Motivating Children to Tidy up their Toys with a Robotic Box

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\textbf{Idea:} Motivate children to tidy up their room

- Make tidying up more pleasant and playful
- Interactive robotic box “Ranger” developed at EPFL
- Evaluate first remote controlled prototype in families
- study adoption of domestic robots
- explore niches for robotics in daily lives of humans

\textbf{Method:} Wizard-of-Oz experiments

- 14 families (31 children (2-10 years), 17 parents)
- 2 different robot behaviors (conditions):
  - \textit{active} (system-driven)
  - \textit{passive} (learner-driven)
- Measurements: empirical, behavioral, subjective data

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{ranger_robot.png}
\caption{Interactive robotic box “Ranger” developed at EPFL}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{ranger_robot_before_after.png}
\caption{Room before (left) and after (right) tidying up with Ranger.}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{ranger_robot_photo.png}
\caption{Photo below: Two boys with Ranger.}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{ranger_robot_results.png}
\caption{Results: Child-robot interaction}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{ranger_robot_evaluation.png}
\caption{Evaluation: Family’s feedback}
\end{figure}

\textbf{Evaluation: Family’s feedback}

- Both children and parents like Ranger
- Appealing design (simple wood, colors, sounds, eyes)
- Wish of having several boxes and probably speech

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{ranger_robot_contacts.png}
\caption{Contact}
\end{figure}

\textbf{References}


\textbf{Results: Child-robot interaction}

- 14 videos (~3 hours interaction)
- Duration: 5:27 min, (M = 704 s, SD = 245 s)
- Delay first object: 23 sec - 23 min, average 2:22 min
- 1740 activities: 47 % of the time children explore the box

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{ranger_robot_results.png}
\caption{More toys put / removed when box is \textit{passive} compared to \textit{active}. Comparing means ANOVA: (F (1,29) = 4.18, p = .05) / (F (1,29) = 3.48, p = .072)}
\end{figure}

- in active condition: more explore, misuse, touch, gestures
- children describe Ranger as “happy” / “unhappy”

\textbf{Future Work}

- Controlled experiments to study which features of robot contribute to the overall effect
- Long-term field study to investigate what happens beyond initial adoption

\textbf{Conclusions}

- Robot’s behavior impacts how children interact with it
  - An interactive robot is engaging but also distracts
  - A passive robot supports better a “task” like tidying
- Robot’s design could be personalized
  - Qualitative gender and age differences in interaction
  - Each child has personal preferences
- Design needs to enable sustainable interaction
  - Strong novelty effects ask for “evolving robot”
  - Adapted to family’s needs

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