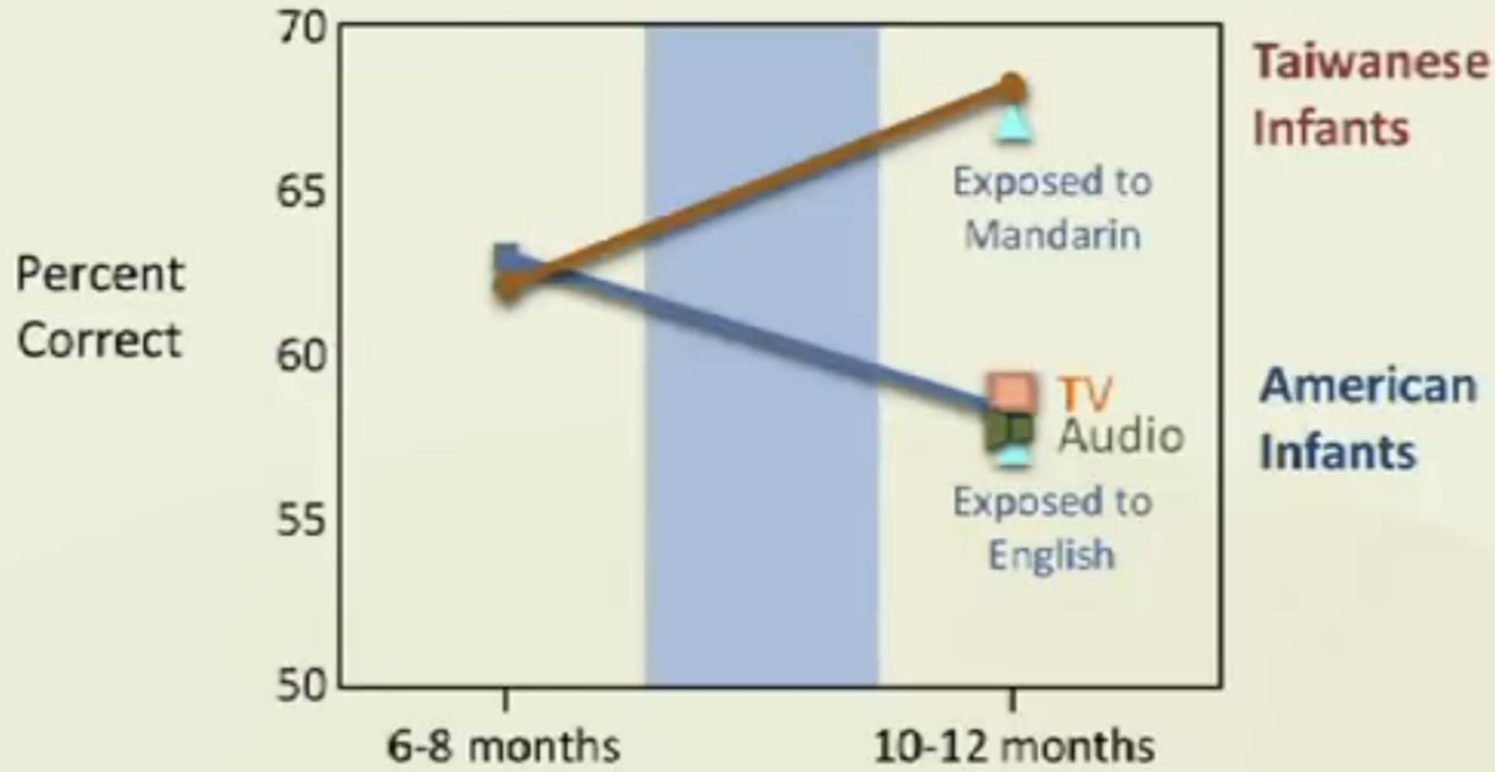

It takes a “human being” for babies to take their statistics

➔ The role of a robot mother is very important

The design

- **Toys: for cultivating baby's cognition development**
- **Robot: for cultivating baby's language development**
- **IoT sensors: for robot to be able to fully aware of the context including interaction situation and the surrounding environment**

Critical successful factors for effective language learning design (3R)

- Repetition: No correction, just repeat again and again
- Relevance: Must be contextualized for making meaning
- Relationship: Human touch, patience and caring

X

O


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Zenbo程序玩家
Zenbo编程乐
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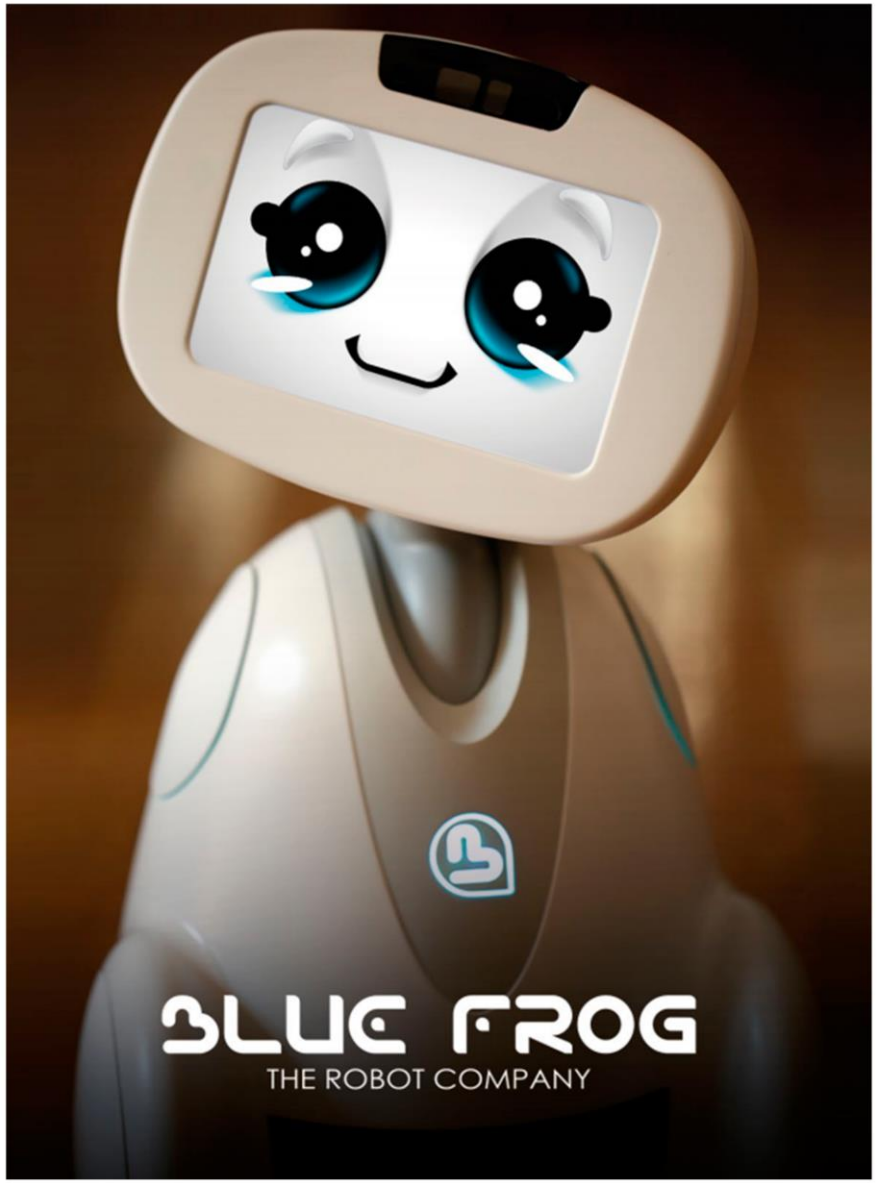
BLUE FROG
THE ROBOT COMPANY


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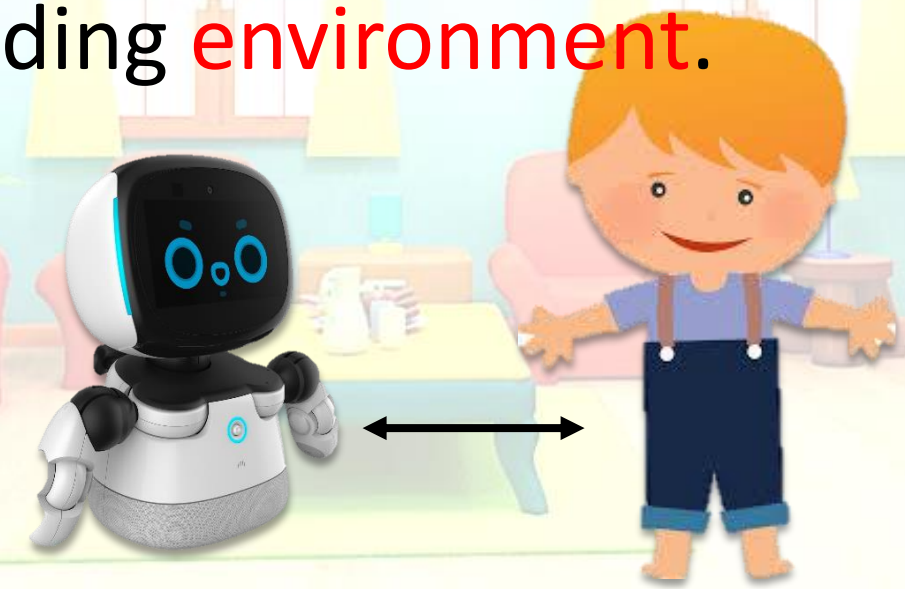
Context awareness learning environment

The robot is able to aware of context through gathering inputs from IoT sensors in the robot, the toys, the human body and the surrending environment.

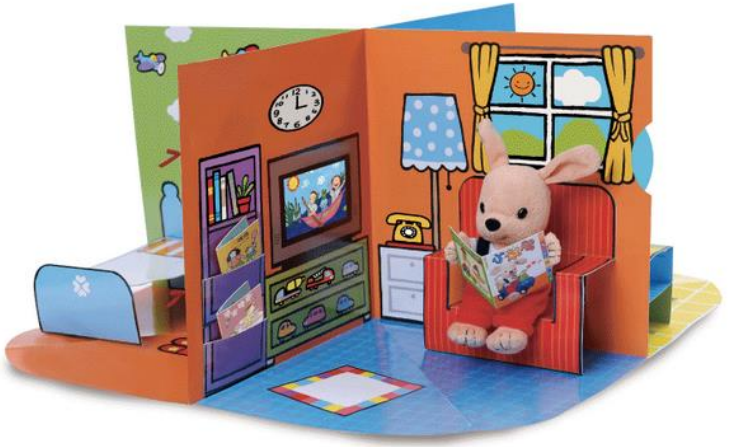


Triggered by sensors, the robot is to generate a conversation accordingly, or simply initiate a conversation

The robot is to interact with children through various IoT toys

Use different types of toys to conduct various studies

a toy supermarket and food items



Pop up books

Story books

pop-up books + electronics hands on activity

The application

1. A facilitation robot
   - task facilitation
   - engagement facilitation
2. A 3D book playing robot
3. A story-telling robot
4. A Chinese classifiers learning robot
5. A STEM and English learning robot

Q & A

Thanks for listening

Research Center for Smart Learning

The aim is to

Create an interactive and immersive language learning environment utilizing robots and toys with IoT sensors