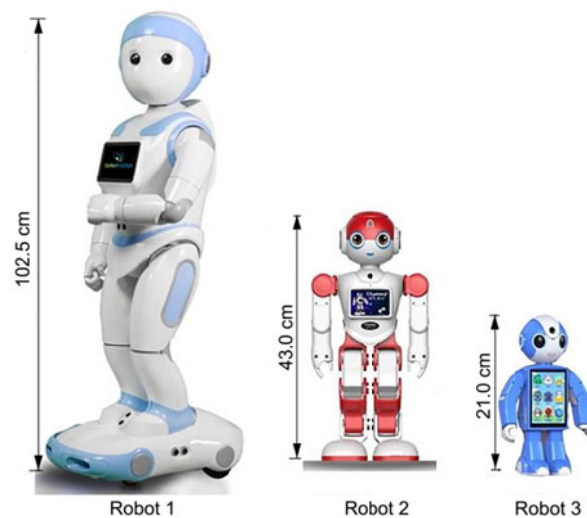


## Supplementary materials for

Guo-bin WAN, Fu-hao DENG, Zi-jian JIANG, et al., 2019. Attention shifting during child–robot interaction: a preliminary clinical study for children with autism spectrum disorder. *Front Inform Technol Electron Eng*, 20(3):374-387. <https://doi.org/10.1631/FITEE.1800555>



**Fig. S1** Appearances of the three different robots: they all had a touch screen in the chest of the body, but differed in the size and the color of the body, and the dexterity of the hands

**Table S1** Functionalities of the three robots

Functionality	Description		
	Robot 1 (Dabao)	Robot 2 (XiaoE)	Robot 3 (Mika)
Greeting	Waving with hands and greeting in Chinese	Waving with hands and greeting in Chinese	Waving with hands and greeting in Chinese
Actions controlling	Using APP iRemoter to turn forward, back, and around	Using APP Smart Robot II to turn forward, back, and around	Using APP Smart Robot II to turn forward, back, and around
Music playing mostly in Chinese without body movements	Songs like “咕力主题曲” (1 min) and “一分钱” (1.5 min)	Songs like “铃儿响叮当” (3 min) and “小毛驴” (1.5 min)	Songs like “鲁冰花” (3.5 min) and “小燕子” (2 min)
Music playing mostly in Chinese with dancing movements such as hand waving and head turning	Songs like “两只老虎” (1 min), “春天在哪里” (1 min), and “Jingle Bells” (1 min)	Songs like “Dance Korean” (3.5 min), “Bang Bang Bang” (1 min), and “圣诞歌” (1 min)	Songs like “功夫” (1 min), “骑马舞” (1 min), and “Animals” (3.5 min)
Story telling in Chinese	Stories like “爱吃水果的牛” (1 min), “狐狸和乌鸦” (5.5 min), and “小猪照镜子” (2 min)	Stories like “熊猫眼镜店” (2.5 min), “真假小白兔” (3 min), and “小猪发脾气” (1.5 min)	Stories like “小鼯鼠请客” (2 min), “萤火虫和小星星” (2 min), and “鱼猫” (3.5 min)

To be continued

Table S1

Ancient poetry reading in Chinese	Poetries like “泊船瓜洲” (1 min), “题西林壁” (1 min), and “登鹳雀楼” (1 min)	Poetries like “望天门山” (0.5 min), “忆江南” (0.5 min), and “咏鹅” (0.5 min)	Poetries like “别董大” (0.5 min), “春晓” (0.5 min), and “咏柳” (0.5 min)
Chinese idioms teaching	Idioms like “望洋兴叹” (2 min) and “掩耳盗铃” (2 min)	Idioms like “如鱼得水” (1.5 min) and “入木三分” (1.5 min)	Idioms like “拔苗助长” (1 min) and “百发百中” (2 min)
Other functionalities	Photo-taking, video chatting, brain-teaser questions answering, interactive games playing, human-face detecting and following, simple programming, and responding to simple touching sensing	Photo-taking and video chatting	Photo-taking

### 儿童陪伴机器人调研问卷

#### Questionnaire for Children Companion Robots

您好！我们是香港中文大学（深圳）联合深圳市妇幼保健院进行儿童陪伴机器人调研的工作人员，希望得到您的积极配合，谢谢！

Hello! We, researchers from The Chinese University of Hong Kong (Shenzhen), are doing a survey about the children companion robot with staffs from Shenzhen Maternal & Child Healthcare Hospital. Thanks for your participation.

1. 您的性别是？ [单选题] [必答题]

- 男士  
 女士

1. What is your gender? [single-choice question] [required]

- Male  
 Female

2. 您的宝宝的性别是？（无宝宝的情况可忽略此题） [单选题] [必答题]

- 男生  
 女生

2. What is your child's gender? (not required if you do not have any child) [single-choice question] [required]

- Male  
 Female

3. 您的宝宝今年年龄是？（无宝宝的情况可忽略此题） [单选题] [必答题]

- 0-3 岁  
 3-5 岁  
 5-8 岁  
 8-12 岁  
 12 岁以上

3. How old is your child? (not required if you do not have any child) [single-choice question] [required]

- 0-3  
 3-5  
 5-8  
 8-12  
 Over 12

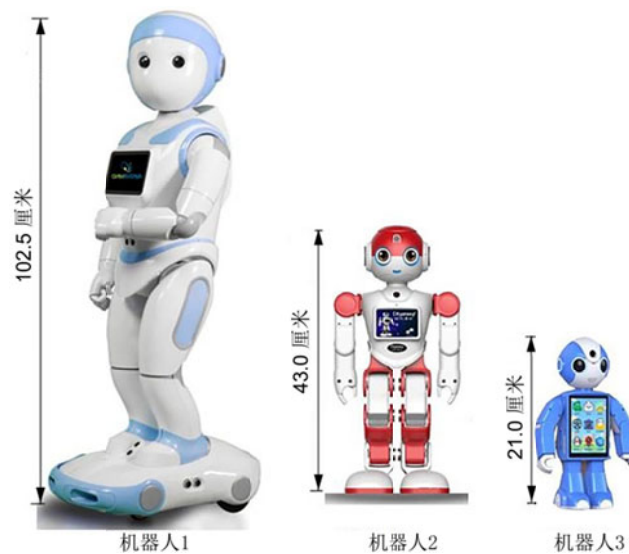
4. 您喜欢机器人的材质是? [多选题] [必答题]

- 毛绒  
 塑料  
 硅胶  
 金属  
 环保的  
 安全的  
 结实耐用的  
 其他 \_\_\_\_\_

4. Which materials of robot is your favorite? [multiple-choice question] [required]

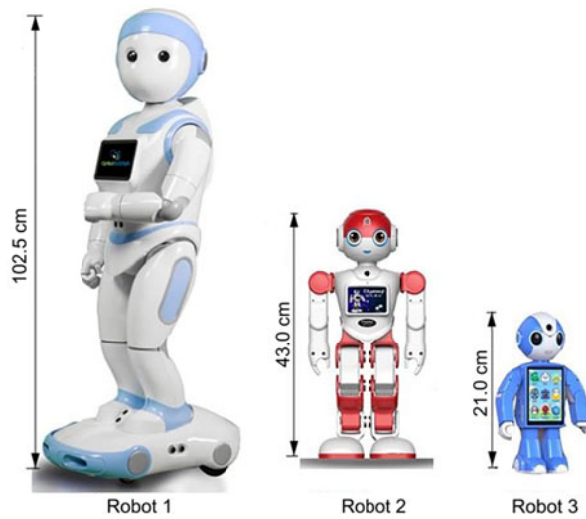
- Plush or fuzzy  
 Plastic  
 Silica gel  
 Metal  
 Eco-friendly  
 Secure  
 Sturdy and durable  
 Others \_\_\_\_\_

5. 请根据实际情况对图中三款机器人的材质进行打分 [矩阵量表题] [必答题]



机器人	满意度				
	非常不满意	不满意	一般	满意	非常满意
机器人 1 (最高)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
机器人 2 (中等高)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
机器人 3 (最矮)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. Please grade the materials of the three robots accordingly from the picture above. [matrix table question] [required]



Robot	Satisfaction grade				
	Very unsatisfied	Unsatisfied	General	Satisfied	Very satisfied
Robot 1 (tallest)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Robot 2 (medium)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Robot 3 (shortest)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. 请根据实际情况对三款机器人的移动方式进行打分 [矩阵量表题] [必答题]

机器人	满意度				
	非常不满意	不满意	一般	满意	非常满意
机器人 1 (最高)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
机器人 2 (中等高)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
机器人 3 (最矮)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. Please grade the walking modes of the three robots accordingly. [matrix table question] [required]

Robot	Satisfaction grade				
	Very unsatisfied	Unsatisfied	General	Satisfied	Very satisfied
Robot 1 (tallest)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Robot 2 (medium)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Robot 3 (shortest)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. 请根据实际情况对三款机器人的尺寸大小进行打分 [矩阵量表题] [必答题]

机器人	满意度				
	非常不满意	不满意	一般	满意	非常满意
机器人 1 (最高)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
机器人 2 (中等高)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
机器人 3 (最矮)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Please grade the sizes of the three robots accordingly. [matrix table question] [required]

Robot	Satisfaction grade				
	Very unsatisfied	Unsatisfied	General	Satisfied	Very satisfied
Robot 1 (tallest)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Robot 2 (medium)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Robot 3 (shortest)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. 请根据实际情况对三款机器人的颜色进行打分 [矩阵量表题] [必答题]

机器人	满意度				
	非常不满意	不满意	一般	满意	非常满意
机器人 1 (最高)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
机器人 2 (中等高)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
机器人 3 (最矮)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. Please grade the colors of the three robots accordingly. [matrix table question] [required]

Robot	Satisfaction grade				
	Very unsatisfied	Unsatisfied	General	Satisfied	Very satisfied
Robot 1 (tallest)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Robot 2 (medium)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Robot 3 (shortest)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. 您认为用于儿童陪伴机器人的色调应为 [多选题] [必答题]

- 明亮的
- 暗淡的
- 暖色调
- 冷色调
- 中性色调的
- 其他 \_\_\_\_\_

9. Which color of the children companion robot do you prefer? [multiple-choice question] [required]

- Bright
- Dark
- Warm
- Cool
- Middle-tone
- Others \_\_\_\_\_

10. 您希望机器人触摸起来是 [单选题] [必答题]

- 平滑的
- 有纹路的
- 柔软的

10. Which tactility of robot do you prefer? [single-choice question] [required]

- Smooth
- Grained
- Soft

11. 关于机器人的形象，您比较喜欢的形象是 [单选题] [必答题]

- 男性
- 女性
- 中性

11. Which sexuality do you prefer the robots to appear as? [single-choice question] [required]

- Male
- Female
- Neuter

12. 您认为机器人应该在儿童心中扮演怎样的角色? [多选题] [必答题]

- 日常小助手
- 生活小保姆
- 玩伴与朋友
- 训练老师

12. What role do you think the robots should play in children's mind? [multiple-choice question] [required]

- Daily assistant
- Live-in nanny
- Friend
- Training teacher

13. 对于儿童陪伴机器人，您希望它具有怎样的个性? [多选题] [必答题]

- 温柔点
- 热情的
- 聪明的
- 酷酷的
- 调皮的
- 呆萌的
- 可爱的
- 其他 \_\_\_\_\_

13. For children companion robots, what personalities do you think they should have? [multiple-choice question] [required]

- Gentle
- Enthusiastic
- Smart
- Cool

- Naughty
- Adorable and dorky
- Cute
- Others \_\_\_\_\_

14. 您觉得儿童陪伴机器人的购买价格区间应该是? [单选题] [必答题]

- 1000 元以下
- 1000–3000 元
- 3000–5000 元
- 5000–8000 元
- 8000–10 000 元
- 10 000–12 000 元
- 12 000 元以上

14. Which price range do you think the children companion robots should be in? [single-choice question] [required]

- Less than 1000 RMB
- 1000–3000 RMB
- 3000–5000 RMB
- 5000–8000 RMB
- 8000–10 000 RMB
- 10 000–12 000 RMB
- More than 12 000 RMB

15. 您希望儿童陪伴机器人具备的功能有? (空白处可再填您希望有的内容) [多选题] [必答题]

- 陪伴功能: 日常生活照顾、语言交流
- 教育功能: 唐诗宋词、故事点读、数学计算
- 娱乐功能: 游戏娱乐、唱歌跳舞
- 诊断功能: 记录儿童社交和行为信息, 协助诊断与康复效果评估
- 治疗功能: 将专业训练内容植入, 起到专业训练作用
- 其他 \_\_\_\_\_

15. What functionalities do you think children companion robots should have? (More expected functions can be filled in the blank) [multiple-choice question] [required]

- Accompanying: consideration in daily life and language communication
- Education: reading Chinese ancient poems, story reading, and mathematical calculation
- Entertainment: gaming, singing and dancing
- Diagnosis: recording information about children's social activities and assisting in diagnosing and evaluating rehabilitation efficacy
- Treatment: embedding courses for professional training
- Others \_\_\_\_\_

16. 您对“儿童陪伴机器人”的功能还有什么好的建议? [填空题] [必答题]

\_\_\_\_\_

16. What functionalities do you suggest the children companion robots should have? [fill in the blank] [required]

\_\_\_\_\_

17. 您向朋友或同事推荐该机器人的可能性有多大? [单选题]

不可能	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	极有可能
不可能	1	2	3	4	5	6	7	8	9	极有可能

17. What is the possibility that you will recommend these robots to your friends and colleagues? [single-choice question]

Never	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Highly possible
Never	1	2	3	4	5	6	7	8	9	Highly possible

18. 如果您对儿童陪伴机器人的免费试用感兴趣, 可留下您的联系方式 [填空题]

\_\_\_\_\_

18. If you are interested in a free trial of children companion robots, please leave your contact information. [fill in the blank]

\_\_\_\_\_