

Older Adults' Acceptance of Assistive Robots for the Home

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Acknowledgments

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This project is a collaborative research effort on human-robot interaction between the Human Factors and Aging Laboratory (Co-Directors Wendy A. Rogers and Arthur D. Fisk; www.hfaging.org) and the Healthcare Robotics Laboratory (Director: Charles C. Kemp; www.healthcare-robotics.com). Many thanks to the researchers in both laboratories for their contributions.

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Overview of Study

Robots have the potential to support older adults as they age in place (Smarr, Fausset, & Rogers, 2011), as well as if they live in assisted living or skilled nursing residences (Mitzner, Chen, Kemp, & Rogers, 2011). Robots can conceivably support older adults for various activities, including self-maintenance, instrumental, and enhanced activities of daily living (Lawton, 1990; Rogers, Meyer, Walker, & Fisk, 1998), and in various capacities. For example, robots could provide support while an older adult performs a task (e.g., by providing stability as an older adult gets dressed). Robots could also execute tasks *for* older adults who are no longer able to perform a particular task (e.g., opening a jar) or for tasks that may be unsafe to perform (e.g., retrieving an item from a high shelf). However, to understand if older adults will be willing to adopt robots as assistive technologies, additional research is needed to better understand older adults' acceptance of robots. Moreover, research is needed to understand whether robot acceptance varies as a function of variables such as task context and robot familiarity and experience.

In this study, we explored older adults' acceptance of robots in general, as well as their acceptance of Willow Garage's Personal Robot 2 (PR2) (www.willowgarage.com), which is a mobile manipulator. Participants included 21 independent living seniors. We administered three questionnaires that we developed to assess different aspects of acceptance. We designed the Robot Familiarity and Usage Questionnaire to assess participants' familiarity with and usage of 13 different types of robots. We developed the Robot Opinions Questionnaire based upon existing technology acceptance scales (Davis, 1989), as a general measure of robot

acceptance. We designed the Assistance Preference Checklist to assess participants' preferences for human or robot assistance for 48 home-based tasks. We also administered a Background & Health Questionnaire, which collected participant demographic information (e.g., gender, education, race/ethnicity, housing type) and health status, as well as a Technology and Computer Experience Questionnaire, which contained questions about technology and computer use. This report presents descriptive statistics from the data we collected in this study. Inferential statistical comparisons are in progress and will be provided in a future report.

The present results provide valuable insights into older adults' attitudes and preferences regarding robot support in the home. Moreover, these findings provide guidance for robot design.

Method

Participants

Questionnaires were collected from 21 older adults (28.6% female, 71.4% male) between the ages of 65 and 93 ($M = 80.25$ years; $SD = 7.19$ years). Participants were recruited from a database maintained by the Human Factors and Aging Laboratory. Most participants indicated they were widowed (42.9%), married (28.6%), or divorced (19%); 9.5% reported to be single. Participants reported having diverse education backgrounds: 4.8% had less than high school degree, 14.3% had a high school degree or GED, 14.3% had vocational training, 14.3% had some college/Associate's degree, 23.8% had a Bachelor's degree (BA, BS), 19% had a master's degree or other post-graduate training), and 9.5% had a doctoral degree (e.g., PhD, MD, EdD, DDS, JD). Participants were also diverse with respect to race/ethnicity: 57.7% reported themselves as White/Caucasian and 42.9% indicated they were Black/African American. Most participants lived in an independent residence in senior housing (66.7%) or in a house, apartment, or condominium (28.5%); 4.8% lived in a relative's home.

We collected data about several different aspects of health. Table 1 shows participants' responses to questions about their general health and health satisfaction. Table 2 shows participants' reported limitations regarding physical activities that are commonly required for tasks of daily living. Limitations were reported most often for climbing several flights of stairs, for moderate activities (e.g., moving a table, pushing a vacuum cleaner, bowling, or playing golf), for vigorous activities (e.g., running, lifting heavy objects, or participating in strenuous sports), and for walking more than a mile.

Table 3 shows the prevalence of certain chronic health conditions; the most prevalent of which were arthritis, hypertension, diabetes, and heart disease.

In addition, we asked about vision and hearing limitations. Most participants (90.5%) reported using eyeglasses and many reported have trouble seeing despite using eyeglasses (38.6%). Some participants (23.8%) reported having trouble hearing with one or both ears, however only 14.3% reported using a hearing aid. The Demographic and Health Questionnaire is presented in Appendix A.

Table 1

General Health (N = 21)

Question	<i>M</i>	<i>SD</i>	1	2	3	4	5
In general, would you say your health is: (1 = poor, 5 = excellent)	3.09	0.61	0%	9.5%	66.7%	23.8%	0%
Compared to other people your own age, would you say your health is: (1 = poor, 5 = excellent)	3.59	0.73	0%	4.8%	28.6%	61.9%	4.8%
How satisfied are you with your present health? (1 = not at all, 5 = extremely)	4.09	0.92	0%	9.5%	4.8%	47.6%	38.1%
How often do health problems stand in the way of your doing the things you want to do? (1 = never, 5 = always)	2.09	1.06	42.9%	19.0%	33.0%	4.8%	0%

Table 2

Health-Related Activity Limitations (N = 21)

Does your health now limit you in these activities?	Limited a lot	Limited a little	Not limited at all
Bathing or dressing yourself	0	0	21
Bending, kneeling or stooping	4.8	38.1	57.1
Climbing one flight of stairs	19	9.5	71.4
Climbing several flights of stairs	28.6	28.6	42.8
Lifting or carrying groceries	9.5	28.6	61.9
Moderate activities , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	14.3	23.8	61.9
Vigorous activities , such as running, lifting heavy objects, or participating in strenuous sports (e.g. swimming laps)	38.1	33.3	28.6
Walking more than a mile	28.6	33.3	38.1
Walking one block	9.5	14.3	76.2
Walking several blocks	19	28.6	52.4

Note. Numbers represent percentages.

Table 3

Prevalence of Chronic Health Conditions (N = 21)

Condition	Had in your lifetime	Have now	Never had
Arthritis	9.5	57.1%	23.8
Asthma or bronchitis	4.8%	4.8	90.4%
Cancer (other than skin cancer)	14.3	4.8%	80.9
Diabetes	4.8%	33.3	61.9%
Epilepsy	0.0	0.0%	100
Heart disease	4.8%	23.8	71.4%
Hypertension	0.0	57.1%	42.9
Stroke	0.0%	4.8	95.2%
Other significant illnesses	23.8	9.5%	19.0

Note. Numbers represent percentages.

Results

Technology and Computer Experience Questionnaire

We measured technology experience by asking participants about the frequency with which they used a variety of technologies (see Appendix B). Table 4 shows the mean, standard deviation, and histogram for the responses to each question on the Technology Experience Questionnaire. The most frequently used technologies ($M > 4 =$ used occasionally) were cell phones, microwave ovens, recording and playback devices, programmable devices, automated telephone menu systems, and answering machines.

We also asked questions about computer/Internet experience. Most participants (71.4%) reported using a computer and/or the Internet and of those who reported such use, most (66.7%) reported that they had been using it for 5 or more years. In terms of frequency of using the computer/Internet, 26.7% reported 10 or more hours a week, 13.3% reported more than 5 but less than 10 hours a week, 40% reported between 1-5 hours a week, and 20% reported less than an hour a week.

Table 4

Technology Experience (Items listed in descending order by mean response; N = 21)

Technology	<i>M</i>	<i>SD</i>	Histogram
1= Not sure what it is, 2= Not used, 3= Used once, 4= Used occasionally, 5= Used frequently			
Cell phone	4.67	0.73	
Microwave oven	4.62	0.74	
Recording and playback device (e.g. CD, DVD, VCR, DVR)	4.48	0.75	
Programmable devices (e.g. thermostat, coffee maker)	4.43	0.93	

Technology	<i>M</i>	<i>SD</i>	Histogram												
1= Not sure what it is, 2= Not used, 3= Used once, 4= Used occasionally, 5= Used frequently															
Automated telephone menu system	4.38	0.92	<p>Detailed description: A histogram with a vertical axis from 0 to 20 and a horizontal axis with categories 1, 2, 3, 4, and 5. The bars represent the number of responses for each rating: 1 (0), 2 (2), 3 (0), 4 (7), and 5 (12).</p> <table border="1"> <tr><th>Rating</th><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><th>Frequency</th><td>0</td><td>2</td><td>0</td><td>7</td><td>12</td></tr> </table>	Rating	1	2	3	4	5	Frequency	0	2	0	7	12
Rating	1	2	3	4	5										
Frequency	0	2	0	7	12										
Answering machine	4.33	1.35	<p>Detailed description: A histogram with a vertical axis from 0 to 20 and a horizontal axis with categories 1, 2, 3, 4, and 5. The bars represent the number of responses for each rating: 1 (0), 2 (2), 3 (0), 4 (3), and 5 (15).</p> <table border="1"> <tr><th>Rating</th><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><th>Frequency</th><td>0</td><td>2</td><td>0</td><td>3</td><td>15</td></tr> </table>	Rating	1	2	3	4	5	Frequency	0	2	0	3	15
Rating	1	2	3	4	5										
Frequency	0	2	0	3	15										
Copier	3.57	1.21	<p>Detailed description: A histogram with a vertical axis from 0 to 20 and a horizontal axis with categories 1, 2, 3, 4, and 5. The bars represent the number of responses for each rating: 1 (0), 2 (7), 3 (0), 4 (9), and 5 (5).</p> <table border="1"> <tr><th>Rating</th><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><th>Frequency</th><td>0</td><td>7</td><td>0</td><td>9</td><td>5</td></tr> </table>	Rating	1	2	3	4	5	Frequency	0	7	0	9	5
Rating	1	2	3	4	5										
Frequency	0	7	0	9	5										
Automatic teller machine (ATM)	3.38	1.28	<p>Detailed description: A histogram with a vertical axis from 0 to 20 and a horizontal axis with categories 1, 2, 3, 4, and 5. The bars represent the number of responses for each rating: 1 (0), 2 (9), 3 (0), 4 (7), and 5 (5).</p> <table border="1"> <tr><th>Rating</th><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><th>Frequency</th><td>0</td><td>9</td><td>0</td><td>7</td><td>5</td></tr> </table>	Rating	1	2	3	4	5	Frequency	0	9	0	7	5
Rating	1	2	3	4	5										
Frequency	0	9	0	7	5										
Books on tape or compact disk	3.33	1.39	<p>Detailed description: A histogram with a vertical axis from 0 to 20 and a horizontal axis with categories 1, 2, 3, 4, and 5. The bars represent the number of responses for each rating: 1 (1), 2 (8), 3 (1), 4 (5), and 5 (6).</p> <table border="1"> <tr><th>Rating</th><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><th>Frequency</th><td>1</td><td>8</td><td>1</td><td>5</td><td>6</td></tr> </table>	Rating	1	2	3	4	5	Frequency	1	8	1	5	6
Rating	1	2	3	4	5										
Frequency	1	8	1	5	6										

Technology	<i>M</i>	<i>SD</i>	Histogram												
1= Not sure what it is, 2= Not used, 3= Used once, 4= Used occasionally, 5= Used frequently															
Fax machine	3.33	1.2	<p>Detailed description: A histogram for 'Fax machine' with a y-axis from 0 to 20 and an x-axis from 1 to 5. The bars represent the number of responses for each rating: 1 (0), 2 (8), 3 (2), 4 (7), and 5 (4).</p> <table border="1"> <tr><th>Rating</th><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><th>Frequency</th><td>0</td><td>8</td><td>2</td><td>7</td><td>4</td></tr> </table>	Rating	1	2	3	4	5	Frequency	0	8	2	7	4
Rating	1	2	3	4	5										
Frequency	0	8	2	7	4										
Home security system	3.14	1.68	<p>Detailed description: A histogram for 'Home security system' with a y-axis from 0 to 20 and an x-axis from 1 to 5. The bars represent the number of responses for each rating: 1 (0), 2 (10), 3 (0), 4 (3), and 5 (7).</p> <table border="1"> <tr><th>Rating</th><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><th>Frequency</th><td>0</td><td>10</td><td>0</td><td>3</td><td>7</td></tr> </table>	Rating	1	2	3	4	5	Frequency	0	10	0	3	7
Rating	1	2	3	4	5										
Frequency	0	10	0	3	7										
In-store automated kiosk (e.g. self-checkout)	3.05	1.12	<p>Detailed description: A histogram for 'In-store automated kiosk (e.g. self-checkout)' with a y-axis from 0 to 20 and an x-axis from 1 to 5. The bars represent the number of responses for each rating: 1 (0), 2 (10), 3 (2), 4 (7), and 5 (2).</p> <table border="1"> <tr><th>Rating</th><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><th>Frequency</th><td>0</td><td>10</td><td>2</td><td>7</td><td>2</td></tr> </table>	Rating	1	2	3	4	5	Frequency	0	10	2	7	2
Rating	1	2	3	4	5										
Frequency	0	10	2	7	2										
Digital photography (e.g. camera, camcorder)	3	1.22	<p>Detailed description: A histogram for 'Digital photography (e.g. camera, camcorder)' with a y-axis from 0 to 20 and an x-axis from 1 to 5. The bars represent the number of responses for each rating: 1 (0), 2 (12), 3 (0), 4 (6), and 5 (3).</p> <table border="1"> <tr><th>Rating</th><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><th>Frequency</th><td>0</td><td>12</td><td>0</td><td>6</td><td>3</td></tr> </table>	Rating	1	2	3	4	5	Frequency	0	12	0	6	3
Rating	1	2	3	4	5										
Frequency	0	12	0	6	3										
Electronic book-reader (e.g. Kindle)	2.67	1.35	<p>Detailed description: A histogram for 'Electronic book-reader (e.g. Kindle)' with a y-axis from 0 to 20 and an x-axis from 1 to 5. The bars represent the number of responses for each rating: 1 (2), 2 (13), 3 (0), 4 (2), and 5 (4).</p> <table border="1"> <tr><th>Rating</th><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><th>Frequency</th><td>2</td><td>13</td><td>0</td><td>2</td><td>4</td></tr> </table>	Rating	1	2	3	4	5	Frequency	2	13	0	2	4
Rating	1	2	3	4	5										
Frequency	2	13	0	2	4										

Technology	<i>M</i>	<i>SD</i>	Histogram												
1= Not sure what it is, 2= Not used, 3= Used once, 4= Used occasionally, 5= Used frequently															
In-car navigation system (e.g. GPS, OnStar)	2.43	0.81	<p>Detailed description: A histogram showing the frequency distribution for 'In-car navigation system'. The x-axis represents frequency levels from 1 to 5. The y-axis represents the number of participants, ranging from 0 to 20. The distribution is as follows: Level 1: 0, Level 2: 16, Level 3: 1, Level 4: 4, Level 5: 0.</p> <table border="1"> <tr><th>Frequency Level</th><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><th>Count</th><td>0</td><td>16</td><td>1</td><td>4</td><td>0</td></tr> </table>	Frequency Level	1	2	3	4	5	Count	0	16	1	4	0
Frequency Level	1	2	3	4	5										
Count	0	16	1	4	0										
MP3/iPod music player	2.38	1.28	<p>Detailed description: A histogram showing the frequency distribution for 'MP3/iPod music player'. The x-axis represents frequency levels from 1 to 5. The y-axis represents the number of participants, ranging from 0 to 20. The distribution is as follows: Level 1: 0, Level 2: 15, Level 3: 1, Level 4: 2, Level 5: 2.</p> <table border="1"> <tr><th>Frequency Level</th><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><th>Count</th><td>0</td><td>15</td><td>1</td><td>2</td><td>2</td></tr> </table>	Frequency Level	1	2	3	4	5	Count	0	15	1	2	2
Frequency Level	1	2	3	4	5										
Count	0	15	1	2	2										
Personal digital assistant (PDA)	1.95	0.8	<p>Detailed description: A histogram showing the frequency distribution for 'Personal digital assistant (PDA)'. The x-axis represents frequency levels from 1 to 5. The y-axis represents the number of participants, ranging from 0 to 20. The distribution is as follows: Level 1: 5, Level 2: 14, Level 3: 0, Level 4: 2, Level 5: 0.</p> <table border="1"> <tr><th>Frequency Level</th><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><th>Count</th><td>5</td><td>14</td><td>0</td><td>2</td><td>0</td></tr> </table>	Frequency Level	1	2	3	4	5	Count	5	14	0	2	0
Frequency Level	1	2	3	4	5										
Count	5	14	0	2	0										

Technology Experience Questionnaire Summary. We measured technology experience by asking participants about the frequency with which they used a variety of technologies. Participants reported using cell phones, microwave ovens, recording and playback devices, programmable devices, automated telephone menu systems, and answering machines most frequently (occasional use, on average). We also asked questions about computer/Internet experience. Most participants reported using a computer and/or the Internet and of those who reported such use, most reported that they had been using it for 5 or more years. Therefore, overall participants were experienced with a wide variety of technologies, including computers.

Robot Usage and Familiarity Questionnaire

We measured different aspects of robot familiarity as well as the frequency of using 13 different types of robots (see Appendix C). Table 5 shows the mean, standard deviation, and histogram for the responses to each robot type on the Robot Usage and Familiarity Questionnaire. Participants reported the most familiarity (i.e., heard about or seen this robot) with surgical robots (e.g. daVinci surgical system), robot lawn mowers, space exploration robots (e.g. Mars Rover), manufacturing robots (e.g. robotic arm in factory), entertainment/toy robots (e.g. Aibo, Furby), and unmanned aerial vehicles (UAV). Very few participants reported using any of the robots.

Table 5

Robot Usage and Familiarity (Items listed in descending order by mean response; N = 21)

Robot	<i>M</i>	<i>SD</i>	Histogram
0 = Not sure what it is 1 = Never heard about, seen or used it 2 = Have only heard about or seen this robot 3 = Have used or operated it only occasionally 4 = Have used or operated it frequently			
Surgical Robot (e.g. daVinci surgical system)	1.95	0.22	

Robot	<i>M</i>	<i>SD</i>	Histogram												
0 =Not sure what it is 1 = Never heard about, seen or used it 2 = Have only heard about or seen this robot 3 = Have used or operated it only occasionally 4 = Have used or operated it frequently															
Robot lawn mower	1.76	0.43	<p>Detailed description: A histogram for 'Robot lawn mower' with a y-axis from 0 to 20 and an x-axis from 0 to 4. The bars show frequencies of approximately 5 for rating 1, 16 for rating 2, and 0 for ratings 0, 3, and 4.</p> <table border="1"> <tr><th>Rating</th><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><th>Frequency</th><td>0</td><td>5</td><td>16</td><td>0</td><td>0</td></tr> </table>	Rating	0	1	2	3	4	Frequency	0	5	16	0	0
Rating	0	1	2	3	4										
Frequency	0	5	16	0	0										
Space exploration robot (e.g. Mars Rover)	1.76	0.62	<p>Detailed description: A histogram for 'Space exploration robot (e.g. Mars Rover)' with a y-axis from 0 to 20 and an x-axis from 0 to 4. The bars show frequencies of approximately 2 for rating 0, 1 for rating 1, and 18 for rating 2. Ratings 3 and 4 have zero frequency.</p> <table border="1"> <tr><th>Rating</th><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><th>Frequency</th><td>2</td><td>1</td><td>18</td><td>0</td><td>0</td></tr> </table>	Rating	0	1	2	3	4	Frequency	2	1	18	0	0
Rating	0	1	2	3	4										
Frequency	2	1	18	0	0										
Manufacturing robot (e.g. robotic arm in factory)	1.67	0.80	<p>Detailed description: A histogram for 'Manufacturing robot (e.g. robotic arm in factory)' with a y-axis from 0 to 20 and an x-axis from 0 to 4. The bars show frequencies of approximately 3 for rating 0, 2 for rating 1, 15 for rating 2, and 1 for rating 3. Rating 4 has zero frequency.</p> <table border="1"> <tr><th>Rating</th><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><th>Frequency</th><td>3</td><td>2</td><td>15</td><td>1</td><td>0</td></tr> </table>	Rating	0	1	2	3	4	Frequency	3	2	15	1	0
Rating	0	1	2	3	4										
Frequency	3	2	15	1	0										
Entertainment/toy robot (e.g. Aibo, Furby)	1.62	0.80	<p>Detailed description: A histogram for 'Entertainment/toy robot (e.g. Aibo, Furby)' with a y-axis from 0 to 20 and an x-axis from 0 to 4. The bars show frequencies of approximately 2 for rating 0, 6 for rating 1, 11 for rating 2, and 2 for rating 3. Rating 4 has zero frequency.</p> <table border="1"> <tr><th>Rating</th><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><th>Frequency</th><td>2</td><td>6</td><td>11</td><td>2</td><td>0</td></tr> </table>	Rating	0	1	2	3	4	Frequency	2	6	11	2	0
Rating	0	1	2	3	4										
Frequency	2	6	11	2	0										
Unmanned Aerial Vehicle (UAV)	1.62	0.80	<p>Detailed description: A histogram for 'Unmanned Aerial Vehicle (UAV)' with a y-axis from 0 to 20 and an x-axis from 0 to 4. The bars show frequencies of approximately 3 for rating 0, 3 for rating 1, 14 for rating 2, and 1 for rating 3. Rating 4 has zero frequency.</p> <table border="1"> <tr><th>Rating</th><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><th>Frequency</th><td>3</td><td>3</td><td>14</td><td>1</td><td>0</td></tr> </table>	Rating	0	1	2	3	4	Frequency	3	3	14	1	0
Rating	0	1	2	3	4										
Frequency	3	3	14	1	0										

Robot	<i>M</i>	<i>SD</i>	Histogram
0 =Not sure what it is 1 = Never heard about, seen or used it 2 = Have only heard about or seen this robot 3 = Have used or operated it only occasionally 4 = Have used or operated it frequently			
Military Robot (e.g. search and rescue)	1.48	0.75	
Robot security guard	1.38	0.86	
Domestic/Home robot (e.g. Roomba)	1.33	0.86	
Personal Robot 2 (PR2)	1.23	0.77	
Autonomous Car	1.19	1.03	

Robot	<i>M</i>	<i>SD</i>	Histogram												
0 =Not sure what it is this robot 1 = Never heard about, seen or used it 2 = Have only heard about or seen 3 = Have used or operated it only occasionally 4 = Have used or operated it frequently															
Research robot (e.g. at university or company)	1.19	0.81	<p>Detailed description: A histogram for 'Research robot' with a y-axis from 0 to 20 and an x-axis from 0 to 4. The bars show approximately 5 responses for rating 0, 7 for rating 1, and 9 for rating 2. Ratings 3 and 4 have zero responses.</p> <table border="1"> <caption>Research robot Histogram Data</caption> <thead> <tr><th>Rating</th><th>Frequency</th></tr> </thead> <tbody> <tr><td>0</td><td>5</td></tr> <tr><td>1</td><td>7</td></tr> <tr><td>2</td><td>9</td></tr> <tr><td>3</td><td>0</td></tr> <tr><td>4</td><td>0</td></tr> </tbody> </table>	Rating	Frequency	0	5	1	7	2	9	3	0	4	0
Rating	Frequency														
0	5														
1	7														
2	9														
3	0														
4	0														
Remote presence robot (e.g. Texai, Anybot)	0.86	0.79	<p>Detailed description: A histogram for 'Remote presence robot' with a y-axis from 0 to 20 and an x-axis from 0 to 4. The bars show approximately 8 responses for rating 0, 8 for rating 1, and 5 for rating 2. Ratings 3 and 4 have zero responses.</p> <table border="1"> <caption>Remote presence robot Histogram Data</caption> <thead> <tr><th>Rating</th><th>Frequency</th></tr> </thead> <tbody> <tr><td>0</td><td>8</td></tr> <tr><td>1</td><td>8</td></tr> <tr><td>2</td><td>5</td></tr> <tr><td>3</td><td>0</td></tr> <tr><td>4</td><td>0</td></tr> </tbody> </table>	Rating	Frequency	0	8	1	8	2	5	3	0	4	0
Rating	Frequency														
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1	8														
2	5														
3	0														
4	0														

Robot Usage and Familiarity Questionnaire Summary. We measured different aspects of robot familiarity as well as the frequency of using 13 different types of robots. Participants reported some familiarity with a variety of classes of robots. Participants had no to very little experience using any of the robots. Therefore, overall participants were somewhat familiar with yet inexperienced using robots. These findings suggest that participants' attitudes about robots on the questionnaires that followed were based more so on robots they have heard about or seen rather than based on their usage of robots.

Assistance Preference Checklist

Following a structured group interview discussing robots, in general, and Willow Garage's PR2, specifically, we administered the Assistance Preference Checklist to assess how assistance preferences vary (robot vs. human) as a function of task. We asked participants to imagine they needed assistance in everyday life and then we asked them to indicate their preferences for human or robot assistance with 48 home-based tasks. We instructed participants to assume that the robot could perform the task to the level of a human. Table 6 presents the means, standard deviations, and histograms of participants' responses on the Assistance Preference Checklist. Participants indicated that they preferred assistance from a robot for 28 out of the 48 tasks (based on the criteria of $M > 3.00$ = no preference). The overall descriptives ($M = 2.99$; $SD = 0.42$) suggests that collapsed across all tasks participants did not have a preference for human or robot assistance. However, it is clear from the histograms that participants' assistance preferences did discriminate between tasks (note: statistical comparisons of these data are in progress).

We also asked participants to indicate which tasks they would like the robot to perform if it could only perform 5 of the tasks listed on the checklist. The frequencies for those top 5 preferences for robot assistance are presented in Table 7. Preliminary coding suggests that most responses related to household duties (e.g., cleaning, laundry/ironing, errands, daily chores) or manual labor (e. g., lawn work, lifting/moving heavy objects, gardening). These data suggest that older adults may be most accepting of robots providing assistance with household duties and manual labor tasks.

Table 6

Robot vs. Human Assistance Preferences (Items listed in descending order by mean response; N = 21)

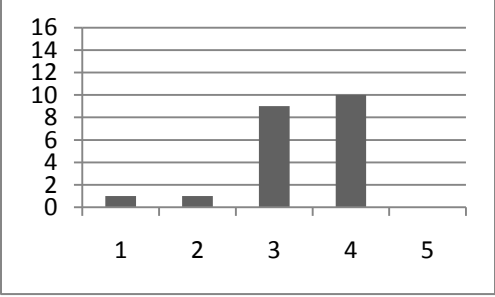
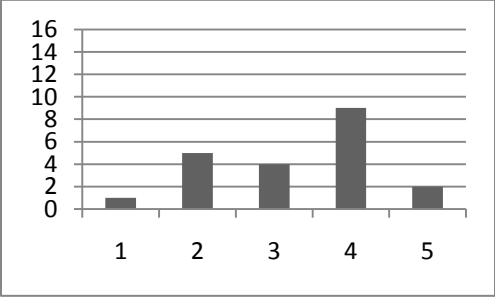
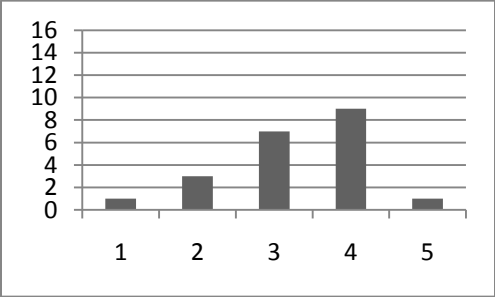
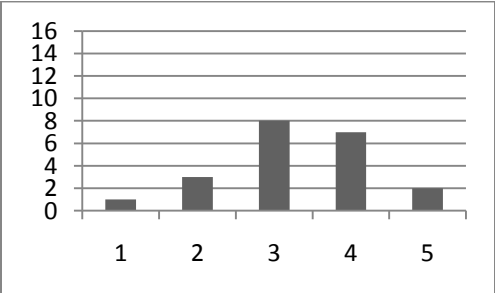
Task	<i>M</i>	<i>SD</i>	Histogram												
1 = Only a human, 2= Prefer a human, 3 = No Preference, 4 = Prefer a robot, 5 = Only a robot															
Maintaining lawn/ raking leaves	3.81	1.03	<table border="1"> <caption>Histogram Data for 'Maintaining lawn/ raking leaves'</caption> <thead> <tr> <th>Response</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> </tr> <tr> <td>2</td> <td>1</td> </tr> <tr> <td>3</td> <td>4</td> </tr> <tr> <td>4</td> <td>10</td> </tr> <tr> <td>5</td> <td>5</td> </tr> </tbody> </table>	Response	Frequency	1	1	2	1	3	4	4	10	5	5
Response	Frequency														
1	1														
2	1														
3	4														
4	10														
5	5														
Fetching objects from floor (e.g. remote control) or other room (e.g. drink from refrigerator)	3.76	0.94	<table border="1"> <caption>Histogram Data for 'Fetching objects from floor...'</caption> <thead> <tr> <th>Response</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> </tr> <tr> <td>2</td> <td>0</td> </tr> <tr> <td>3</td> <td>6</td> </tr> <tr> <td>4</td> <td>10</td> </tr> <tr> <td>5</td> <td>4</td> </tr> </tbody> </table>	Response	Frequency	1	1	2	0	3	6	4	10	5	4
Response	Frequency														
1	1														
2	0														
3	6														
4	10														
5	4														
Picking up/moving heavy objects (e.g. furniture)	3.76	1.00	<table border="1"> <caption>Histogram Data for 'Picking up/moving heavy objects...'</caption> <thead> <tr> <th>Response</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> </tr> <tr> <td>2</td> <td>1</td> </tr> <tr> <td>3</td> <td>4</td> </tr> <tr> <td>4</td> <td>11</td> </tr> <tr> <td>5</td> <td>4</td> </tr> </tbody> </table>	Response	Frequency	1	1	2	1	3	4	4	11	5	4
Response	Frequency														
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3	4														
4	11														
5	4														
Cleaning kitchen	3.71	0.78	<table border="1"> <caption>Histogram Data for 'Cleaning kitchen'</caption> <thead> <tr> <th>Response</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> </tr> <tr> <td>2</td> <td>0</td> </tr> <tr> <td>3</td> <td>4</td> </tr> <tr> <td>4</td> <td>15</td> </tr> <tr> <td>5</td> <td>1</td> </tr> </tbody> </table>	Response	Frequency	1	1	2	0	3	4	4	15	5	1
Response	Frequency														
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4	15														
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Task	<i>M</i>	<i>SD</i>	Histogram												
1 = Only a human, 2= Prefer a human, 3 = No Preference, 4 = Prefer a robot, 5 = Only a robot															
Reaching for objects	3.71	0.96	<table border="1"> <caption>Data for Reaching for objects histogram</caption> <thead> <tr> <th>Preference Level</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>1</td></tr> <tr><td>3</td><td>4</td></tr> <tr><td>4</td><td>12</td></tr> <tr><td>5</td><td>3</td></tr> </tbody> </table>	Preference Level	Frequency	1	1	2	1	3	4	4	12	5	3
Preference Level	Frequency														
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3	4														
4	12														
5	3														
Controlling for pests/rodents	3.67	1.02	<table border="1"> <caption>Data for Controlling for pests/rodents histogram</caption> <thead> <tr> <th>Preference Level</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>2</td></tr> <tr><td>3</td><td>3</td></tr> <tr><td>4</td><td>12</td></tr> <tr><td>5</td><td>3</td></tr> </tbody> </table>	Preference Level	Frequency	1	1	2	2	3	3	4	12	5	3
Preference Level	Frequency														
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4	12														
5	3														
Sweeping/scrubbing/mopping	3.67	0.97	<table border="1"> <caption>Data for Sweeping/scrubbing/mopping histogram</caption> <thead> <tr> <th>Preference Level</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>2</td></tr> <tr><td>3</td><td>2</td></tr> <tr><td>4</td><td>14</td></tr> <tr><td>5</td><td>2</td></tr> </tbody> </table>	Preference Level	Frequency	1	1	2	2	3	2	4	14	5	2
Preference Level	Frequency														
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3	2														
4	14														
5	2														
Finding/delivering items (e.g. car keys, glasses)	3.62	0.92	<table border="1"> <caption>Data for Finding/delivering items histogram</caption> <thead> <tr> <th>Preference Level</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>1</td></tr> <tr><td>3</td><td>5</td></tr> <tr><td>4</td><td>12</td></tr> <tr><td>5</td><td>2</td></tr> </tbody> </table>	Preference Level	Frequency	1	1	2	1	3	5	4	12	5	2
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1 = Only a human, 2= Prefer a human, 3 = No Preference, 4 = Prefer a robot, 5 = Only a robot															
Cleaning bathrooms	3.57	0.93	<table border="1"> <caption>Data for Cleaning bathrooms histogram</caption> <thead> <tr><th>Category</th><th>Frequency</th></tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>2</td></tr> <tr><td>3</td><td>3</td></tr> <tr><td>4</td><td>14</td></tr> <tr><td>5</td><td>1</td></tr> </tbody> </table>	Category	Frequency	1	1	2	2	3	3	4	14	5	1
Category	Frequency														
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3	3														
4	14														
5	1														
Cleaning windows	3.57	0.93	<table border="1"> <caption>Data for Cleaning windows histogram</caption> <thead> <tr><th>Category</th><th>Frequency</th></tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>2</td></tr> <tr><td>3</td><td>3</td></tr> <tr><td>4</td><td>14</td></tr> <tr><td>5</td><td>1</td></tr> </tbody> </table>	Category	Frequency	1	1	2	2	3	3	4	14	5	1
Category	Frequency														
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4	14														
5	1														
Monitoring home/warning about dangers (e.g. fire)	3.57	1.25	<table border="1"> <caption>Data for Monitoring home/warning about dangers (e.g. fire) histogram</caption> <thead> <tr><th>Category</th><th>Frequency</th></tr> </thead> <tbody> <tr><td>1</td><td>3</td></tr> <tr><td>2</td><td>0</td></tr> <tr><td>3</td><td>4</td></tr> <tr><td>4</td><td>10</td></tr> <tr><td>5</td><td>4</td></tr> </tbody> </table>	Category	Frequency	1	3	2	0	3	4	4	10	5	4
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4	10														
5	4														
Changing light bulbs	3.55	0.83	<table border="1"> <caption>Data for Changing light bulbs histogram</caption> <thead> <tr><th>Category</th><th>Frequency</th></tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>0</td></tr> <tr><td>3</td><td>7</td></tr> <tr><td>4</td><td>11</td></tr> <tr><td>5</td><td>1</td></tr> </tbody> </table>	Category	Frequency	1	1	2	0	3	7	4	11	5	1
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Task	<i>M</i>	<i>SD</i>	Histogram												
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Making bed/changing sheets	3.52	0.98	<table border="1"> <caption>Data for 'Making bed/changing sheets' histogram</caption> <thead> <tr> <th>Preference Level</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>2</td></tr> <tr><td>3</td><td>5</td></tr> <tr><td>4</td><td>11</td></tr> <tr><td>5</td><td>2</td></tr> </tbody> </table>	Preference Level	Frequency	1	1	2	2	3	5	4	11	5	2
Preference Level	Frequency														
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Taking out trash/recyclables	3.50	1.19	<table border="1"> <caption>Data for 'Taking out trash/recyclables' histogram</caption> <thead> <tr> <th>Preference Level</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>2</td></tr> <tr><td>2</td><td>2</td></tr> <tr><td>3</td><td>3</td></tr> <tr><td>4</td><td>10</td></tr> <tr><td>5</td><td>3</td></tr> </tbody> </table>	Preference Level	Frequency	1	2	2	2	3	3	4	10	5	3
Preference Level	Frequency														
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5	3														
Being reminded of appointments	3.48	0.93	<table border="1"> <caption>Data for 'Being reminded of appointments' histogram</caption> <thead> <tr> <th>Preference Level</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>1</td></tr> <tr><td>3</td><td>8</td></tr> <tr><td>4</td><td>9</td></tr> <tr><td>5</td><td>2</td></tr> </tbody> </table>	Preference Level	Frequency	1	1	2	1	3	8	4	9	5	2
Preference Level	Frequency														
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Being reminded of appointments	3.48	0.93	<table border="1"> <caption>Data for 'Being reminded of appointments' histogram</caption> <thead> <tr> <th>Preference Level</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>1</td></tr> <tr><td>3</td><td>8</td></tr> <tr><td>4</td><td>9</td></tr> <tr><td>5</td><td>2</td></tr> </tbody> </table>	Preference Level	Frequency	1	1	2	1	3	8	4	9	5	2
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1 = Only a human, 2= Prefer a human, 3 = No Preference, 4 = Prefer a robot, 5 = Only a robot															
Being reminded of daily activities	3.48	0.93	<table border="1"> <caption>Histogram Data for 'Being reminded of daily activities'</caption> <thead> <tr> <th>Category</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> </tr> <tr> <td>2</td> <td>1</td> </tr> <tr> <td>3</td> <td>8</td> </tr> <tr> <td>4</td> <td>9</td> </tr> <tr> <td>5</td> <td>2</td> </tr> </tbody> </table>	Category	Frequency	1	1	2	1	3	8	4	9	5	2
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Loading/unloading dishwasher	3.48	0.93	<table border="1"> <caption>Histogram Data for 'Loading/unloading dishwasher'</caption> <thead> <tr> <th>Category</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> </tr> <tr> <td>2</td> <td>2</td> </tr> <tr> <td>3</td> <td>5</td> </tr> <tr> <td>4</td> <td>12</td> </tr> <tr> <td>5</td> <td>1</td> </tr> </tbody> </table>	Category	Frequency	1	1	2	2	3	5	4	12	5	1
Category	Frequency														
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2	2														
3	5														
4	12														
5	1														
Gardening/pruning	3.43	0.98	<table border="1"> <caption>Histogram Data for 'Gardening/pruning'</caption> <thead> <tr> <th>Category</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> </tr> <tr> <td>2</td> <td>2</td> </tr> <tr> <td>3</td> <td>7</td> </tr> <tr> <td>4</td> <td>9</td> </tr> <tr> <td>5</td> <td>2</td> </tr> </tbody> </table>	Category	Frequency	1	1	2	2	3	7	4	9	5	2
Category	Frequency														
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3	7														
4	9														
5	2														
Getting information on weather/news	3.43	1.08	<table border="1"> <caption>Histogram Data for 'Getting information on weather/news'</caption> <thead> <tr> <th>Category</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2</td> </tr> <tr> <td>2</td> <td>1</td> </tr> <tr> <td>3</td> <td>6</td> </tr> <tr> <td>4</td> <td>10</td> </tr> <tr> <td>5</td> <td>2</td> </tr> </tbody> </table>	Category	Frequency	1	2	2	1	3	6	4	10	5	2
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Opening and closing doors/drawers	3.33	0.80	 <table border="1"> <caption>Data for Histogram: Opening and closing doors/drawers</caption> <thead> <tr> <th>Preference Level</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>1</td></tr> <tr><td>3</td><td>9</td></tr> <tr><td>4</td><td>10</td></tr> <tr><td>5</td><td>0</td></tr> </tbody> </table>	Preference Level	Frequency	1	1	2	1	3	9	4	10	5	0
Preference Level	Frequency														
1	1														
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4	10														
5	0														
Being reminded to take medicine	3.29	1.10	 <table border="1"> <caption>Data for Histogram: Being reminded to take medicine</caption> <thead> <tr> <th>Preference Level</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>5</td></tr> <tr><td>3</td><td>4</td></tr> <tr><td>4</td><td>9</td></tr> <tr><td>5</td><td>2</td></tr> </tbody> </table>	Preference Level	Frequency	1	1	2	5	3	4	4	9	5	2
Preference Level	Frequency														
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3	4														
4	9														
5	2														
Doing laundry	3.29	0.96	 <table border="1"> <caption>Data for Histogram: Doing laundry</caption> <thead> <tr> <th>Preference Level</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>3</td></tr> <tr><td>3</td><td>7</td></tr> <tr><td>4</td><td>9</td></tr> <tr><td>5</td><td>1</td></tr> </tbody> </table>	Preference Level	Frequency	1	1	2	3	3	7	4	9	5	1
Preference Level	Frequency														
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2	3														
3	7														
4	9														
5	1														
Painting (e.g. interior/exterior of home)	3.29	1.01	 <table border="1"> <caption>Data for Histogram: Painting (e.g. interior/exterior of home)</caption> <thead> <tr> <th>Preference Level</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>3</td></tr> <tr><td>3</td><td>8</td></tr> <tr><td>4</td><td>7</td></tr> <tr><td>5</td><td>2</td></tr> </tbody> </table>	Preference Level	Frequency	1	1	2	3	3	8	4	7	5	2
Preference Level	Frequency														
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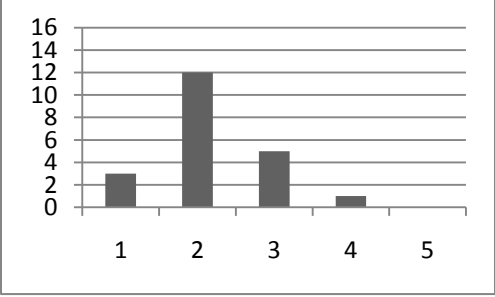
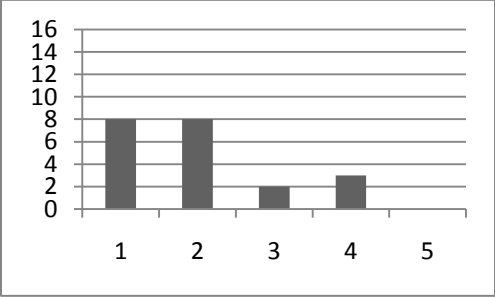
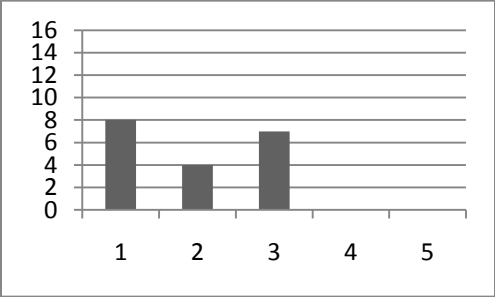
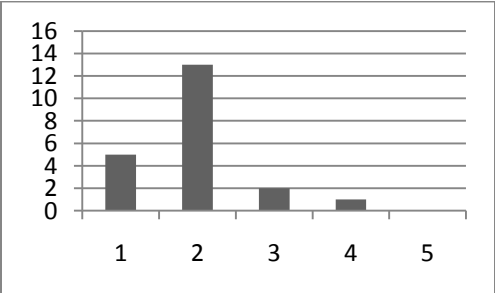
Task	<i>M</i>	<i>SD</i>	Histogram												
1 = Only a human, 2= Prefer a human, 3 = No Preference, 4 = Prefer a robot, 5 = Only a robot															
Sorting mail, shredding, throwing away junk mail	3.29	1.19	<table border="1"> <caption>Histogram Data for 'Sorting mail, shredding, throwing away junk mail'</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>2</td></tr> <tr><td>2</td><td>4</td></tr> <tr><td>3</td><td>3</td></tr> <tr><td>4</td><td>10</td></tr> <tr><td>5</td><td>2</td></tr> </tbody> </table>	Rating	Frequency	1	2	2	4	3	3	4	10	5	2
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4	10														
5	2														
Watering plants	3.29	1.10	<table border="1"> <caption>Histogram Data for 'Watering plants'</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>5</td></tr> <tr><td>3</td><td>4</td></tr> <tr><td>4</td><td>9</td></tr> <tr><td>5</td><td>2</td></tr> </tbody> </table>	Rating	Frequency	1	1	2	5	3	4	4	9	5	2
Rating	Frequency														
1	1														
2	5														
3	4														
4	9														
5	2														
Learning how to use new technologies	3.19	1.21	<table border="1"> <caption>Histogram Data for 'Learning how to use new technologies'</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>3</td></tr> <tr><td>2</td><td>2</td></tr> <tr><td>3</td><td>6</td></tr> <tr><td>4</td><td>8</td></tr> <tr><td>5</td><td>2</td></tr> </tbody> </table>	Rating	Frequency	1	3	2	2	3	6	4	8	5	2
Rating	Frequency														
1	3														
2	2														
3	6														
4	8														
5	2														
Getting information on hobbies/topics of interest	3.14	1.11	<table border="1"> <caption>Histogram Data for 'Getting information on hobbies/topics of interest'</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>2</td></tr> <tr><td>2</td><td>4</td></tr> <tr><td>3</td><td>5</td></tr> <tr><td>4</td><td>9</td></tr> <tr><td>5</td><td>1</td></tr> </tbody> </table>	Rating	Frequency	1	2	2	4	3	5	4	9	5	1
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Task	<i>M</i>	<i>SD</i>	Histogram												
1 = Only a human, 2= Prefer a human, 3 = No Preference, 4 = Prefer a robot, 5 = Only a robot															
Learning new skills (e.g. second language, new technology)	3.10	1.18	<table border="1"> <caption>Data for Learning new skills histogram</caption> <thead> <tr> <th>Preference Level</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>3</td> </tr> <tr> <td>2</td> <td>3</td> </tr> <tr> <td>3</td> <td>5</td> </tr> <tr> <td>4</td> <td>9</td> </tr> <tr> <td>5</td> <td>1</td> </tr> </tbody> </table>	Preference Level	Frequency	1	3	2	3	3	5	4	9	5	1
Preference Level	Frequency														
1	3														
2	3														
3	5														
4	9														
5	1														
keeping refrigerator clean/stocked	3.00	1.21	<table border="1"> <caption>Data for keeping refrigerator clean/stocked histogram</caption> <thead> <tr> <th>Preference Level</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2</td> </tr> <tr> <td>2</td> <td>7</td> </tr> <tr> <td>3</td> <td>1</td> </tr> <tr> <td>4</td> <td>9</td> </tr> <tr> <td>5</td> <td>1</td> </tr> </tbody> </table>	Preference Level	Frequency	1	2	2	7	3	1	4	9	5	1
Preference Level	Frequency														
1	2														
2	7														
3	1														
4	9														
5	1														
Washing dishes by hand	3.00	1.18	<table border="1"> <caption>Data for Washing dishes by hand histogram</caption> <thead> <tr> <th>Preference Level</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2</td> </tr> <tr> <td>2</td> <td>6</td> </tr> <tr> <td>3</td> <td>5</td> </tr> <tr> <td>4</td> <td>6</td> </tr> <tr> <td>5</td> <td>2</td> </tr> </tbody> </table>	Preference Level	Frequency	1	2	2	6	3	5	4	6	5	2
Preference Level	Frequency														
1	2														
2	6														
3	5														
4	6														
5	2														
Repairing plumbing (e.g. fixing leaking faucets)	2.86	1.20	<table border="1"> <caption>Data for Repairing plumbing histogram</caption> <thead> <tr> <th>Preference Level</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>3</td> </tr> <tr> <td>2</td> <td>6</td> </tr> <tr> <td>3</td> <td>4</td> </tr> <tr> <td>4</td> <td>7</td> </tr> <tr> <td>5</td> <td>1</td> </tr> </tbody> </table>	Preference Level	Frequency	1	3	2	6	3	4	4	7	5	1
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Task	<i>M</i>	<i>SD</i>	Histogram												
1 = Only a human, 2= Prefer a human, 3 = No Preference, 4 = Prefer a robot, 5 = Only a robot															
Calling doctors/911	2.67	1.11	<table border="1"> <caption>Data for Calling doctors/911 Histogram</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>3</td></tr> <tr><td>2</td><td>7</td></tr> <tr><td>3</td><td>6</td></tr> <tr><td>4</td><td>4</td></tr> <tr><td>5</td><td>1</td></tr> </tbody> </table>	Rating	Frequency	1	3	2	7	3	6	4	4	5	1
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3	6														
4	4														
5	1														
Grocery shopping	2.67	0.97	<table border="1"> <caption>Data for Grocery shopping Histogram</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>2</td></tr> <tr><td>2</td><td>8</td></tr> <tr><td>3</td><td>6</td></tr> <tr><td>4</td><td>5</td></tr> <tr><td>5</td><td>0</td></tr> </tbody> </table>	Rating	Frequency	1	2	2	8	3	6	4	5	5	0
Rating	Frequency														
1	2														
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3	6														
4	5														
5	0														
Exercising	2.62	1.12	<table border="1"> <caption>Data for Exercising Histogram</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>4</td></tr> <tr><td>2</td><td>5</td></tr> <tr><td>3</td><td>8</td></tr> <tr><td>4</td><td>3</td></tr> <tr><td>5</td><td>1</td></tr> </tbody> </table>	Rating	Frequency	1	4	2	5	3	8	4	3	5	1
Rating	Frequency														
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2	5														
3	8														
4	3														
5	1														
Taking medicine	2.60	1.23	<table border="1"> <caption>Data for Taking medicine Histogram</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>5</td></tr> <tr><td>2</td><td>5</td></tr> <tr><td>3</td><td>3</td></tr> <tr><td>4</td><td>7</td></tr> <tr><td>5</td><td>0</td></tr> </tbody> </table>	Rating	Frequency	1	5	2	5	3	3	4	7	5	0
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5	0														

Task	<i>M</i>	<i>SD</i>	Histogram												
1 = Only a human, 2= Prefer a human, 3 = No Preference, 4 = Prefer a robot, 5 = Only a robot															
Walking	2.55	1.10	<p>Detailed description: A histogram for the 'Walking' task. The x-axis represents ratings from 1 to 5. The y-axis represents frequency from 0 to 16. The bars show the following frequencies: 1: 3, 2: 8, 3: 5, 4: 3, 5: 1.</p> <table border="1"> <tr><th>Rating</th><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><th>Frequency</th><td>3</td><td>8</td><td>5</td><td>3</td><td>1</td></tr> </table>	Rating	1	2	3	4	5	Frequency	3	8	5	3	1
Rating	1	2	3	4	5										
Frequency	3	8	5	3	1										
Setting the table	2.50	1.10	<p>Detailed description: A histogram for the 'Setting the table' task. The x-axis represents ratings from 1 to 5. The y-axis represents frequency from 0 to 16. The bars show the following frequencies: 1: 4, 2: 6, 3: 7, 4: 2, 5: 1.</p> <table border="1"> <tr><th>Rating</th><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><th>Frequency</th><td>4</td><td>6</td><td>7</td><td>2</td><td>1</td></tr> </table>	Rating	1	2	3	4	5	Frequency	4	6	7	2	1
Rating	1	2	3	4	5										
Frequency	4	6	7	2	1										
Brushing teeth	2.48	1.03	<p>Detailed description: A histogram for the 'Brushing teeth' task. The x-axis represents ratings from 1 to 5. The y-axis represents frequency from 0 to 16. The bars show the following frequencies: 1: 4, 2: 7, 3: 6, 4: 4, 5: 0.</p> <table border="1"> <tr><th>Rating</th><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><th>Frequency</th><td>4</td><td>7</td><td>6</td><td>4</td><td>0</td></tr> </table>	Rating	1	2	3	4	5	Frequency	4	7	6	4	0
Rating	1	2	3	4	5										
Frequency	4	7	6	4	0										
Deciding what medication to take	2.38	1.16	<p>Detailed description: A histogram for the 'Deciding what medication to take' task. The x-axis represents ratings from 1 to 5. The y-axis represents frequency from 0 to 16. The bars show the following frequencies: 1: 5, 2: 9, 3: 1, 4: 6, 5: 0.</p> <table border="1"> <tr><th>Rating</th><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><th>Frequency</th><td>5</td><td>9</td><td>1</td><td>6</td><td>0</td></tr> </table>	Rating	1	2	3	4	5	Frequency	5	9	1	6	0
Rating	1	2	3	4	5										
Frequency	5	9	1	6	0										

Task	<i>M</i>	<i>SD</i>	Histogram												
1 = Only a human, 2= Prefer a human, 3 = No Preference, 4 = Prefer a robot, 5 = Only a robot															
Getting dressed	2.38	0.92	<table border="1"> <caption>Data for 'Getting dressed' histogram</caption> <thead> <tr> <th>Category</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>3</td> </tr> <tr> <td>2</td> <td>10</td> </tr> <tr> <td>3</td> <td>5</td> </tr> <tr> <td>4</td> <td>3</td> </tr> <tr> <td>5</td> <td>0</td> </tr> </tbody> </table>	Category	Frequency	1	3	2	10	3	5	4	3	5	0
Category	Frequency														
1	3														
2	10														
3	5														
4	3														
5	0														
Calling family/friends	2.29	1.10	<table border="1"> <caption>Data for 'Calling family/friends' histogram</caption> <thead> <tr> <th>Category</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>6</td> </tr> <tr> <td>2</td> <td>7</td> </tr> <tr> <td>3</td> <td>4</td> </tr> <tr> <td>4</td> <td>4</td> </tr> <tr> <td>5</td> <td>0</td> </tr> </tbody> </table>	Category	Frequency	1	6	2	7	3	4	4	4	5	0
Category	Frequency														
1	6														
2	7														
3	4														
4	4														
5	0														
Eating/feeding myself	2.29	0.90	<table border="1"> <caption>Data for 'Eating/feeding myself' histogram</caption> <thead> <tr> <th>Category</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>5</td> </tr> <tr> <td>2</td> <td>6</td> </tr> <tr> <td>3</td> <td>9</td> </tr> <tr> <td>4</td> <td>1</td> </tr> <tr> <td>5</td> <td>0</td> </tr> </tbody> </table>	Category	Frequency	1	5	2	6	3	9	4	1	5	0
Category	Frequency														
1	5														
2	6														
3	9														
4	1														
5	0														
Bathing	2.24	1.09	<table border="1"> <caption>Data for 'Bathing' histogram</caption> <thead> <tr> <th>Category</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>6</td> </tr> <tr> <td>2</td> <td>8</td> </tr> <tr> <td>3</td> <td>3</td> </tr> <tr> <td>4</td> <td>4</td> </tr> <tr> <td>5</td> <td>0</td> </tr> </tbody> </table>	Category	Frequency	1	6	2	8	3	3	4	4	5	0
Category	Frequency														
1	6														
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Task	<i>M</i>	<i>SD</i>	Histogram										
1 = Only a human, 2= Prefer a human, 3 = No Preference, 4 = Prefer a robot, 5 = Only a robot													
Being entertained (e.g. playing games, dancing)	2.19	0.75	 <table border="1"> <caption>Data for 'Being entertained' histogram</caption> <thead> <tr> <th>Preference</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>3</td> </tr> <tr> <td>2</td> <td>12</td> </tr> <tr> <td>3</td> <td>5</td> </tr> <tr> <td>4</td> <td>1</td> </tr> </tbody> </table>	Preference	Frequency	1	3	2	12	3	5	4	1
Preference	Frequency												
1	3												
2	12												
3	5												
4	1												
Entertaining guests	2.00	1.05	 <table border="1"> <caption>Data for 'Entertaining guests' histogram</caption> <thead> <tr> <th>Preference</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>8</td> </tr> <tr> <td>2</td> <td>8</td> </tr> <tr> <td>3</td> <td>2</td> </tr> <tr> <td>4</td> <td>3</td> </tr> </tbody> </table>	Preference	Frequency	1	8	2	8	3	2	4	3
Preference	Frequency												
1	8												
2	8												
3	2												
4	3												
Shaving	1.95	0.91	 <table border="1"> <caption>Data for 'Shaving' histogram</caption> <thead> <tr> <th>Preference</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>8</td> </tr> <tr> <td>2</td> <td>4</td> </tr> <tr> <td>3</td> <td>7</td> </tr> </tbody> </table>	Preference	Frequency	1	8	2	4	3	7		
Preference	Frequency												
1	8												
2	4												
3	7												
Washing/combing hair	1.95	0.74	 <table border="1"> <caption>Data for 'Washing/combing hair' histogram</caption> <thead> <tr> <th>Preference</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>5</td> </tr> <tr> <td>2</td> <td>13</td> </tr> <tr> <td>3</td> <td>2</td> </tr> <tr> <td>4</td> <td>1</td> </tr> </tbody> </table>	Preference	Frequency	1	5	2	13	3	2	4	1
Preference	Frequency												
1	5												
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Task	<i>M</i>	<i>SD</i>	Histogram												
1 = Only a human, 2= Prefer a human, 3 = No Preference, 4 = Prefer a robot, 5 = Only a robot															
Preparing meals/cooking	1.90	0.91	<table border="1"> <caption>Histogram Data for Preparing meals/cooking</caption> <thead> <tr> <th>Category</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>7</td> </tr> <tr> <td>2</td> <td>10</td> </tr> <tr> <td>3</td> <td>1</td> </tr> <tr> <td>4</td> <td>2</td> </tr> <tr> <td>5</td> <td>0</td> </tr> </tbody> </table>	Category	Frequency	1	7	2	10	3	1	4	2	5	0
Category	Frequency														
1	7														
2	10														
3	1														
4	2														
5	0														

Table 7

Top Preferences for Robot Assistance (N = 21)

If the robot could perform only 5 of the tasks listed on the previous pages, which 5 would you want it to do?	Number of Responses
Household duties	Total = 37
Cleaning	19
Laundry/ironing	3
Errands (e.g., groceries)	4
Daily chores (e.g., cleaning dishes, making beds)	6
Miscellaneous jobs (e.g., changing light bulbs, recycling)	5
Manual labor	Total = 24
Lawn work	5
Lifting/moving heavy objects	11
Gardening/plant maintenance	5
Repairs (e.g., plumbing, painting)	3
Life organization and safety	Total = 17
Task/appointment reminders	6
Medical reminders	5
Household monitoring	3
Warning for danger	3
Object Retrieval	Total = 12
Locating objects	2
Delivering objects	6
Reaching for objects	4
Other Tasks	Total = 5
Education	1
Food preparation	2
Mail retrieval/organization	2

Assistance Preference Checklist Summary. We administered the Assistance Preference Checklist to assess how assistance preferences vary (robot vs. human) as a function of task. This questionnaire was administered following a structured group interview discussing robots, in general, and Willow Garage's PR2, specifically. We asked participants to imagine they needed assistance in everyday life while they indicated their preferences for human or robot assistance with 48 home-based tasks. Participants indicated that they preferred assistance from a robot for 28 out of the 48 tasks. We also asked participants to indicate which tasks they would like the robot to perform if it could only perform 5 of the tasks listed on the checklist. Preliminary coding suggests that most responses related to household duties (e.g., cleaning, laundry/ironing, errands, daily chores) or manual labor (e. g., lawn work, lifting/moving heavy objects, gardening). Overall, these data suggest that older adults are accepting of robots, particularly for household duties and manual labor tasks.

Robot Opinions Questionnaire

We administered the Robot Opinions Questionnaire before and after a group structured interview discussion about robots, which included the presentation of a video about Willow Garage's PR2. Tables 8 - 19 present the means, standard deviations, and histograms of participants' responses to the 12 individual questions of the Robot Opinions Questionnaire. Table 20 presents the mean, standard deviation, and histogram for participants' overall score (i.e., a composite of all 12 questions) on this questionnaire, which was designed to assess robot acceptance. The means for both the pre-discussion and post-discussion overall score were above a 5 (5 = Slightly likely),

suggesting that older adults, in general, are amenable to accepting robots, however inferential statistical comparisons of these data are in progress.

Table 8

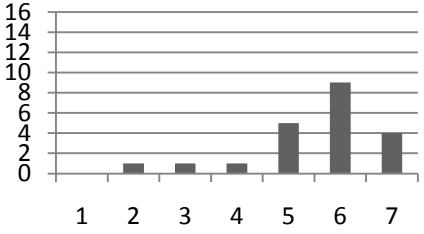
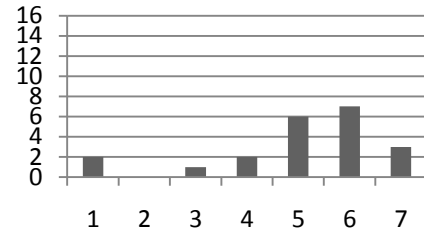
“My interaction with a robot would be clear and understandable.”

Time of Administration	<i>M</i>	<i>SD</i>	Histogram
Pre-Discussion	5.05	1.32	
Post-Discussion	5.57	1.33	

Note. 1= Extremely unlikely 2= Quite unlikely 3= Slightly unlikely 4=Neither 5= Slightly likely 6= Quite likely 7 = Extremely likely

Table 9

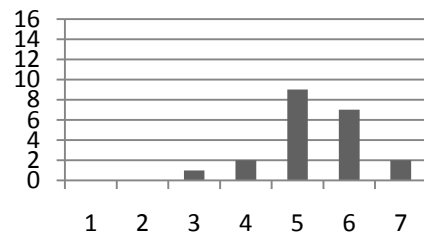
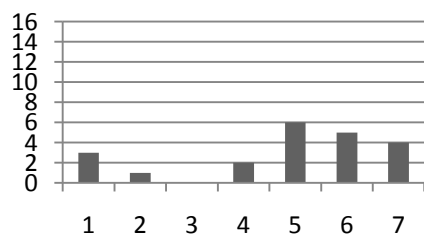
“I would find a robot useful in my daily life.”

Time of Administration	<i>M</i>	<i>SD</i>	Histogram
Pre-Discussion	5.52	1.29	
Post-Discussion	5.05	1.69	

Note. 1= Extremely unlikely 2= Quite unlikely 3= Slightly unlikely 4=Neither 5= Slightly likely 6= Quite likely 7 = Extremely likely

Table 10

“Using a robot would enhance my effectiveness in my daily life.”

Time of Administration	<i>M</i>	<i>SD</i>	Histogram
Pre-Discussion	5.33	0.97	
Post-Discussion	4.81	1.99	

Note. 1= Extremely unlikely 2= Quite unlikely 3= Slightly unlikely 4=Neither 5= Slightly likely 6= Quite likely 7 = Extremely likely

Table 11

“Using a robot in my daily life would increase my productivity.”

Time of Administration	M	SD	Histogram																
Pre-Discussion	4.81	1.40	<table border="1"> <caption>Pre-Discussion Histogram Data</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>0</td></tr> <tr><td>2</td><td>2</td></tr> <tr><td>3</td><td>1</td></tr> <tr><td>4</td><td>5</td></tr> <tr><td>5</td><td>6</td></tr> <tr><td>6</td><td>5</td></tr> <tr><td>7</td><td>2</td></tr> </tbody> </table>	Rating	Frequency	1	0	2	2	3	1	4	5	5	6	6	5	7	2
Rating	Frequency																		
1	0																		
2	2																		
3	1																		
4	5																		
5	6																		
6	5																		
7	2																		
Post-Discussion	4.67	1.94	<table border="1"> <caption>Post-Discussion Histogram Data</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>3</td></tr> <tr><td>2</td><td>1</td></tr> <tr><td>3</td><td>0</td></tr> <tr><td>4</td><td>4</td></tr> <tr><td>5</td><td>4</td></tr> <tr><td>6</td><td>6</td></tr> <tr><td>7</td><td>3</td></tr> </tbody> </table>	Rating	Frequency	1	3	2	1	3	0	4	4	5	4	6	6	7	3
Rating	Frequency																		
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7	3																		

Note. 1= Extremely unlikely 2= Quite unlikely 3= Slightly unlikely 4=Neither 5= Slightly likely 6= Quite likely 7 = Extremely likely

Table 12

“Using a robot would make my daily life easier.”

Time of Administration	M	SD	Histogram																
Pre-Discussion	4.81	1.40	<table border="1"> <caption>Pre-Discussion Histogram Data</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>0</td></tr> <tr><td>2</td><td>1</td></tr> <tr><td>3</td><td>1</td></tr> <tr><td>4</td><td>2</td></tr> <tr><td>5</td><td>7</td></tr> <tr><td>6</td><td>8</td></tr> <tr><td>7</td><td>2</td></tr> </tbody> </table>	Rating	Frequency	1	0	2	1	3	1	4	2	5	7	6	8	7	2
Rating	Frequency																		
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6	8																		
7	2																		
Post-Discussion	4.67	1.94	<table border="1"> <caption>Post-Discussion Histogram Data</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>1</td></tr> <tr><td>3</td><td>0</td></tr> <tr><td>4</td><td>1</td></tr> <tr><td>5</td><td>9</td></tr> <tr><td>6</td><td>6</td></tr> <tr><td>7</td><td>3</td></tr> </tbody> </table>	Rating	Frequency	1	1	2	1	3	0	4	1	5	9	6	6	7	3
Rating	Frequency																		
1	1																		
2	1																		
3	0																		
4	1																		
5	9																		
6	6																		
7	3																		

Note. 1= Extremely unlikely 2= Quite unlikely 3= Slightly unlikely 4=Neither 5= Slightly likely 6= Quite likely 7 = Extremely likely

Table 13

“Using a robot would improve my daily life.”

Time of Administration	<i>M</i>	<i>SD</i>	Histogram																
Pre-Discussion	5.14	1.24	<table border="1"> <caption>Pre-Discussion Histogram Data</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>0</td></tr> <tr><td>2</td><td>1</td></tr> <tr><td>3</td><td>1</td></tr> <tr><td>4</td><td>3</td></tr> <tr><td>5</td><td>7</td></tr> <tr><td>6</td><td>7</td></tr> <tr><td>7</td><td>2</td></tr> </tbody> </table>	Rating	Frequency	1	0	2	1	3	1	4	3	5	7	6	7	7	2
Rating	Frequency																		
1	0																		
2	1																		
3	1																		
4	3																		
5	7																		
6	7																		
7	2																		
Post-Discussion	5.14	1.42	<table border="1"> <caption>Post-Discussion Histogram Data</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>1</td></tr> <tr><td>3</td><td>0</td></tr> <tr><td>4</td><td>2</td></tr> <tr><td>5</td><td>7</td></tr> <tr><td>6</td><td>8</td></tr> <tr><td>7</td><td>2</td></tr> </tbody> </table>	Rating	Frequency	1	1	2	1	3	0	4	2	5	7	6	8	7	2
Rating	Frequency																		
1	1																		
2	1																		
3	0																		
4	2																		
5	7																		
6	8																		
7	2																		

Note. 1= Extremely unlikely 2= Quite unlikely 3= Slightly unlikely 4=Neither 5= Slightly likely 6= Quite likely 7 = Extremely likely

Table 14

“Using a robot in my daily life would enable me to accomplish tasks more quickly.”

Time of Administration	<i>M</i>	<i>SD</i>	Histogram																
Pre-Discussion	5.15	1.40	<table border="1"> <caption>Pre-Discussion Histogram Data</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>0</td></tr> <tr><td>2</td><td>1</td></tr> <tr><td>3</td><td>2</td></tr> <tr><td>4</td><td>1</td></tr> <tr><td>5</td><td>8</td></tr> <tr><td>6</td><td>5</td></tr> <tr><td>7</td><td>3</td></tr> </tbody> </table>	Rating	Frequency	1	0	2	1	3	2	4	1	5	8	6	5	7	3
Rating	Frequency																		
1	0																		
2	1																		
3	2																		
4	1																		
5	8																		
6	5																		
7	3																		
Post-Discussion	5.00	2.19	<table border="1"> <caption>Post-Discussion Histogram Data</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>3</td></tr> <tr><td>2</td><td>2</td></tr> <tr><td>3</td><td>0</td></tr> <tr><td>4</td><td>0</td></tr> <tr><td>5</td><td>4</td></tr> <tr><td>6</td><td>6</td></tr> <tr><td>7</td><td>6</td></tr> </tbody> </table>	Rating	Frequency	1	3	2	2	3	0	4	0	5	4	6	6	7	6
Rating	Frequency																		
1	3																		
2	2																		
3	0																		
4	0																		
5	4																		
6	6																		
7	6																		

Note. 1= Extremely unlikely 2= Quite unlikely 3= Slightly unlikely 4=Neither 5= Slightly likely 6= Quite likely 7 = Extremely likely

Table 15

“I would find a robot easy to use.”

Time of Administration	<i>M</i>	<i>SD</i>	Histogram																
Pre-Discussion	5.10	1.41	<table border="1"> <caption>Data for Pre-Discussion Histogram</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>0</td></tr> <tr><td>2</td><td>2</td></tr> <tr><td>3</td><td>2</td></tr> <tr><td>4</td><td>0</td></tr> <tr><td>5</td><td>6</td></tr> <tr><td>6</td><td>10</td></tr> <tr><td>7</td><td>1</td></tr> </tbody> </table>	Rating	Frequency	1	0	2	2	3	2	4	0	5	6	6	10	7	1
Rating	Frequency																		
1	0																		
2	2																		
3	2																		
4	0																		
5	6																		
6	10																		
7	1																		
Post-Discussion	5.48	1.29	<table border="1"> <caption>Data for Post-Discussion Histogram</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>0</td></tr> <tr><td>3</td><td>0</td></tr> <tr><td>4</td><td>1</td></tr> <tr><td>5</td><td>7</td></tr> <tr><td>6</td><td>9</td></tr> <tr><td>7</td><td>3</td></tr> </tbody> </table>	Rating	Frequency	1	1	2	0	3	0	4	1	5	7	6	9	7	3
Rating	Frequency																		
1	1																		
2	0																		
3	0																		
4	1																		
5	7																		
6	9																		
7	3																		

Note. 1= Extremely unlikely 2= Quite unlikely 3= Slightly unlikely 4=Neither 5= Slightly likely 6= Quite likely 7 = Extremely likely

Table 16

“I would find a robot to be flexible for me to interact with.”

Time of Administration	<i>M</i>	<i>SD</i>	Histogram																
Pre-Discussion	5.29	1.01	<table border="1"> <caption>Data for Pre-Discussion Histogram</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>0</td></tr> <tr><td>2</td><td>0</td></tr> <tr><td>3</td><td>2</td></tr> <tr><td>4</td><td>0</td></tr> <tr><td>5</td><td>11</td></tr> <tr><td>6</td><td>6</td></tr> <tr><td>7</td><td>2</td></tr> </tbody> </table>	Rating	Frequency	1	0	2	0	3	2	4	0	5	11	6	6	7	2
Rating	Frequency																		
1	0																		
2	0																		
3	2																		
4	0																		
5	11																		
6	6																		
7	2																		
Post-Discussion	5.05	1.69	<table border="1"> <caption>Data for Post-Discussion Histogram</caption> <thead> <tr> <th>Rating</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>1</td><td>2</td></tr> <tr><td>2</td><td>1</td></tr> <tr><td>3</td><td>0</td></tr> <tr><td>4</td><td>0</td></tr> <tr><td>5</td><td>8</td></tr> <tr><td>6</td><td>8</td></tr> <tr><td>7</td><td>2</td></tr> </tbody> </table>	Rating	Frequency	1	2	2	1	3	0	4	0	5	8	6	8	7	2
Rating	Frequency																		
1	2																		
2	1																		
3	0																		
4	0																		
5	8																		
6	8																		
7	2																		

Note. 1= Extremely unlikely 2= Quite unlikely 3= Slightly unlikely 4=Neither 5= Slightly likely 6= Quite likely 7 = Extremely likely

Table 17

“It would be easy for me to become skillful at using a robot.”

Time of Administration	M	SD	Histogram
Pre-Discussion	5.19	1.50	
Post-Discussion	5.48	1.44	

Note. 1= Extremely unlikely 2= Quite unlikely 3= Slightly unlikely 4=Neither 5= Slightly likely 6= Quite likely 7 = Extremely likely

Table 18

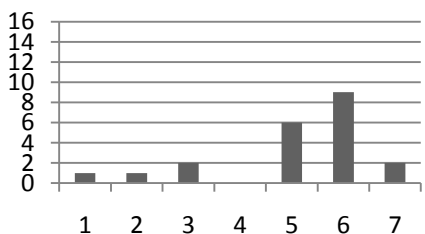
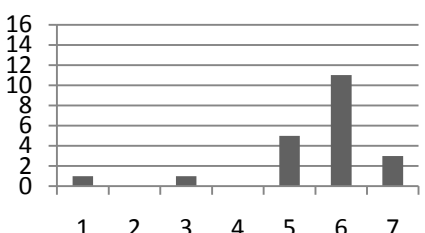
“I would find it easy to get a robot to do what I want it to do.”

Time of Administration	M	SD	Histogram
Pre-Discussion	4.95	1.56	
Post-Discussion	5.57	1.22	

Note. 1= Extremely unlikely 2= Quite unlikely 3= Slightly unlikely 4=Neither 5= Slightly likely 6= Quite likely 7 = Extremely likely

Table 19

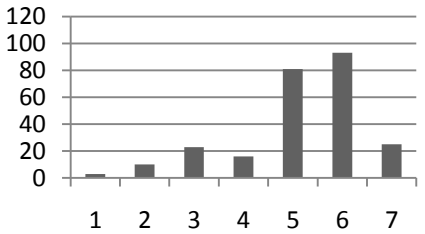
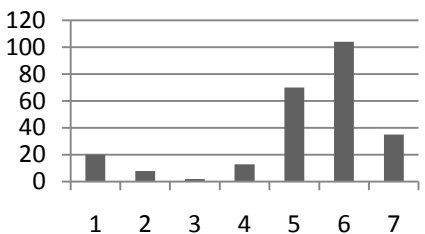
“Learning to operate a robot would be easy for me.”

Time of Administration	M	SD	Histogram
Pre-Discussion	5.10	1.58	
Post-Discussion	5.52	1.36	

Note. 1= Extremely unlikely 2= Quite unlikely 3= Slightly unlikely 4=Neither 5= Slightly likely 6= Quite likely 7 = Extremely likely

Table 20

Overall Robot Opinions Scores

Time of Administration	M	SD	Histogram
Pre-Discussion	5.16	1.32	
Post-Discussion	5.21	1.60	

Note. 1= Extremely unlikely 2= Quite unlikely 3= Slightly unlikely 4=Neither 5= Slightly likely 6= Quite likely 7 = Extremely likely

Robot Opinions Questionnaire Summary. We administered the Robot Opinions Questionnaire before and after a group structured interview discussion about robots, which included the presentation of a video about Willow Garage's PR2. Overall, these preliminary results suggest that participants were amenable to accepting robots before and after the group structured interview discussion; however inferential statistical comparisons of these data are in progress.

Discussion

Robots have the potential to support older adults as they age in place (Smarr, Fausset, & Rogers, 2011), for activities such as self-maintenance, instrumental, and enhanced activities of daily living (Lawton, 1990; Rogers, Meyer, Walker, & Fisk, 1998). However, it is unclear whether older adults will be accepting of robot assistance for the tasks related to these activities. Moreover, it is possible that their acceptance is dependent on factors such as task context or robot familiarity and experience.

We collected data from 21 independent living older adults (65 - 93 years of age) to assess their acceptance of robots, in general, and of the PR2, specifically, for various home-based tasks. Participants were diverse in terms of race/ethnicity and education and most had computer experience. We assessed participants' familiarity and usage of robots and found that many participants had heard about or seen different types of robots; few however had experience using robots.

We also examined participants' preferences for human vs. robot assistance for various home-based tasks. Collapsed across all tasks older adults did not show a preference for human or robot assistance. However, this result is misleading because preferences varied across tasks. We are determining the appropriate statistical techniques that will enable us to make certain conclusions about these data. Participants did indicate that they preferred assistance from a robot for 28 out of the 48 tasks (based on the criterion of $M > 3.00$, where 3 = no preference). Furthermore, when we asked participants to list the top 5 tasks for which they would prefer robot assistance most responses were categorized as household duties (e.g., cleaning, laundry/ironing,

errands, daily chores) or manual labor (e. g., lawn work, lifting/moving heavy objects, gardening). These data suggest that robots designed to perform household and manual labor tasks may be acceptable to older adults.

Lastly, we assessed robot acceptance before and after a discussion about robots, in general, as well as Willow Garage's PR2, in particular. The results of both assessments showed that overall participants were "slightly likely" to accept robots. Hence, despite their limited experience with robots participants' attitudes were not negative overall. Given that general measures of technology acceptance have been used to predict and explain technology use (e.g., Davis, 1989), these findings suggest that older users are willing to use assistive robots in their daily lives.

Again, this report presents descriptive statistics from the data we collected in this study. Inferential statistical comparisons are in progress. Our planned analyses will elucidate older adults' needs and preferences for robot assistance, as well as provide insight about the factors that drive those needs and preferences. By assessing older adults' acceptance of robots and including older adults early on in the design process, designers will be able to develop robots that are more likely to be accepted and adopted by older users. It is important to note that the participants in the present study were relatively healthy, independent elders and there is a need to extend this research to older adults in different contexts, such as those who live in assisted and skilled nursing residences and have greater needs for assistance.

References

- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.
- Lawton, M. P., & Brody, E. M. (1969). Assessment of older people: Self-maintaining and instrumental activities of daily living. *The Gerontologist*, 9, 179-186.
- Mitzner, T. L., Chen, T. L., Kemp, C. C., & Rogers, W. A. (2011). *Critical opportunities for assisting older adults as a function of living environment* (HFA-TR-1104). Atlanta, GA: Georgia Institute of Technology, School of Psychology, Human Factors and Aging Laboratory.
- Rogers, W. A., Meyer, B., Walker, N., & Fisk, A. D. (1998). Functional limitations to daily living tasks in the aged: A focus group analysis. *Human Factors*, 40(1), 111-125.
- Smarr, C., Fausset, C. B., & Rogers, W. A. (2011). *Understanding the potential for robot assistance for older adults in the home environment* (HFA-TR-1102). Atlanta, GA: Georgia Institute of Technology, School of Psychology, Human Factors and Aging Laboratory.

Appendix A: Background & Health Questionnaire

Background & Health Questionnaire

PLEASE READ:

- **We would like to know a little about your background and health.**
- **Please answer the following questions by placing an X in the appropriate box.**
- **Remember, this is an anonymous questionnaire.**
- **Published documents regarding these answers will not identify individuals with their answers.**
- **If there is a question you do not wish to answer, please just leave it blank and go on to the next question.**
- **Thank you in advance for your help.**

Background Information

Gender: Male ₁ **Female** ₂

Age: _____

1. What is your highest level of education?

- ₁ No formal education
- ₂ Less than high school graduate
- ₃ High school graduate/GED
- ₄ Vocational training
- ₅ Some college/Associate's degree
- ₆ Bachelor's degree (BA, BS)
- ₇ Master's degree (or other post-graduate training)
- ₈ Doctoral degree (PhD, MD, EdD, DDS, JD, etc.)

2. Current marital status (check one)

- ₁ Single
- ₂ Married
- ₃ Separated
- ₄ Divorced
- ₅ Widowed
- ₆ Other (please specify) _____

3. Do you consider yourself Hispanic or Latino?

₁ Yes

₂ No

3 a. If "Yes", would you describe yourself:

₁ Cuban

₂ Mexican

₃ Puerto Rican

₄ Other (please specify) _____

4. How would you describe your primary racial group?

₁ No Primary Group

₂ White/Caucasian

₃ Black/African American

₄ Asian

₅ American Indian/Alaska Native

₆ Native Hawaiian/Pacific Islander

₇ Multi-racial

₈ Other (please specify) _____

5. In which type of housing do you live?

- ₁ Residence hall/College dormitory
- ₂ House/Apartment/Condominium
- ₃ Senior housing (independent)
- ₄ Assisted living
- ₅ Nursing home
- ₆ Relative's home
- ₇ Other (please specify) _____

6. Is English your primary language?

- ₁ Yes
- ₂ No

6 a. If "No", what is your primary language? _____

Health Information

1. In general, would you say your health is:

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Poor	Fair	Good	Very good	Excellent

2. Compared to other people your own age, would you say your health is:

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Poor	Fair	Good	Very good	Excellent

3. How satisfied are you with your present health?

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Not at all satisfied	Not very satisfied	Neither satisfied nor dissatisfied	Somewhat satisfied	Extremely satisfied

4. How often do health problems stand in the way of your doing the things you want to do?

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Never	Seldom	Sometimes	Often	Always

5. The following items are about activities you might do during a typical day. Does your health now limit you in these activities? Check one box for each type of activity.

	Limited a lot₁	Limited a little₂	Not limited at all₃
a. Bathing or dressing yourself			
b. Bending, kneeling, or stooping			
c. Climbing one flight of stairs			
d. Climbing several flights of stairs			
e. Lifting or carrying groceries			
f. Moderate activities , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf			
g. Vigorous activities , such as running, lifting heavy objects, or participating in strenuous sports (e.g., swimming laps)			
h. Walking more than a mile			
i. Walking one block			
j. Walking several blocks			

6. For each of the following conditions please indicate if you have ever had that condition in your life, have the condition now at this time or never had the condition. Check one box for each condition.

<i>Condition</i>	In your lifetime₁	Now₂	Never₃
a. Arthritis			
b. Asthma or Bronchitis			
c. Cancer (other than skin cancer)			
d. Diabetes			
e. Epilepsy			
f. Heart Disease			
g. Hypertension			
h. Stroke			
i. Other significant illnesses (please list)			

6. The next set of questions is about your vision and hearing. Please indicate if you have any of the following conditions:

a. Do you use eyeglasses?

₁ Yes ₂ No

b. Do you now have trouble seeing with one or both eyes, even when wearing glasses?

₁ Yes ₂ No

c. Do you use hearing aids?

₁ Yes ₂ No

d. Do you now have any trouble hearing with one or both ears?

₁ Yes ₂ No

Medication Information Form

Please list the medical products that you are currently taking. Include medicinal herbs, vitamins, aspirin, etc., as well as prescription medications (copy names from label if possible).

Below is an example of how to fill out the form. If you take Ibuprofen for Arthritis two times a day, you would fill the form out as shown in the example below. There is space for up to eight different medications. If you take more than eight medications regularly, please list the rest on the back of the last page.

Name of Medication	Reason for taking medication	How often do you take this medication? (Please select one)
<p>Example:</p> <p><i>Ibuprofen</i></p>	<p><i>Arthritis</i></p>	<p><input checked="" type="checkbox"/> Daily <u>2</u> times/day <input type="checkbox"/> Weekly _____ times/week</p> <p><input type="checkbox"/> Monthly _____ times/month <input type="checkbox"/> As Needed</p>

Please turn the page to list your medications

Name of Medication	Reason for taking medication	How often do you take this medication? (Please select one)
1.		<input type="checkbox"/> Daily _____ times/day <input type="checkbox"/> Weekly _____ times/week <input type="checkbox"/> Monthly _____ times/month <input type="checkbox"/> As Needed
2.		<input type="checkbox"/> Daily _____ times/day <input type="checkbox"/> Weekly _____ times/week <input type="checkbox"/> Monthly _____ times/month <input type="checkbox"/> As Needed
3.		<input type="checkbox"/> Daily _____ times/day <input type="checkbox"/> Weekly _____ times/week <input type="checkbox"/> Monthly _____ times/month <input type="checkbox"/> As Needed
4.		<input type="checkbox"/> Daily _____ times/day <input type="checkbox"/> Weekly _____ times/week <input type="checkbox"/> Monthly _____ times/month <input type="checkbox"/> As Needed

Name of Medication	Reason for taking medication	How often do you take this medication? (Please select one)
5.		<input type="checkbox"/> Daily _____ times/day <input type="checkbox"/> Weekly _____ times/week <input type="checkbox"/> Monthly _____ times/month <input type="checkbox"/> As Needed
6.		<input type="checkbox"/> Daily _____ times/day <input type="checkbox"/> Weekly _____ times/week <input type="checkbox"/> Monthly _____ times/month <input type="checkbox"/> As Needed
7.		<input type="checkbox"/> Daily _____ times/day <input type="checkbox"/> Weekly _____ times/week <input type="checkbox"/> Monthly _____ times/month <input type="checkbox"/> As Needed
8.		<input type="checkbox"/> Daily _____ times/day <input type="checkbox"/> Weekly _____ times/week <input type="checkbox"/> Monthly _____ times/month <input type="checkbox"/> As Needed

Appendix B: Technology Experience Questionnaire

Technology Experience Questionnaire

PLEASE READ:

- **For the following questions, please think about your experiences in the last year with the different technologies.**
- **Think about your interactions with technologies inside and outside of your own home.**
- **Also, think about not only using your own technologies but also those of others.**
- **Please answer all questions by placing a check mark at the appropriate response or by circling the most appropriate response.**

Technology Experience

1. Within the last year, please indicate how much you have used any of the technologies listed below.

	Not sure what it is ₁	Not used ₂	Used once ₃	Used occasionally ₄	Used frequently ₅
a. Answering machine					
b. Automated telephone menu system					
c. Automatic teller machine (ATM)					
d. Books on tape or compact disk (CD)					
e. Cell phone					
f. Copier					
g. Digital photography (e.g., camera, camcorder)					
h. Electronic book-reader (e.g., Kindle)					
i. Fax machine					
j. Home security system					
k. In-car navigation system (e.g., GPS, OnStar)					
l. In-store automated kiosk (e.g., self-checkout)					
m. Microwave oven					
n. MP3/iPod music player					
o. Personal digital assistant (PDA)					

	Not sure what it is ₁	Not used ₂	Used once ₃	Used occasionally ₄	Used frequently ₅
p. Programmable devices (e.g., thermostat, coffee maker)					
q. Recording and playback device (e.g., CD, DVD, VCR, DVR)					

2. Do you ever use a computer and/or the Internet?

₁ Yes ₂ No

3. How often do you use the computer and/or Internet each week?

- ₁ Less than 1 hour/week
- ₂ Between 1-5 hours/week
- ₃ More than 5, but less than 10 hours/week
- ₄ 10 or more hours/week

4. How long have you been using the computer and/or Internet?

- ₁ Less than 6 months
- ₂ Between 6 months and 1 year
- ₃ More than 1 year, but less than 5 years
- ₄ 5 or more years

Appendix C: Robot Familiarity and Use Questionnaire

Robot Familiarity and Use Questionnaire

For the following robots, please indicate your familiarity in terms of hearing about them, using them, or operating them. Please circle only one option.

Robots	Not sure what this is ₀	Never heard about, seen, or used this robot ₁	Have only heard about or seen this robot ₂	Have used or operated this robot <u>only occasionally</u> ₃	Have used or operated this robot <u>frequently</u> ₄
1. Autonomous Car	0	1	2	3	4
2. Domestic/Home robot (e.g., Roomba)	0	1	2	3	4
3. Entertainment/toy robot (e.g., Aibo, Furby)	0	1	2	3	4
4. Manufacturing robot (e.g., robotic arm in factory)	0	1	2	3	4
5. Military Robot (e.g., search and rescue)	0	1	2	3	4
6. Personal Robot 2 (PR2)	0	1	2	3	4
7. Remote presence robot (e.g., Texai, Anybot)	0	1	2	3	4
8. Research robot (e.g., at university or company)	0	1	2	3	4
9. Robot lawn mower	0	1	2	3	4
10. Robot security guard	0	1	2	3	4
11. Space exploration robot (e.g., Mars Rover)	0	1	2	3	4
12. Surgical robot (e.g., da Vinci Surgical System)	0	1	2	3	4
13. Unmanned Aerial Vehicle (UAV)	0	1	2	3	4

Appendix D: Assistance Preference Checklist

Assistance Preference Checklist

We are interested in learning about older adults' preferences for assistance in performing daily living tasks. In particular, we are looking for opinions about human assistance and robot assistance. When completing this questionnaire, please imagine you need assistance in everyday life with various tasks.

For each of the following tasks, please provide your opinion about your:

- Preference for human assistance
- No preference
- Preference for robot assistance

Assume that the robot could perform the task to the level of a human.

Please circle the most appropriate response for your general preference (we understand that there may be exceptions).

On the last page, there is space for you to provide additional comments about your preferences for having robot and human assistance.

If I needed assistance with...	If I needed assistance, I would prefer help from...				
	Only a human ₁	Prefer a human ₂	No Preference ₃	Prefer a robot ₄	Only a robot ₅
a. Bathing	1	2	3	4	5
b. Being entertained (e.g., playing games, dancing)	1	2	3	4	5
c. Being reminded of appointments	1	2	3	4	5
d. Being reminded of daily activities	1	2	3	4	5
e. Being reminded to take medicine	1	2	3	4	5
f. Brushing teeth	1	2	3	4	5
g. Calling doctors/911	1	2	3	4	5
h. Calling family/friends	1	2	3	4	5
i. Changing light bulbs	1	2	3	4	5
j. Cleaning bathrooms	1	2	3	4	5
k. Cleaning kitchen	1	2	3	4	5
l. Cleaning windows	1	2	3	4	5
m. Controlling for pests/rodents	1	2	3	4	5
n. Deciding what medication to take	1	2	3	4	5
o. Doing laundry	1	2	3	4	5
p. Eating/feeding myself	1	2	3	4	5
q. Entertaining guests	1	2	3	4	5
r. Exercising	1	2	3	4	5
s. Fetching objects from floor (e.g., remote control) or other room (e.g., drink from refrigerator)	1	2	3	4	5
t. Finding/delivering items (e.g., car keys, glasses)	1	2	3	4	5
u. Gardening/pruning	1	2	3	4	5
v. Getting dressed	1	2	3	4	5
w. Getting information on hobbies/topics of interest	1	2	3	4	5
x. Getting information on weather/news	1	2	3	4	5

If I needed assistance with...	If I needed assistance, I would prefer help from...				
	Only a human ₁	Prefer a human ₂	No Preference ₃	Prefer a robot ₄	Only a robot ₅
y. Grocery shopping	1	2	3	4	5
z. Keeping refrigerator clean/stocked	1	2	3	4	5
aa. Learning how to use new technologies	1	2	3	4	5
bb. Learning new skills (e.g., second language, new technology)	1	2	3	4	5
cc. Loading/unloading dishwasher	1	2	3	4	5
dd. Maintaining lawn/raking leaves	1	2	3	4	5
ee. Making bed/changing sheets	1	2	3	4	5
ff. Monitoring home/warning about dangers (e.g., fire)	1	2	3	4	5
gg. Opening and closing doors/drawers	1	2	3	4	5
hh. Painting (e.g., interior/exterior of home)	1	2	3	4	5
ii. Picking up/moving heavy objects (e.g., furniture)	1	2	3	4	5
jj. Preparing meals/cooking	1	2	3	4	5
kk. Reaching for objects	1	2	3	4	5
ll. Repairing plumbing (e.g., fixing leaking faucets)	1	2	3	4	5
mm. Setting the table	1	2	3	4	5
nn. Shaving	1	2	3	4	5
oo. Sorting mail, shredding, throwing away junk mail	1	2	3	4	5
pp. Sweeping/scrubbing/mopping	1	2	3	4	5
qq. Taking medicine	1	2	3	4	5
rr. Taking out trash/recyclables	1	2	3	4	5
ss. Walking	1	2	3	4	5
tt. Washing dishes by hand	1	2	3	4	5
uu. Washing/combing hair	1	2	3	4	5
vv. Watering plants	1	2	3	4	5

2. If the robot could perform only 5 of the tasks listed on the previous pages, which 5 would you want it to do? (you may list from 0-5 tasks)

1) _____

2) _____

3) _____

4) _____

5) _____

3. Please write any comments about how you answered these questions here:

4. Are there any additional tasks with which you would like robotic assistance? (you may list from 0-5 additional tasks)

1) _____

2) _____

3) _____

4) _____

5) _____

Appendix E: Robot Opinions Questionnaire

Robot Opinions Questionnaire

Imagine that you have the opportunity to use or operate a robot. Please place an X in the response box that best represents your general opinion (we understand that there may be exceptions).

1. My interaction with a robot would be clear and understandable.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

2. I would find a robot useful in my daily life.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

3. Using a robot would enhance my effectiveness in my daily life.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

4. Using a robot in my daily life would increase my productivity.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

5. Using a robot would make my daily life easier.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

6. Using a robot would improve my daily life.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

7. Using a robot in my daily life would enable me to accomplish tasks more quickly.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

8. I would find a robot easy to use.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

9. I would find a robot to be flexible for me to interact with.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

10. It would be easy for me to become skillful at using a robot.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

11. I would find it easy to get a robot to do what I want it to do.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely

12. Learning to operate a robot would be easy for me.

<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Neither	Slightly Likely	Quite Likely	Extremely Likely