

# Annotation scheme for systematic review “CAs and Children”

*Note that many annotations are followed by a “xxx\_txt” column, where the actual text from the document is pasted on which the annotation was based.*

Annotation column	Annotation options	Explanation
id	#	Unique number for item in database
year	#	Year of publication
submissiontype	in proceedings article conference	According to acm/scopus
venue	text	Where item was published
venue_acc	hci robot/agent CCI speech CUI misc	Where item was published in bins: Hci: technology related but not specific about agents/robots or children (e.g., CHI) robot/agent: specific about robot/agent but not children (e.g. HRI) CCI: technology with children, not necessarily robot/agent (e.g., IDC) Speech: speech venues (e.g., Interspeech) CUI: published at the recently started CUI conference, specific about conversational interfaces Misc: anything not fitting the above (e.g., child psychology journal)
journalorconference	journal conference	Was this publication venue a journal or conference?
country	text	Countries of researchers' labs

Annotation column	Annotation options	Explanation
region	Europe North America South America Oceania East Asia South Asia Southeast Asia Central Asia Western Asia combination	What region does the research comes from, based on 'country' Europe: anything on continent Europe North America: anything from Caribbean and up South America: anything below Caribbean Oceania: Australia, Papua New Guinea, New Zealand, Fiji, the Solomon Islands, Federated States Of Micronesia, Vanuatu, Samoa, Kiribati, Tonga, the Marshall Islands, Palau, Tuvalu, and Nauru South Asia: Sri Lanka, Bangladesh, India, Afghanistan, Pakistan, Bhutan, Nepal, The Maldives, Iran Central Asia: Tajikistan, Uzbekistan, Kazakhstan, Turkmenistan, Kyrgyzstan East Asia: China, Mongolia, North Korea, South Korea, Japan, Hong Kong, Taiwan, Macau Southeast Asia: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor Leste, Vietnam Western Asia: Georgia, Armenia, Azerbaijan, Turkey, Cyprus, Syria, Lebanon, Israel, Palestine, Jordan, Iraq, Oman, Yemen, Kuwait, Bahrain, Qatar, Saudi Arabia Combination: labs from different regions were involved in the research
title	text	Title of item
abstract	text	Abstract of item
url	text	Public url of item
link	text	Internal link to pdf
include	yes no	Whether item meets inclusion criteria (all in database should have 'Yes')
name	text	Name of agent used in user study
type	Robot Smart Speaker	Type of agent used in user study Robot: physically embodied entity that can interact using multiple modalities

Annotation column	Annotation options	Explanation
	Virtual Agent Voice Assistant	Smart speaker: physical entity only aimed at vocal interaction Voice assistant: agent that can only use vocal interaction but does not have a specific embodiment, can be housed in different embodiments (e.g., on a phone or computer) Virtual Agent: virtually embodied agent that can interact using multiple modalities
auton	Fully autonomous Wizarded Combinations	How autonomous is the agent in the interaction? Fully autonomous: system does not need human intervention during interaction Wizarded: system needs human intervention, at least for recognizing spoken input (and possibly more) Combination: agent uses combination of autonomy and wizarding for certain decisions in recognition Ns: not specified in the document
CA_child	Yes No Partially Ns	Has the agent been designed for or tailored to children? (not necessarily specifically on speech modules) Yes: authors specify in document that agent is made for children or adapted to children No: authors specify in document that agent is not made for children or adapted to children Partially: authors specify that some parts of the agent are made for children or adapted to children, while other parts have not been Ns: not specified
tts_child	Yes No Partially Not relevant Ns	Has the speech generation module been designed for or tailored to children? Yes: authors specify in document that speech generation is made for children or adapted to children No: authors specify in document that speech generation is not made for children or adapted to children Partially: authors specify that some parts of the speech generation are made for children or adapted to children, while other parts have not been

Annotation column	Annotation options	Explanation
		Not relevant: the agent does not speak, so generation is not needed; it only listens to spoken input Ns: not specified
asr_child	Yes No Partially Wizarded Not relevant No ns	Has the speech recognition module been designed for or tailored to children? Yes: authors specify in document that speech recognition is made for children or adapted to children No: authors specify in document that speech recognition is not made for children or adapted to children Partially: authors specify that some parts of the speech recognition are made for children or adapted to children, while other parts have not been Wizarded: the agent uses a 'wizard' (= human puppeteer) to deal with speech recognition Not relevant: the agent does not use spoken input, so recognition is not needed; Ns: not specified
dof	free speech limited phrases limited commands not relevant ns	What are the degrees of freedom of the child during the interaction, that is, how freely can the child speak? Free speech: the child is given no limits in how to speak to the agent Limited phrases: the child is given a set of phrases to use when speaking to the agent Limited commands: the child is given a set of commands (often one or two words, like 'Go') to use when speaking to the agent Not relevant: the child does not talk to the agent, the agent only speaks in this interaction Ns: not specified
dof_recode	free speech limited not relevant ns	In this annotation 'limited phrases' and 'limited commands' from 'dof' have been combined into 'limited'

Annotation column	Annotation options	Explanation
dof_num	#	If the degrees of freedom of the child were limited, how many options did the child have?
domain	Education Entertainment Edutainment Healthcare Generic Other	<p>What goal domain is the agent intended for according to the authors?</p> <p>Education: authors specify an educational domain to frame their agent, e.g. the classroom</p> <p>Entertainment: authors specify an entertainment domain to frame their agent, where the agent is solely intended to be fun to the children, e.g. a game (with no educational purposes)</p> <p>Edutainment: authors specify an entertainment domain to frame their agent, but there's an educational purpose as well, but this is not formally tested in school, such as an 'improve your reading game' at home</p> <p>Healthcare: authors specify a healthcare domain to frame their agent, e.g. to help children with ASD or diabetes</p> <p>Generic: authors have not specified a specific domain to frame their agent, it seems to be all purpose</p> <p>Other: authors have specified the domain to frame their agent but this does not fit the above categories</p>
role	text	How do the authors describe the role of the agent towards the child in the interaction?
role_hier	equal lower higher unclear	<p>What level of footing does the agent have towards the child? This is based on "role"</p> <p>Equal: the agent has the same authority as the child, authors specify that the agent is like a peer or companion</p> <p>Lower: the agent has less authority than the child, authors specify that the agent is like an assistant, pupil or mere listener</p> <p>Higher: the agent has more authority than the child, authors specify that the agent is like a tutor, parent or instructor</p> <p>Unclear: the authors did not specify how the agent related to the child</p>
setting	text	What was the setting of the user study? In what place did it take place?

Annotation column	Annotation options	Explanation
setting_recoded	lab school home public space therapy space online other ns	<p>The previous 'setting' annotation categorized into bins.</p> <p>Lab: the authors specify that the user study was conducted in a space in their lab, at their university</p> <p>School: the authors specify that the user study took place at a school, note that this could still be a separate room</p> <p>Home: the authors specify that the user study took place at the child's home</p> <p>Public space: the authors specify that the user study was conducted in a space that is accessible to anyone of the community, e.g. a hospital, museum or community center</p> <p>Therapy space: the authors specify that the user study took place in a doctor's/psychologist's room or an institution that specifies in developmental issues</p> <p>Online: the authors specify that the user study was conducted via an online platform (e.g., over Zoom), and not where the child was sitting</p> <p>Other: the authors specify the setting of the user study but did not fit the categories above</p> <p>Ns: not specified</p>
CA_purpose	text	What is the purpose of the agent in the interaction, as specified by the authors?
age	#	What is the age of children who participated? This is taking into account the ages of actual participants, meaning when the authors say: "We are interested in children 10-12 years old. Participants ranged in age from 9 to 11", we annotated it as 9,10,11 NOT 10,11,12
age_group	10-12 7-9 young broad ns	<p>Age group categories based on previous annotation 'age'.</p> <p>10-12: if age range was equal or less than 3 years and majority of this range falls in 10-12 year old category</p> <p>7-9: if age range was equal or less than 3 years and majority of this range falls in 7-9 year old category</p> <p>Young: if age range was equal or less than 3 years and majority of this range falls under 7 year old category</p> <p>Broad: if age range was more than 3 years</p>

Annotation column	Annotation options	Explanation
		Ns: not specified
age_range	#	What was the age range of participants?
age_bn	wide broad narrow ns	Categorized age range, based on previous annotation: Wide: age range >5 years Broad: age range $3 < x \leq 5$ years Narrow: age range $\leq 3$ years Ns: not specified
typical	TD ASD speech impairment diabetes ns	Do authors specify any developmental issues of the children? TD: authors specify children are typically developed ASD: authors specify children are on the spectrum, diagnosed with a form of autism or AD(H)D, without severe speech impairments Speech impairment: authors specify children have severe speech impairments, e.g., due to cerebral palsy Diabetes: authors specify children were diagnosed with diabetes Ns: not specified
number	#	Number of child participants that interacted with the agent and were included in the analysis
numbergroup	1-10 11-20 ...	Number of child participants into categories, based on previous annotation
research_purpose	Evaluating the CA Effect of CA on xyz Effect with CA on xyz (could have been any CA)	Purpose of the research, as specified by the authors Evaluating the CA: authors specify that the research reported in this item was to evaluate their CA on its performance Effect of CA on xyz: authors specify that the research reported in this item was to look into an effect that their CA might have Effect with CA on xyz: authors specify that the research reported in this item was to look into an effect that a CA (not necessarily this CA) might have

Annotation column	Annotation options	Explanation
indep	text	What were the reported independent variables?
dep	text	What were the reported dependent variables?
language	text ns	What was the reported language of the interaction? Ns: not specified
language_English	English Other ns	The previous annotation categorized into bins: English: the language of the interaction was English Other: the language of the interaction was any other language Ns: not specified
comments	text	Any comments during annotation
comm2	text	If more than one comment was necessary