Family as Third Space for AI Literacy
Growing up with AI
What we know

Family learning & Technology
(Barron et al. 2009)

Family AI Literacy
(Druga et al. 2020
Long et al. 2020)

Family Media Join-Engagement
(Stevens & Takeuchi 2011)
Initial Perceptions Matter

Children perceived agents as friendly and truthful

Now I’ll ask the other one

I’m not so sure it’s smart

It’s smarter than me

Children treated different devices (e.g., two Alexas) as completely independent

Age made a difference in how intelligence was perceived

Stefania Druga, Randi Williams, Cynthia Breazeal. ""Hey Google is it OK if I eat you?"" Initial Explorations in Child-Agent Interaction Proceedings of the 2017 Conference on Interaction Design and Children 2017
How smart are the smart toys?

• “I would choose the mouse as smarter because the mouse is an animal, the robot is programmed by humans”- Olivia, 9 years old.

• “Either the robot is being driven by a person with a remote control, or by software, and either way it’s not smart because it’s not alive.”- Lucas’s mom.

• “The robot was more fluent. It’s similar to the mouse, but since the robot was programmed by humans it could go through the maze more easily.”- Mason, 8 years old.
Study participants: 30 pairs of children (4-10 years old) parents. Children mirrored parent’s choices and arguments for more intelligent agent.

Stefania Druga, Randi Williams, Cynthia Breazeal. “How smart are the smart toys?”- Children’s and parents’ attributions of intelligence to computational objects.” IDC. 2018
Intelligent toys are influencing children moral decisions

Programming with AI

Shady Hill Private School

EPH Public Center

ESCS Public school

Empower Private Center
Is it smarter than you? (pre/post)

How do children’s perceptions of machine intelligence change when training and coding smart programs?

Druga, Stefania, and Ko, Amy J. Interaction Design for Children ACM 2021
AI literacy for families

Figure 10: Examples of ways in which children were trying to trick the AI

The 4As: Ask, Adapt, Author, Analyze AI Literacy Framework for Families  Stefania, Druga, Jason, Yip, Michael, Preston, and Devin, MIT Press 2020
AI literacy for families

The 4As: Ask, Adapt, Author, Analyze AI Literacy Framework for Families  Stefania, Druga, Jason, Yip, Michael, Preston, and Devin, MIT Press 2020
What we want to learn

RQ1: How do children and parents learn about AI together?

RQ2: How can we design learning supports for family AI literacies?
Study design

- 15 families
- 34 participants
- 11 languages
- 10 USA states

5 Weeks In-Home
- 11 activities
- 5 sessions/family

Theory of Multiple Literacies
1. Situated Practice
2. Over Instruction
3. Critical Framing
4. Transformed Practice
(New London Group 1996)
Initial perceptions of AI

“I would like an app where you can add personal information. It’d be nice if they [AI devices] don’t know unless you give them that information. Otherwise, it seems creepy” — R., mom F11.

“Siri has a lot trouble recognizing my voice, which annoys me.” — J., mom F9, who speaks Spanish as a first language
Session 1 - Image Classification
Learn more about how computers classify images

Coral Learning Activity
Image classification for families

Classification Game
Classify Coral Images

Anchor Game
Pick Segments of Coral Images
“A computer would make mistakes because everything makes mistakes. Because computers, they are just people programming something new.” — L., daughter F8.
Session 2 - Machine Learning

Teach a machine to learn from your examples

Scavenger Hunt
Machine Learning Game

Detect Home Objects
Mobile Apps for Object Detection

Guess Prediction Game
Guess Machine Object Predictions
“We should probably aim it at the ceiling, cause we have a bunch of pillows [in the background].” — A., son F11, suggesting how to fix the background being noisy when training the AI.
Session 3 - Voice Assistants
Learn how to play with & better understand voice assistants

Ask AI
Voice Assistants Family Game

Draw How it Works
What is inside Alexa?
## Findings Voice Assistants

<table>
<thead>
<tr>
<th>Questions</th>
<th>Family members' answers</th>
<th>AI's answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do I have any pets?</td>
<td>Yes you do.</td>
<td>I couldn’t say.</td>
</tr>
<tr>
<td>How’s the weather today?</td>
<td>It is sunny and warm; there are some clouds.</td>
<td>It is cloudy and 70 degrees... 69 degrees at night...</td>
</tr>
<tr>
<td>Can you recite the first 10 digits of pi?</td>
<td>The answer is 3.1457629...</td>
<td>Okay... the first 10 digits of pi... here is... (showing websites)</td>
</tr>
<tr>
<td>Which came first: the chicken or the egg?</td>
<td>That’s a trick question... If I knew the answer to this question, I would be the... philosopher...</td>
<td>It appears that human civilizations awfully preoccupied by this question...</td>
</tr>
</tbody>
</table>

Come up with your own questions!

| Why does a t-rex have tiny arms? | Because they run around using their legs and they don’t need big arms... | National geographic... (showing articles related to t-rex).                   |

“If Alexa was smart enough, she could have seen (...) we don’t order any of the pet products, which probably means that we don’t have pets.” — R., son F3 talking to his mom.
Session 4 - Design & Analyze AI

- Design AI
  Design Smart Assistants

- Analyze AI
  AI Friend or Foe?

- Bingo Game
  Prompt & Trick AI
“What if it was like a face that looked more like a robot face? Would that still be creepy? [C. nods]” — N., mom F12, suggesting potential modifications to their AI design.
RQ 1: How do children and parents learn about AI together?
# Parents Roles

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheerleader</td>
<td>Emotionally support the child during an activity or display excitement.</td>
</tr>
<tr>
<td>Mediator</td>
<td>Mediate between siblings and help them work together. Direct a child’s attention or explain task instructions.</td>
</tr>
<tr>
<td>Mentor</td>
<td>Guide the child to a more nuanced understanding. Encourages child to explain and clarify their reasoning.</td>
</tr>
<tr>
<td>Student</td>
<td>Learn a new concept or a new practice from the child. Change perspective towards AI functionalities.</td>
</tr>
<tr>
<td>Teacher</td>
<td>Explain a new concept or a new practice to the child. Provide guidance to use AI functionalities.</td>
</tr>
<tr>
<td>Observer</td>
<td>Let the child do the activity alone. Step in when help is needed or asked for.</td>
</tr>
</tbody>
</table>
Joint Roles

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>Tinkerer</td>
<td>Encourage the child to break, fix, and test the AI. Model this tinkering behavior.</td>
</tr>
<tr>
<td>Collaborator</td>
<td>Work with the child as a friend, and be actively engaged in the activity.</td>
</tr>
</tbody>
</table>
RQ 2: How can we design learning supports for family AI literacies?

Scavenger Hunt

Playbook For Families

Image Anchoring Game
Families will select the most representative part of each coral image, and place a mask (anchor) on the image to cover the non-representative part.

Design & Analyze AI

All study materials are available at aiplayground.me
RQ 2: How can we design learning supports for family AI literacies?
AI Literacy practices and skills led some families to consider making meaningful use of AI devices they already have in their homes and re-design their interactions with them. These findings suggest that family has the potential to act as a third space for AI learning!
6 Ingredients For AI Literacy

01 Mutual Engagement
Families are equally participating and engaging in the activity. Engage by asking your voice assistant (on your phone or in the house) a series of questions, like “assistant, what should we make for dinner tonight? Who made you? How do you learn?”. Try to build off of the assistant’s responses and each other’s questions.

02 Co-Creation
Kids and parents use AI Technologies to create things together that are meaningful for their families. Go to TeachableMachine.com and teach the computer to recognize you and your family members. Once you are done, think of different ways to trick the computer together and improve the way you teach it.
03 Boundary Crossing
Kids and parents share their past experiences and personal stories during the activity with AI. As a family share what past technologies voice assistants remind you of, and imagine what the future voice assistant may look like.

04 Collaborative Inquiry
Families collaborate to understand together how AI works. Try to understand how a voice assistant may work. Take turns and draw or discuss what you think is inside the device. As you are brainstorming, you may ask questions to the assistant to help you better understand how it works.

05 Intention to Develop
Families develop awareness of their own or their partners' needs and/or interests. Then, they help themselves or their partners to grow through the activity. Make a diary of your daily use of a specific AI technology. Write down interesting things, and see how it changes over time.

06 Focus on Content, Not Control
Families focus on the content and genuine interactions with AI, while minimizing the considerations for technical features and/or design elements. Try and compare the differences in your experience interacting with a complicated device and using something simple. How does it change the experience?
Thank you to all the families who participated in this study!


Study materials available at [aiplayground.me](http://aiplayground.me)

Illustrations by Sarah Strickler & [https://undraw.co/](https://undraw.co/).