

Coding Guidelines - Perception of Soft Robots

Before starting coding, if you have not mentally present the study and study design, please (a) click through our main study on risks and benefits of soft robots & read the scenario texts on (i) socially assistive robots + information “soft”, (ii) search and rescue robots + information “soft”, (b) read randomly created sub-word list generated by Shiny-App which we provide to you. The random sub-word list was created after summarization of a part of the concepts that have been written by participants in our CAM-study, (c) read the [coding guidelines](#) below (the category system) several times, (d) the “to consider” section below and (e) the graphical representation of possible connections between the concepts at the end of the document (p. 7). It is strongly recommended to display the coding guidelines on a second screen during coding or to print them out in advance.

Link to main study (click twice on the link to see both studies:

(i) socially assistive: <https://studien.psychologie.uni-freiburg.de/publix/564998da-e3fa-491b-8844-86464ce30ddc/df9ee6a1-1d9c-4013-a4f1-16e4785745b2/start>

(ii) search and rescue: <https://studien.psychologie.uni-freiburg.de/publix/12e3668a-de47-446f-80e4-47be40be2f78/df9ee6a1-1d9c-4013-a4f1-16e4785745b2/start>

General remarks:

- After reviewing the coding guidelines, categorize the concepts from the provided word list into subordinated categories based on our coding guidelines, please consider the comment columns and the valence of the respective words.
 - Please use the “codes” of the categories for the coding process. This means you **enter the codes of the respective categories in the first column of the wordlist “Superordinated” of the word list**. The “codes” can be found in the first column of the coding guidelines.
 - Important: After our joint session, 4 new categories were added to the coding guidelines and two categories were modified: new categories: (i) technological limitations, (ii) technological possibilities, (iii) rest category, ambiv., (iv) rest category, neutr. Modified categories: (i) Perceived usefulness -> now: rest category, pos.: perceived usefulness, (ii) Perceived uselessness -> now: rest category, neg.: perceived uselessness.
- Important: The word list also includes our predefined concepts for the CAMs. Please do not summarize them into superordinate categories. The predefined terms are: “Vorteile”, “Nachteile”, “sozialer Assistenzroboter”, “Rettungsroboter”.
- Please consider the valence and provided comments by the participants of the words for the coding process.
- Please carefully decide which category each concept belongs to.

How to proceed:

- To summarize the concepts, please do the following: In the third column of the wordlist (C) you will see concepts, which have been written by the participants in our study.
 - Based on our coding guidelines, you should consider which superordinate category the respective concept should be assigned to. You then enter the **code** of the superordinate term based on our coding guidelines in the first column (“Superordinate”). For example, the concept “Diskriminierung” could be superordinate into the category “MT” (Mistrust) from our coding guidelines.
- You should not summarize the predefined concepts (see general remarks above).
- If you are facing any problems or have any open questions regarding single concepts, please write them down in the respective comment column (2). Please do not talk to other rather during this process, because the independence of the raters is crucial.

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Timeline for the three central tasks:

1. Done: finish the first coding process (each of us will code the same 100 concepts) till 20th of February
2. Done: we have a joint session to discuss possible ambiguities and difficulties in a hybrid meeting on the 23th of February
3. Please finish the second coding process till 18th of March

To consider

Please consider the following while coding:

- All the key points mentioned in the “Coding Rules” do not have to be fulfilled to assign the respective categories.
- If you have difficulties assigning the concepts from the wordlist to the given categories, sort them into the 4 “rest categories” (pos., neg., amiv., neutr. considering the valence) > you should use the comment column (2) to explain why you are assigning a term to a “rest category”.
- In the end of the document, after the coding guidelines, you will find a graphic showing the complementary terms of the coding guidelines (such as safety vs. risk) as well the differentiation between the terms (coding rules).
- You can write comments if you have assigned concepts to categories but have questions/uncertainties.
- Please assign every word to one (but only) one of the provided codes in the category system.

If you have any questions or something is unclear, please send me an E-Mail:

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Coding Guidelines for Assessing Risks and Benefits of (Soft) Robots

Code	Category	Definition	Coding Rules	Anker
SA	safety	<p>The belief that the robot is</p> <ul style="list-style-type: none"> operating safely performing tasks without posing risks and/or harm to humans performing tasks even safer than humans 	Compared to “Trust” this concept primarily concerned with <u>operational safety</u> rather than overall reliability and integrity of the robot	“Genauigkeit der Ausführung”; “Sicherer für Menschen”; “Präzise und Effizienz”; “Verletzungsrisiko gemindert”; “Schnelles Handeln”
R	risk	<p>The belief that the robot is</p> <ul style="list-style-type: none"> operating unsafely performing tasks that pose risks to humans performing tasks riskier than humans 	Compared to “Mistrust” this concept emphasizes the assessment of risky behaviors and actions on the <u>operational level</u> , rather than focusing on the robot's overall reliability and integrity	“Mangel an Genauigkeit”; “leichte Beschädigung”; “Mögliche Fehlfunktionen”
T	trust	<p>The belief that the robot</p> <ul style="list-style-type: none"> performs with integrity and/or reliability is thus considered trustworthy 	Compared to “Safety” this concept focuses on the overall <u>reliability and integrity</u> of the robot, rather than focusing solely on operational safety components	“Einheitlichkeit der Pflege”; “objektiv/neutral”; “Anpassung an Patient/Klient”; “besseres Wissensvermögen”; “bewertet nicht”
MT	mistrust	<p>The lack of belief that the robot</p> <ul style="list-style-type: none"> performs tasks with integrity and/or reliability <ul style="list-style-type: none"> leading to mistrust, skepticism and/or doubt 	Compared to “Risk” this concept focuses on skepticism or doubts about the robot's <u>reliability and integrity</u> , rather than focusing on specific risky behaviors or actions on the operational level	“Diskriminierung von Personen”; “Bevorzugung”; “können missbraucht werden”; “Algorithmen-voreingenommenheit”

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AP	anthropomorphism, pos.	Positive evaluation of the <ul style="list-style-type: none"> attribution of human characteristics and/or behaviors to the robot such as autonomy or emotions 	Compared to “HRI, pos.,” this concept focuses more on the evaluation of specific positive robot <u>characteristics</u> than on the interaction itself	“Autonome Entscheidungen”; “Beruhigt verletze”
AN	anthropomorphism, neg.	Negative evaluation of the <ul style="list-style-type: none"> attribution or lack of human characteristics and/or behaviors to the robot such as autonomy or emotions 	Compared to “HRI, neg.,” this concept focuses more on the evaluation of specific negative robot <u>characteristics</u> than on the interaction itself	“Autonome Entscheidungen”; “begrenzte emotionale Intelligenz”; “fehlende Empathie”;
HRIP	Human-Robot-Interaction = HRI, pos.	Positive implications of the <ul style="list-style-type: none"> interaction between humans and robots 	Compared to “Social impact, pos.,” this concept emphasizes positive aspects of the direct <u>interaction of humans and robots</u> , not broader societal impacts	“Interaktion mit Älteren/Autisten”; “Hilfe bei Schamgefühl (objektiv/neutral)”
HRIN	Human-Robot-Interaction = HRI, neg.	Negative implications of the <ul style="list-style-type: none"> interaction between humans and robots 	Compared to “Social impact, neg.,” this concept emphasizes negative aspects of <u>interaction</u> , not broader societal impacts	“unerwünschte emotionale Beziehung”; “unpersönlich”; “Ausgrenzung”; “Abhängigkeit”;
SIP	social impact, pos.	Positive impacts of <ul style="list-style-type: none"> robots human-robot-interaction on society 	Compared to “HRI, pos.,” this concept is not about the direct interaction between humans and robots but emphasizes positive <u>impacts</u> that robots and HRI might have on society, including long term impacts	“mehr Arbeitsplätze”; “fördert soziale Interaktion/Integration”; “Gerechtigkeit (Objektivität); “verringert Einsamkeit”

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SIN	social impact, neg.	Negative impacts of <ul style="list-style-type: none"> • robots • human-robot-interaction society 	Compared to “HRI, neg.,” this concept emphasizes negative <u>impacts</u> that robots and HRI might have on society, including long term impacts	“weniger Arbeitsplätze”; “Verlust menschliche Natur”; “Verlust menschliche Interaktion”; “Verlust menschlicher Fähigkeiten”; “Verrohung des menschlichen Verhaltens”; “Menschen werden ersetzt”
TL	technological limitation	Technological limitations of the robot	Compared to “Mistrust”, “HRI, neg.” & “Social impact, neg.” this concept focuses solely on the technological limitations of the robot	“Beschränktes Knowhow”; “beschränkte Autonomie”; “Defekte”; “Eingeschränkte Lernfähigkeit”
TP	Technological possibilities	Technological possibilities of the robot	Compared to “Trust”, “HRI, pos.” & “Social impact, pos.” this concept focuses solely on the technological possibilities of the robot	“dauerhafte Einsatzbereitschaft”; “können Hürden überwinden”
LC	low cost	Low cost of <ul style="list-style-type: none"> • robot fabrication and deployment • on a personal and/or societal level 	Compared to “High Cost,” this concept focuses on economical aspects and cost-effectiveness in robot development and deployment	“günstig”; “kosteneffizient”, “günstige Arbeitskräfte”
HC	high cost	High cost of <ul style="list-style-type: none"> • robot fabrication and deployment • on a personal and/or societal level 	Compared to “Low Cost,” this concept highlights the higher financial investment required for robot development and deployment	“teuer”; “hohe Kosten”
RCPP	rest category, pos.: perceived usefulness	The belief that the robot is <ul style="list-style-type: none"> • useful and/or assistive and/or overall good • on a personal and/or societal level • the concept cannot be assigned, but is general positive 	All <u>positive</u> terms that cannot be clearly assigned to one of the above-mentioned belong in this category. Can be concepts regarding usefulness, and others	“angepasste Programmierung”, “für Therapie”, “Einheitlichkeit der Pflege”; “kognitive Überlegenheit”

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RCPN	rest category, neg.: perceived uselessness	The belief that the robot is <ul style="list-style-type: none"> • useless and/or overall bad • on a personal and/or societal level • the concept cannot be assigned, but is general negative 	All <u>negative</u> terms that cannot be clearly assigned to one of the above-mentioned belong in this category. Can be concepts regarding perceived uselessness, and others	“keine spezifische Fachkompetenz”; “schwierig anzupassen”
RCA	rest category, ambiv.	<ul style="list-style-type: none"> • All terms that • do not fall under above constructs, • and/or are neither positive or negative but ambivalent 	All terms that cannot be clearly assigned to one of the above-mentioned constructs because of their <u>ambivalent</u> valance belong in this category	“Ethisches Verhalten ungeklärt”; “Haftung”
RCN	rest category, neutr.	<ul style="list-style-type: none"> • All terms that • do not fall under above constructs, • and/or are neither positive/negative, ambivalent but neutral 	All terms that cannot be clearly assigned to one of the above-mentioned constructs because of their <u>neutral</u> valence belong in this category	“Bauweise”; “hybridkonstruktion”

Graphical representation of possible connections between the concepts

In the following graphic the complementary terms of the coding guidelines (such as safety vs. risk) are shown, whereby only the codes are written. Arrows on the left or right indicate that these terms were mentioned in the coding rules of the respective other term, which highlights the need to differentiate between these terms.

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