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| **Online Appendix I.** Full details of focus group sample |
| Child | Gender/Age | DVA Exposure | Siblings in the Household | Parental Education | Focus Group Participation |
| 1st Focus Group | 2nd Focus Group |
| Clara | F/6 | Yes (domestic) | Yes(1) | Apprenticeship/traineeship | Yes | Yes |
| Max | M/8 | No(-) | Yes(3) | University degree  | No | Yes |
| Jonas | M/9 | Yes (domestic) | No(-) | Technical college degree | Yes | Yes |
| Steven | M/7 | No(-) | No(-) | Apprenticeship/traineeship | No | Yes |
| Stephanie | F/8 | Yes (external) | Yes(1) | Technical college degree | Yes | Yes |
| Megan | F/8 | Yes (external) | Yes(1) | Applied Sciences & Arts degree | Yes | Yes |
| Natalie | F/10 | Yes (external) | Yes(1) | Apprenticeship/traineeship | Yes | Yes |
| Manuela | F/9 | Yes (domestic) | No(-) | Apprenticeship/traineeship | Yes | Yes |
| Jordan | M/10 | Yes(external) | Yes(1) | Applied Sciences & Arts degree | Yes | Yes |
| Paul | M/9 | No(-) | Yes(1) | Applied Sciences & Arts degree | Yes | Yes |
| Marianne | F/8 | Yes (external) | Yes(3) | University degree  | Yes | Yes |
| Kate | F/9 | Yes (external) | No(-) | Apprenticeship/traineeship | Yes | Yes |
| Leon | M/8 | Yes (external) | Yes(2) | University degree  | Yes | Yes |
| Laura | F/8 | Yes (external) | Yes(2) | University degree  | Yes | Yes |
| Noah | M/10 | Yes (external) | Yes(2) | Technical college degree | Yes | No |
| Oliver | M/8 | Yes (domestic) | Yes(1) | n/a | Yes | No |
| James | M/8 | Yes (domestic) | Yes(1) | Apprenticeship/traineeship | Yes | Yes |
| Emily | F/10 | Yes (external) | Yes(2) | University degree  | Yes | Yes |
| William | M/10 | No(-) | Yes(1) | Applied Sciences & Arts degree | Yes | Yes |
| Benjamin | M/8 | Yes (domestic) | No(-) | University degree  | Yes | No |
| Alice | F/6 | No(-) | Yes(1) | University degree  | No | Yes |
| Isabelle | F/10 | Yes (external) | Yes(1) | University degree | Yes | No |
| Eva | F/10 | Yes (domestic) | Yes(1) | Apprenticeship/traineeship | Yes | No |
| Elisa | F/6 | Yes (external) | Yes(1) | University degree  | Yes | Yes |
| Freya | F/9 | No(-) | Yes(1) | University degree  | Yes | Yes |
| Lukas | M/9 | Yes (domestic) | Yes(1) | Apprenticeship/traineeship | Yes | Yes |
| Jeff | M/9 | Yes(external) | Yes(1) | Apprenticeship/traineeship | No | Yes |
| Emma | F/10 | No(-) | Yes(1) | Technical college degree | Yes | No |
| *Notes.* Table provides full details of focus group participants. Demographic details are based extracted on parental survey data. For the sake of full anonymity, all names are pseudonyms with no similarity to the real names of individuals. DVA-exposure refers to the presence of DVAs at home (domestic) or within the closer circle of family in friends (external). Parental education corresponds to the highest educational degree that the survey respondent completed within German education system. |

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| **Online Appendix II.** Detailed procedure of focus group session 1 |
| Part | Title | Length | Description |
| (I) | Introductory briefing | ∽ 5 | (-) |
| (II) | Structured activity | ∽ 5 | Group drawing exercise:* Aim: Engaging children in abstract and categorical ways of thinking
* Volunteering child was asked to lie down on large piece of paper; two other volunteers were asked to draw the first child’s body outline
* Body outline was supposed to serve as first level of abstraction (i.e. volunteering child *→* volunteering child’s life-size body outline)
* Following this researcher asked the group to think of potential differences and similarities between volunteering child and themselves
* For each comment a small and coloured shape of a human was placed in the life-sized body outline in order to symbolize further levels of abstraction
 |
| (III) | Moderated group discussion |  ∽ 15 | Questions to probe the discussion:* What does it mean to be a human? What is special about humans?
* What are the similarities and differences among humans?
* How do humans differ from other living beings?
* What does it mean to ‘live’?
 |
| (IV) | Structured activity | ∽ 5 | Attentive stimulus:* Aim: Guiding group discussion towards human brain and qualities of HI
* Researcher asked group what the most important part of the human body might be
* After at least one child named human brain researcher showed a life-size model of the human brain and passed it around
 |
| (V) | Moderated group discussion | ∽ 15 | Questions to probe the discussion:* Why do we need our brain? What can we do with our brain?
* What is special about our brain?
* How do we learn things? How do we acquire knowledge?
* What makes a human very bright and smart?
 |
| (VI) | Break | ∽ 10 | (-) |
| (VII) | Moderated group discussion | ∽ 15 | Questions to probe the discussion:* What are the differences between a human brain and a computer?
* What are the things that a computer can do better than a human? Can a computer be smarter than a human?
* What are the things that a human can do better than a computer?
* Who has heard of artificial intelligence? What does artificial intelligence mean?
 |
| (VIII) | Debriefing | ∽ 5 | (-) |
| *Notes.* Table shows detailed focus group procedure of the first session. The approximate (∽) length of each part is indicated in minutes. Questions were introduced and explained one-by-one, mostly in the depicted order depending on the flow of the discussion. |

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| **Online Appendix III.** Final set-up of focus group session 1 |
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| *Notes.* Figure shows basic set-up of the first focus group session. The picture was taken in the aftermath of the first session in school 1.*Source.* Picture taken by the researcher. |

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| **Online Appendix IV.** Detailed procedure of focus group session 2 |
| Part | Title | Length | Description |
| (I) | Introductory briefing | ∽ 5 | (-) |
| (II) | Group reflection | ∽ 5 | Reflection exercise:* Repetition of the previous focus group session mainly based on what children were able to memorise (input was complemented by researcher if necessary)
 |
| (III) | Introduction to VAIG |  ∽ 10 | Introducing the group to VAIG:* Presenting DVAs to the group: Alexa (device: Amazon Echo Dot) and Google Assistant (device: Google Home Mini)
* Brief discussion on DVAs in general (e.g. Who has seen a DVA before? Who has a DVA at home? What is a DVA?)
* Instructing the group with the rules and objectives of VAIG (e.g. emphasising that all means of verbal inquiry are allowed and that reasonings behind answers are as important as the answers themselves)
* Separating group into grade-specific groups (i.e. Group 1: first and second grade; Group 2: third and fourth grade)
 |
| (IV) | First round of VAIG | ∽ 15 | * Group 1 (younger children) in Room 1 (Alexa)
* Group 2 (older children) in Room 2 (Google Assistant)
 |
| (V) | Break | ∽ 10 | (-) |
| (VI) | Second round of VAIG | ∽ 15 | * Group 1 (younger children) in Room 2 (Google Assistant)
* Group 2 (older children) in Room 1 (Alexa)
 |
| (VII) | Moderated group discussion | ∽ 15 | Questions to probe the discussion:* What DVA could have been controlled by a human?
* Why or why not?
 |
| (VIII) | Debriefing | ∽ 5 | Important details of the debriefing* Researcher revealed that both DVAs were not controlled by a human being and that the alleged human controller was indeed fictional
* Researcher explained the idea of the original TT as well as the reasons for playing VAIG
 |
| *Notes.* Table shows detailed focus group procedure of the second session. The approximate (∽) length of each part is indicated in minutes. During the first and second round of VAIG, the researcher entered each room once or twice for approximately one or two minutes in order to ensure that children maintained a focus on the task. Both rooms were audio-visually recorded. |

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| **Online Appendix V.** Detailed structure of online questionnaire used in parental survey |
| Item No. | Item content | Data entry |
| 1 | [Introduction]Dear Parents, dear guardians**Welcome** to the survey platform of the **Department of Education** [hyperlink: www.education.ox.ac.uk] at the **University of Oxford** [hyperlink: http://www.ox.ac.uk].**Thank you** already in advance that you have decided to take part in this anonymous survey! Your participation will help us to gain a broad overview on how **digital technologies & media** affect the **daily life** of **parents and guardians** as well as their **children**.The survey consists of **three parts** and participation should take **20 minutes** on average. Most of the statements simply require you to **click** or **select** one of the response options, while a few statements are **open-entry** questions (this means that statements have to be typed in manually).**Let’s go!** [emojis: 💪🏻🎊🎉][Name student investigator] & [Name principal investigator] | [None] |
| *Page break* |
| 2 | **Section I: Digital Technologies & media** **in** **daily life** [emojis: 📱💻🎧]In the following section we would like to know how digital technologies & media affect **your personal daily life.****What do we mean by digital technologies & media?*** **Devices:** Smartphones, tablets, laptops, computers, smart TVs, Apple TV, Amazon Fire TV, smart watches, voice assistants and so on
* **Communication & social media:** WhatsApp, iMessage, emails, Facebook, Facebook Messenger, Instagram, Snapchat and so on
* **Entertainment:** YouTube, computer- and app games, music and audiobook streaming (Spotify, Prime Music and so on), video streaming (Netflix, Prime Video and so on)
* **Organisation, hobbies, and practical functions:** Online shopping, surfing on the internet in general, online banking, fitness apps, smart home application and so on
 | [None] |
| *Page break* |
| 3 | Let’s start with an introductory question: Do you use **digital technologies & media** in your daily life?**Comment:** This question refers to all types of privately used digital technologies & media, regardless how often or for what purposes you may use them. | □ [A] = Yes, I do use digital technologies & media in my daily life.□ [B] = No, I do not use digital technologies & media *at all* in my daily life. |
| *Page break* |
| 4.1 – 4.16 | [If item 3 = A]In the following you may find a list of **statements**. For each statement, please indicate **how well this statement applies to you personally or rather to what extent you agree with it**. | Likert Scales:□ [-2] = Totally disagree□ [-1] = Rather Disagree□ [0] = Neutral□ [1] = Rather Agree□ [2] = Totally agree |
| I love it to use new digital technologies & media! [Positively poled item] |
| I like to go to specialist shops in order to seek advice on digital technologies & media! [Positively poled item]  |
| I would have a hard time if I had to seek information on digital technologies & media without somebody’s help! [Negatively poled item] |
| Using digital technologies & media increases the standard of living! [Positively poled item] |
| Using digital technologies & media cause intellectual impoverishment! [Negatively poled item] |
| Using digital technologies & media complicates lots of things! [Negatively poled item] |
| I seek information on technological trends and developments, even if I have no intention to buy something! [Positively poled item] |
| I enjoy trying out new digital technologies & media! [Positively poled item] |
| Digital technologies & media make my daily life easier! [Positively poled item] |
| Using digital technologies & media is a security and privacy threat! [Negatively poled item] |
| Digital technologies & media reduce the personal contact among humans! [Negatively poled item] |
| I know most of the functions of the digital devices and application I use! [Positively poled item] |
| I am excited when new digital technologies & media are released to the market. [Positively poled item] |
| Using digital technologies & media is causing stress! [Negatively poled item] |
| It is easy for me to learn how to use new digital technologies & media! [Positively poled item] |
| Hopefully digital technologies & media will be introduced to more areas of daily life! [Positively poled item] |
| *Page break* |
| 5 | **How much** do you have to deal with technological trends and developments in your **daily work environment**?**Comment:** This question especially refers to how much the pursuance of your profession has been affected by technological trends and developments in recent years, or how regularly this topic plays a role in your daily work environment. | Likert Scales:□ [1] = Never□ [2] = Rarely□ [3] = Occasionally□ [4] = Often□ [5] = Very Often □ [99] = I am currently unemployed. |
| Page break |
| 6 | [If item 3 = B]What were or what are the **main reasons** for you **to refrain from the usage of digital technologies & media**? | [Open-entry] |
| Page break |
| 7 | **Section II: Is this smart or what? Artificial Intelligence in daily life** [emojis: 💡⚙💬]The second part of the survey is about artificial intelligence. **Important:** This part is based on very general questions that do not require any specialist knowledge! Following that, we would also like to know whether you own a digital voice assistant and how you use it in your daily life. | [None] |
| *Page break* |
| 8 | Let’s start with another introductory question: **How familiar** are you with the term ‘**Artificial Intelligence’** (often abbreviated with ‘**A.I.’**)? | Likert Scales:□ [1] = Not at all familiar / Never heard of it□ [2] = Slightly familiar / Have heard of it a once or twice□ [3] = Somewhat familiar / Hear it from time to time□ [4] = Moderately familiar / Have read up on it a little bit□ [5] = Extremely familiar / Know a lot about it |
| *Page break* |
| 9.1 – 9.5 | [If item 8 = 2 or 3 or 4 or 5]In the following you may find a list of **statements** again. For each statement, please indicate **how well this statement applies to you personally or rather to what extent you agree with it**. | Likert Scales:□ [-2] = Totally disagree□ [-1] = Rather Disagree□ [0] = Neutral□ [1] = Rather Agree□ [2] = Totally agree |
| I find it convenient that a growing number of tasks and processes are becoming automated based on A.I.! [Positively poled item] |
| It is progressive that nowadays machines are able to improve themselves while carrying out certain tasks! [Positively poled item] |
| I believe that today, or at some point in the future, artificial intelligence is, or will be, a great threat to society! [Negatively poled item] |
| If A.I. is able to carry out a certain task in a more accurate and reliable way compared to a human, the application of the respective technology should be considered! [Positively poled item] |
| I am worried that the future prospects of younger generations will be negatively affected by the growing automation of tasks and processes! [Negatively poled item] |
| *Page break* |
| 10 | **Do you own devices** at home that allow you or other family members to use **digital voice assistants**?**Comment:** This question refers todigital voice assistants such as *Alexa*, *Siri*, *Google*, *Cortana* or similar applications which can be accessed through smartphones, smart speakers or laptops. | □ [A] = Yes, we do own such devices and make use of digital voice assistants.□ [B] = Yes, we do own devices at home which would allow us to use digital voice assistants, but we do not make use of them.□ [C] = No, we do not own any devices at all which would allow us to use digital voice assistants. |
| *Page break* |
| 11 | [If item 10 = A]**What digital voice assistants** do you or other family members use?**Comment:** If you own or even use multiple digital voice assistants, please select the one that you think is used the most in your household. | □ [A] = Apple’s Siri□ [B] = Amazon’s Alexa□ [C] = Google’s Google Home□ [D] = Microsoft’s Cortana□ [E] = Other: [open-entry] |
| 12 | [If item 10 = A]**On how many devices** do you or other family members use the digital voice assistant selected above? | □ [1] = 1 device□ [2] = 2 devices□ [3] = 3 devices□ [4] = 4 or more devices |
| 13 | [If item 10 = A]**How long have** you or other family members used the digital voice assistant selected above? | □ [1] = Less than 1 year□ [2] = Between 1 and 2 years□ [3] = Between 2 and 3 years□ [4] = More than 3 years |
| 14 | [If item 10 = A]**Where** do you or other family members use the digital voice assistant selected above?**Comment:** Multiple selections possible. | □ [A] = Dining room□ [B] = Bedroom□ [C] = Bathroom□ [D] = Children’s room□ [E] = Living room□ [F] = Other locations: [open-entry] |
| 15 | [If item 10 = A]**How much** do you or other family members use the digital voice assistant for the following purposes? | Likert Scales:□ [1] = Never□ [2] = Rarely□ [3] = Occasionally□ [4] = Often□ [5] = Very Often |
| Music, audiobooks, podcasts or other audio entertainment**Examples:** Spotify, Prime Music, Apple Music, audio book apps and so on |
| Games or other forms of *interactive* entertainment**Examples:** Asking funny questions, playing Bingo/Akinator/Rock-paper-scissors or similar applications |
| Daily practical assistance**Examples:** Setting timers/alarms/reminders/calendar entries or similar things, seeking weather information, online shopping and so on |
| Controlling smart home devices**Examples:** Smart plugs, light bulbs, thermostat, door bells and so on |
| *Page break* |
| 16 | **Do people in your closer circle of family and friends** use digital voice assistants? | □ [A] = Yes, there are people in my closer circle of family and friends who use digital voice assistants.□ [B] = No, I do not know anybody within my closer circle of family and friends who uses digital voice assistants. |
| 17 | [If item 16 = A]Does **your child** have the opportunity **to engage with digital voice assistants** in your **closer circle of family and friend**s? | □ [A] = Yes, this can happen.□ [B] = No, up to my knowledge this does not happen. |
| *Page break* |
| 18 | [If item 10 = B or C]What were or what are the **main reasons** for you **to refrain from the usage of digital voice assistants**? | □ [A] = Expected utility and value is too little□ [B] = Too expensive to buy□ [C] = Concerns regarding privacy and data protection□ [D] = Did not know that there are things like “digital voice assistants”□ [E] = Installation and usage would be too complicated□ [F] = Other reasons: [open-entry] |
| Page break |
| 19 | **Section III: Children and digital technologies & media in daily life** [emojis: 📱💻🎧]In the third and last section of this survey we would like to what extent your child uses digital technologies & media.**Comments:*** This section refers to your child that currently goes to [name of participating primary school].
* For households with multiple children who currently go to [name of participating primary school]: For our study it would be sufficient if you focus on one of the children living in your household, given that your answers to the following questions differ for your children.
 | [None] |
| *Page break* |
| 20 | Let’s start with some introductory question again: **How many children currently** live in your household?**Comment:** This question refers to all individuals who are below the age of 21. and who permanently reside in your household. | □ [1] = 1 child□ [2] = 2 children□ [3] = 3 children□ [4] = 4 or more children |
| 21 | **How old is your child** that currently goes to [name of participating primary school]? | □ [1] = 5 years or younger□ [2] = 6 years□ [3] = 7 years□ [4] = 8 years□ [5] = 9 years□ [6] = 10 years□ [7] = 11 years or older |
| 22 | **What family relationship** do you have with your child that currently goes to [name of participating primary school]? | □ [A] = Mother□ [B] = Father□ [C] = Other: [open-entry] |
| 23 | **What age group** would you assign yourself to? | □ [1] = 24 years or younger□ [2] = Between 25 and 34 years□ [3] = Between 35 and 44 years□ [4] = Between 45 and 54 years□ [5] = Between 55 and 64 years□ [6] = Between 65 or older |
| 24 | What educational group would you assign yourself to?**Comment:** This question refers to the highest educational degree you have obtained so far. | □ [1] = Apprenticeship or traineeship in the [German] dual system□ [2] = Degree from a [German technical] college□ [3] = Degree from a [German] university of applied sciences and arts□ [4] = University degree□ [5] = No educational degree□ [6] = Other: [open-entry] |
| *Page break* |
| 25 | Could you briefly describe **to what extent your child uses digital technologies & media** on a daily basis?**Comment:** Notesare sufficient.**Examples:*** What devices does your child normally use and how often (e.g. smartphones, tablets, laptops, Smart TVs and so on)?
* Does your child own his or her own device or are the devices shared with others?
* To what extent is your child supervised while using digital technologies & media?
* What are the main functions and applications that your child normally uses (e.g. learning games, WhatsApp or similar applications, listening to music or audiobooks, watching movies or shows, taking pictures and so on)?
* Do you restrict certain devices to age-appropriate usage modes (e.g. content filters, time restrictions and so on)?
 | [Open-entry] |
| Page break |
| 26.1 - 26.5 | In the following you may find a list of **statements** again. For each statement, please indicate **how well this statement applies to you personally or rather to what extent you agree with it**. | □ [-2] = Totally disagree□ [-1] = Rather Disagree□ [0] = Neutral□ [1] = Rather Agree□ [2] = Totally agree |
| I think it is positive if primary school children already learn how they can use digital technologies & media! [Positively poled item] |
| It is quite alarming that nowadays primary school children grow up with so much technology! I think less would be better! [Negatively poled item] |
| I think that nowadays primary school children should already learn basic programming skills! [Positively poled item] |
| In my opinion the most important thing is that primary school children should learn the implicit dangers and risks of using digital technologies & media! [Negatively poled item] |
| Access to digital technologies & media is important so children do not lose touch with their social environment! [Positively poled item] |
| *Page break* |
| 27 | [If item 10 = A]You have mentioned earlier that you or other family members use digital voice assistants. Could you briefly describe **to what extent your child uses this voice assistant** on a daily basis?**Comment:** Notesare sufficient.**Examples:*** What are typical situations in which your child uses the digital voice assistant?
* What are the main functions and applications that your child normally uses (e.g. music or audiobooks, applications, interactive games and so on)?
* Who is normally present in these situations (e.g. family members, friends, child alone)?
* Are there certain things that you have noticed when your child uses the voice assistant (e.g. speech, behaviour, learning effects, excitement etc.)?
 | [Open-entry] |
| *Page break* |
| 28 | [If item 10 = B or C] and [if item 16 = A] and [if item 17 = A]You have mentioned earlier that **your child** has the opportunity **to engage with digital voice assistants** in your **closer circle of family and friends**. Could you **briefly describe** how these situations normally look like?**Comment:** Notesare sufficient.**Examples:*** Can your child actively use the voice assistant or is he or she only passively observing?
* What are the main functions and applications that your child normally uses (e.g. music or audiobooks, applications, interactive games and so on)?
* Who is normally present in these situations (e.g. family members, friends, child alone)?
* Are there certain things that you have noticed when your child uses the voice assistant (e.g. speech, behaviour, learning effects, excitement etc.)?
 | [Open-entry] |
| *Page break* |
| 29 | [Closing section]**Almost done!** [emojis: 💪🏻🎊🎉]You have **successfully** completed the survey! **Thank you** for your participation!Lastly, we would like to ask you whether you are interested that your child participates in **two interactive workshops**, which will take place on **[workshop dates]** in the premises of the [name of participating primary school]. **All relevant details** can be found on the backside of the **survey invitation**. | [None] |
| 30 | Are you interested that your child participates in both of these workshops?**Comment:** Please note that your answer is only supposed to help us with the preparation of the workshop, especially regarding the expected number of participating children. | □ [A] = Yes, I would be interested that my child participates in both of these workshops.□ [B] = No, I am not interested that my child participates in these workshops. |
| 31 | [If item 30 = A]Participation in the workshop requires that your child has to **submit the signed consent form** in the **beginning of the first workshop.** The consent form is attached to the survey invitation.In order to link your anonymous survey data with the workshop data, we would kindly ask you to do the following:* In the following field you can enter a **random four-digit code** based on **numbers as well as letters** (e.g. ABF4, S5RD and so on).
* After you have entered a random four-digit code, **please use the same code** on the respective field on the consent form.
* In order to ensure the anonymity of your personal data the consent forms will be **treated as confidential** and **destroyed upon the completion of the study**.
 | Your personally selected code (e.g. ABF4, S5RD and so on): [Open-entry] |
| 32 | **Thank you** for your participation!In case you have **any further questions** please do not hesitate to reach out to us! You may find the **contact details** on the the survey invitation!With best regards[Name student investigator] & [Name principal investigator] | [None] |
| *Notes*. Table shows detailed structure of the online questionnaire as it was used in parental survey, including section and page structure, section headlines, item numbers, item contents, item styles (e.g. bold-printed words, emojis) conditionalities and the data entry. Data entries based on letters indicate nominal measurements without implicit ordinal ranks, while data entries based on numbers indicate at least ordinal or even interval measurements. For items 4.1 – 4.16, the original wording used by Karrer et al. (2009) was adjusted, because the key terminology used in their original instrument – namely ‘electronical devices’ – appeared to be rather outdated and old-fashioned in the context of digitisation in 2019. Hence, the SI made the unorthodox decision adjust the instrument by replacing the term ‘electronical devices’ with ‘digital technologies and media’ in the entire instrument. The term ‘digital technologies and media’ was exemplified in the introduction of the questionnaire (see item 2). |

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| **Online Appendix VI.** Code book of thematic analysis applied to parental survey |
| (I) Children’s general engagement with digital technologies and media (open entry survey item 25) |
| Code name | Code description & Examples | References |
| *Communication* |  |  |
| WhatsApp  | Parental respondents indicate that child uses WhatsApp to communicate with family members or friends | 17 |
| Phone calls | Parental respondents indicate that child uses mobile devices to call family members or friends | 3 |
| *Device ownership* |  |  |
| Child owns a device | Parental respondents indicate that child ‘owns’ an unspecified device (i.e. child does not have to share the device with somebody else) | 25 |
| Child owns DVA | Parental respondents indicate that child ‘owns’ a DVA (e.g. Alexa) | 4 |
| Child owns mobile device | Parental respondents indicate that child ‘owns’ a mobile device (e.g. smartphones, tablet) | 17 |
| Child owns other offline devices | Parental respondents indicate that child ‘owns’ a device without internet access (e.g. laptop without internet access, digital camera, TV) | 2 |
| Child owns stationary computer | Parental respondents indicate that child ‘owns’ a stationary computer (e.g. laptop, desktop computer) | 2 |
| Child owns video game console | Parental respondents indicate that child ‘owns’ a gaming console (e.g. PS4, Nintendo Wii) | 2 |
| Parental and family owned devices | Parental respondents indicate that child uses shared devices that are ‘owned’ by other individuals or the family in general (e.g. parental smartphones or tablets, smart TVs, DVAs, laptops) | 40 |
| *Devices* |  |  |
| Mobile devices | Parental respondents indicate that their child uses smartphones or tablets (e.g. iPhones, iPads) | 56 |
| Offline devices | Parental respondents indicate that their child uses offline devices (e.g. MP3-players, iPods, digital cameras, laptops without internet access) | 4 |
| Smart TV | Parental respondents indicate that their child uses television devices that allow users to directly access streaming services (e.g. Netflix or Amazon Prime) | 7 |
| Stationary computer devices | Parental respondents indicate that their child uses stationary computer devices (e.g. desktop computers, Laptops) | 17 |
| Video game consoles | Parental respondents indicate that their child uses gaming consoles (e.g. PS4, Nintendo Wii, Nintendo DS) | 9 |
| *Supervision* |  |  |
| Content restrictions | Parental respondents indicate that their child cannot access or use certain contents due to on-device controls or in-app controls (e.g. browser restrictions, YouTube Kids, child-friendly search engines) | 12 |
| Direct supervision | Parental respondents indicate that they personally observe their child’s engagement with digital technologies and media or even join the child | 19 |
| Indirect supervision | Parental respondents indicate that they are generally aware of their child's engagement with digital technologies and media, personally observe it sometimes but not always, or talk about it with the child | 8 |
| Restricted device access | Parental respondents indicate that their child can only access designated devices (e.g. tablets or smartphone with content restrictions, laptops without internet access) | 5 |
| Prevention of internet access | Parental respondents indicate that internet access is omitted on certain devices (e.g. browser is disabled) | 6 |
| *Time restrictions* |  |  |
| Daily time restriction | Parental respondents indicate that their child can only use certain devices for a specified period of time per day | 18 |
| General time restriction (unspecified) | Parental respondents indicate that their child can only use certain devices for a restricted but unspecified period of time | 12 |
| Monthly time restrictions | Parental respondents indicate that their child can only use certain devices for a specified period of time per month | 2 |
| Other forms of restrictions | Parental respondents indicate that time restrictions for their child’s usage of digital technologies and media are exercised through other means (e.g. vouchers, negotiated individually based on parental gut feeling) | 4 |
| Weekly time restriction | Parental respondents indicate that their child can only use certain devices for a specified period of time per week | 9 |
| *Usage* |  |  |
| Games | Parental respondents indicate that their child uses devices to play games, without explicitly mentioning educational purposes | 49 |
| Usage for educational purposes | Parental respondents indicate that their child uses digital technologies and media for educational purposes (e.g. educational games, typing exercises, looking up information) | 30 |
| Antolin (reading software) | Parental respondents indicate that their child uses ‘Antolin’ (i.e. reading app developed by the German publisher Westermann) | 5 |
| Educational purposes on mobile devices | Parental respondents indicate that their child uses mobile devices for educational purposes | 14 |
| Educational purposes on stationary devices | Parental respondents indicate that their child uses stationary devices for educational purposes | 8 |
| Information seeking | Parental respondents indicate that their child uses digital technologies and media to search for specific information (e.g. news or facts related to football, homework) | 8 |
| Audiobooks | Parental respondents indicate that child uses digital technologies and media to listen to audiobooks | 31 |
| Music | Parental respondents indicate that their child uses digital technologies and media to listen to music | 41 |
| Photography | Parental respondents indicate that their child uses digital technologies and media for photography (e.g. taking or looking at pictures) | 20 |
| Watching Movies, Shows and Videos | Parental respondents indicate that their child uses digital technologies and media to watch movies, shows or (online) videos | 46 |
| Netflix | Parental respondents indicate that their child uses Netflix | 6 |
| YouTube | Parental respondents indicate that their child uses YouTube or YouTube Kids | 23 |
| (II.A) Children’s engagement with DVAs at home (open entry survey item 27) |
| Code name | Code description & examples | References |
| *Excitement* |  |  |
| Asking funny questions | Parental respondents indicate that their child likes to ask funny questions and wait for DVA-responses (e.g. Alexa, how are you?) | 7 |
| Probing adults with DVA-knowledge | Parental respondents indicate that their child likes to ask knowledge-based questions in order to confirm whether adults (e.g. parents) know the answer as well | 4 |
| Usage when boredom occurs | Parental respondents indicate that DVA-usage mainly occurs when their child is bored | 2 |
| Using funny features | Parental respondents indicate that their child likes to use funny features that the DVA has to offer (e.g. Alexa ‘Fart Generator’) | 3 |
| *Supervision* |  |  |
| Direct supervision | Parental respondents indicate that they or other family members personally observe their child’s engagement with the DVA or even engage in joint activities | 9 |
| Indirect supervision | Parental respondents indicate that they are generally aware of their child's engagement with the DVA, personally observe or hear it sometimes but not always, or talk about it with the child  | 5 |
| Technologically enabled supervision | Parental respondents indicate that they regularly check the DVA’s voice protocol or usage history that can be accessed through mobile devices | 4 |
| *Usage* |  |  |
| Audiobooks | Parental respondents indicate that their child uses the DVA to listen to audiobooks | 6 |
| Information seeking | Parental respondents indicate that their child uses the DVA to listen to music | 8 |
| Interactive games | Parental respondents indicate that their child uses the DVA to play interactive games (e.g. ‘Akinator’, quiz games) | 5 |
| Music | Parental respondents indicate that their child uses the DVA to listen to music | 10 |
| Practical assistance | Parental respondents indicate that their child uses the DVA for practical assistance (e.g. setting alarms, setting ambient sounds before going to bed) | 4 |
| Selecting movies or shows | Parental respondents indicate that their child uses the DVA to listen to music | 2 |
| Weather forecasts | Parental respondents indicate that their child uses the DVA to ask for local weather forecasts | 4 |
| *Other parental observations* |  |  |
| Diminishing levels of excitement | Parental respondents report that their child’s excitement for the DVA has diminished over time | 2 |
| (II.B) Children’s engagement with DVAs in social circle of family and friends (open entry survey item 28) |
| Code name | Code description & examples | References |
| *Engaging Excitement* |  |  |
| Asking funny questions | Parental respondents indicate that their child likes to ask funny questions and wait for the responses when engaging with a DVA in the closer circle of family and friends (e.g. Alexa, how are you?) | 5 |
| General excitement for DVA-technology | Parental respondents indicate that their child is generally very excited about DVAs after having exposure in the closer circle of family and friends | 8 |
| Jealousy (child also wants a DVA at home) | Parental respondents indicate that their child has already indicated the wish to have a DVA at home after having exposure in the closer circle of family and friends | 2 |
| Using funny features | Parental respondents indicate that their child likes to use funny features and when engaging with a DVA in the closer circle of family and friends (e.g. Alexa ‘Fart Generator’) | 4 |
| *Supervision* |  |  |
| Direct supervision | Parental respondents indicate that adults are always present when their child engages with a DVA in the closer circle of family and friends | 3 |
| Indirect supervision | Parental respondents indicate that sometimes but not always adults are probably present when their child engages with a DVA in the closer circle of family and friends | 7 |
| *Usage* |  |  |
| Audiobooks | Parental respondents indicate that their child listens to audiobooks when engaging with a DVA in the closer circle of family and friends | 10 |
| Information seeking | Parental respondents indicate that their child seeks for general information from the internet when engaging with a DVA in the closer circle of family and friends | 5 |
| Interactive games | Parental respondents indicate that their child plays interactive games when engaging with a DVA in the closer circle of family and friends | 4 |
| Music | Parental respondents indicate that their child listens to music when engaging with a DVA in the closer circle of family and friends | 2 |
| Practical assistance | Parental respondents indicate that their child uses assisting features when engaging with a DVA in the closer circle of family and friends (e.g. asking DVA to solve an arithmetical problem) | 3 |
| Weather forecasts | Parental respondents indicate that their child listens to ask for local weather forecasts when engaging with a DVA in the closer circle of family and friends | 3 |
| *Other parental observations* |  |  |
| Child only observes how others use DVAs | Parental respondents indicate that in the closer circle of family and friends their child passively observes how others engage with DVAs instead of actively engaging with it | 10 |
| Diminishing levels of excitement | Parental respondents report that their child’s excitement for the DVA has diminished after having DVA-exposure in the closer circle of family and friends for an extended period of time | 1 |
| *Notes.* Tables shows detailed code book of the thematic analysis that was applied to text data of parental survey (see open entry items 25, 27 and 28 in **Online Appendix V**). Sections I, II.A and II.B of the table are organised by overarching themes that were inductively identified in the data. Each row represents a node within a theme, including the node’s name, its description, examples as well as its frequency in the data. The analysis was conducted in NVivo 12. |

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| **Online Appendix VII.** Code book of thematic analysis applied to focus group data |
| (I) Children’s verbal characterisation of human nature (focus group session 1) |
| Code name | Code description & Examples | References |
| *Characteristics of human nature* |  |  |
| Human as a sensual being | Interviewee mentions characteristics related to or involving the human senses (i.e. sight, hearing, smell, taste and touch) | 7 |
| Human as an empathetic being | Interviewee mentions characteristics related to emotions that humans can feel for one another | 2 |
| Human as an emotional being | Interviewee mentions characteristics related to emotions and feelings (e.g. anger, disgust, fear, happiness, sadness, or surprise) | 8 |
| Human speech and language | Interviewee mentions characteristics related to human language (e.g. special characteristics of human language) | 16 |
| *Differences among humans* |  |  |
| Differences in preferences | Interviewee mentions different tastes that humans have (e.g. favourite colours or music) | 4 |
| Different body sizes | Interviewee mentions that humans have different body sizes (e.g. some humans are taller, and some humans are shorter) | 5 |
| Different eye colours | Interviewee mentions that humans have different eye colours | 1 |
| Different faces | Interviewee mentions that each human being has a unique face and facial expression | 3 |
| Different voices | Interviewee mentions that human being has a unique voice | 2 |
| Gender | Interviewee mentions that differences related to genders (e.g. boys and girls) | 3 |
| *Human body* |  |  |
| Body parts | Interviewee mentions characteristics related to different parts of the human body (e.g. legs, arms, head, hair) | 3 |
| Organs | Interviewee mentions characteristics related human organs (e.g. heart, skin, brain) | 5 |
| *Human category within the ontological belief system* |  |  |
| Human as a living entity | Interviewee describes human as an animate being  | 4 |
| Breath | Interviewee describes breathing as an indicator of human animacy | 6 |
| Human as a mammal | Interviewee describes that humans belong to the animate group of mammals | 7 |
| Human life as a finite existence | Interviewee describes that human life is limited to a certain period of time | 2 |
| Motion | Interviewee describes motion of the body as an indicator of human animacy | 14 |
| *Human as part of nature's ecosystem* |  |  |
| Human as the result of evolution | Interviewee refers to the theory of evolution (e.g. humans descended from apes) | 8 |
| Human-animal comparison | Interviewee compares and points out differences and similarities between humans and other animals (e.g. different use of language) | 15 |
| Plants | Interviewee refers to plants as another category of living entities or that we need plants in order to survive on the planet (i.e. photosynthesis) | 4 |
| Simple organisms | Interviewee refers to simple organisms as another category of living entity (e.g. bacteria) | 3 |
| (II) Children’s verbal characterisation of HI and MI (focus group session 1) |
| Code name | Code description & Examples | References |
| *Dimensions of HI* |  |  |
| Smartness | Interviewee characterises intelligence in terms of being smart, including characteristics that indicate how smart somebody is | 7 |
| Mathematical thinking | Interviewee mentions characteristics of HI related to mathematical thinking (e.g. mental arithmetic, counting) | 5 |
| Memory and knowledge | Interviewee mentions characteristics of HI related to the memorisation of information and the acquisition of knowledge | 8 |
| Task-orientation | Interviewee mentions characteristics of HI related to solving tasks and providing answers to questions | 2 |
| *Nature of learning* |  |  |
| Learning through listening | Interviewee characterises learning as a process of listening to something or someone | 3 |
| Learning through repetition and practice | Interviewee characterises learning as process of repeating and practicing exercises  | 4 |
| Learning through understanding | Interviewee characterises learning as process that requires the learner to understand something | 2 |
| *Nature of the human brain* |  |  |
| Human brain as a control unit | Interviewee characterises the human brain as control unit (e.g. controlling bodily functions or motions) | 11 |
| Human brain as the origin of thought | Interviewee states that humans need their brain to think, belief or reason | 6 |
| *Perception of machines* |  |  |
| Artefactual language | Interviewee’s choice of words while describing machines (e.g. computers) refers to artefactual and object- qualities (e.g. storage, turning machines on or off, hard drives, hard disks, computer chips, programming) | 9 |
| Machines as memory systems | Interviewee refers to machines (e.g. computers) as entities that can store information and allow humans to access these information | 9 |
| Machines as programmable entities | Interviewee refers to machines (e.g. computers) as entities that are instructed by humans who write programs | 10 |
| *Perception of the HI-MI relation* |  |  |
| Human brain as a machine | Interviewee uses analogies between the human brain and machines (e.g. computers) regarding their working mechanisms or functions (e.g. human brain is something like a storage disk) | 4 |
| Firm perception of ontological HI-MI hierarchy | Interviewee argues that MI can never be more intelligent or more capable than the HI who built it | 19 |
| Flexible perception of ontological HI-MI hierarchy | Interviewee is not sure or even opposes that MI can never be more intelligent or more capable than the HI who built it | 9 |
| (III) Children’s behavioural and verbal engagement patterns (focus group session 2) |
| Code name | Code description & Examples | References |
| *Volatile dynamics* |  |  |
| Interfering voice commands | Interviewees ‘steal’ each other’s wake words by quickly adding voice command after someone else said the wake word | 9 |
| Rapidly changing content | Interviewees quickly change content played by DVA (e.g. changing songs after a couple seconds of playtime) | 16 |
| *Engaging excitement* |  |  |
| Amusement based on misunderstandings with DVAs | Interviewee displays amusement (e.g. giggling or laughing) based on a misunderstanding with a DVA (e.g. DVA-response to not correspond with intended voice command) | 5 |
| Playfulness | Interviewee displays playful engagement (e.g. giggling, laughing, amused or exciting tones) | 4 |
| Provoking obscene responses from DVAs | Interviewee uses voice command that is supposed to evoke vulgar or indecent DVA-responses (e.g. asking the DVA to make farting or burping noises) | 16 |
| *Tone of engagement patterns* |  |  |
| Complementing | Interviewee pays DVA a compliment | 4 |
| Courtesy and politeness | Interviewee uses language cues related to courtesy and politeness (e.g. ‘thank you’ or ‘please’) | 8 |
| Requesting silence | Interviewee tells DVA to be quiet via a voice command | 10 |
| Unfriendly or aggressive behaviour  | Interviewee displays explicit offensive behaviour towards DVA (e.g. insults or showing a middle finger) | 22 |
| *Usages and applications* |  |  |
| Asking for explicit content | Interviewee asks DVA to play adult content (e.g. obscene rap songs) | 5 |
| Asking for interactive features | Interviewee requests DVA to start interactive features (e.g. ‘Alexa, tell me a joke!’ or ‘Alexa, can you play games?’) | 13 |
| Asking for music or audiobook content | Interviewee requests DVA to play music songs or audiobooks | 17 |
| Asking for the time | Interviewee asks DVA what time it is | 2 |
| Asking for weather forecasts | Interviewee requests weather forecast from DVA | 16 |
| Information seeking | Interviewee requests various kinds of information (e.g. facts, numbers, meaning of words) | 34 |
| (IV) Children’s probing schemes when exploring DVAs’ intelligence and identity |
| Code name | Code description & Examples | References |
| *Probing DVAs’ knowledge* |  |  |
| Interpersonal knowledge | Interviewee asks questions related to knowledge of interpersonal nature (e.g. “Alexa, what’s my father’s name?”) | 3 |
| Nominal facts | Interviewee asks questions that can be answered with one word or sentence (e.g. “Alexa, do polar bears live at the South Pole?”)  | 21 |
| Open information | Interviewee asks open questions that require more than one word or sentence (e.g. “Alexa, tell me something about America!”) | 5 |
| Meaning of words | Interviewee asks for the meaning of certain terms of names (e.g. Jordan: “Alexa, what does Jordan mean?”) | 6 |
| *Probing skills* |  |  |
| Foreign language skills | Interviewee probes DVAs’ foreign language skills (e.g. “Hey Google, can you say a word in Spanish?”) | 6 |
| Mathematical skills | Interviewee probes DVAs’ mathematical skills (e.g. “Hey Google, what is 2000 + 2000?”) | 13 |
| Generic skills | Interviewee probes DVAs’ generic skills (e.g. “Hey Google, say a word!”) | 5 |
| *Probing DVAs perceived identity* | Interviewee asks questions related to DVAs’ ‘personality’ traits or ‘personal’ background information (e.g. name, age, relationship status) | 15 |
| *Probing DVAs reflexivity* | Interviewee asks questions that would require introspection when answered by a human (e.g. “Hey Google, how are you doing?” or “Alexa, where are we right now?”) | 22 |
| (V) DVAs’ response behaviours perceived as human behaviour (focus group session 2) |
| Code name | Code description & Examples | References |
| *Dynamics of DVAs’**response behaviour* |  |  |
| Delayed responses | Interviewee perceives DVA’s slow response behaviour (e.g. long gaps between voice command and response, or several voice commands necessary to obtain desired response) as an indicator for the presence of human control over the device | 9 |
| Permanent responsiveness | Interviewee perceives observation that DVA always reacts to voice commands with verbal responses as an indicator for the presence of human control over the device | 10 |
| Non-responsiveness | Interviewee perceives observation that DVA does not always react to voice commands with verbal responses (e.g. although lights go on after wake word, no verbal response is provided) as an indicator for the presence of human control over the device | 15 |
| *Nature of responses* |  |  |
| Creative responses | Interviewee perceives rather original and imaginative DVA-responses (e.g. puns or very playfully formulated answers) as an indicator for the presence of human control over the device | 8 |
| Response mistakes | Interviewee perceives objective mistakes or inconsistencies made by the DVA (e.g. Google Assistant reacts to the wake word ‘Alexa’) as an indicator for the presence of human control over device | 2 |
| (VI) DVAs’ response behaviours interpreted as machine behaviour (focus group session 2) |
| Code name | Code description & Examples | References |
| *DVAs’ conversational qualities* |  |  |
| Lack of common sense | Interviewee perceives DVA’s struggle to respond to questions that would normally require common sense if answered by a human (e.g. describing how a human being looks like) as an indicator for actual machine behaviour (i.e. absence of active human control) | 5 |
| Lack of understanding | Interviewee perceives DVA’s struggle to understand questions in the intended way as an indicator for actual machine behaviour (i.e. absence of active human control) | 6 |
| *Dynamics of DVAs’ response behaviour* |  |  |
| Promptness | Interviewee perceives DVA’s instantaneous response behaviour (e.g. capacity to provide nominal facts or quantities instantly after a question was asked) as an indicator for actual machine behaviour (i.e. absence of active human control); | 13 |
| Permanent responsiveness | Interviewee perceives that fact that DVA always reacts to voice commands with verbal responses as an indicator for actual machine behaviour (i.e. absence of active human control) | 2 |
| Non-responsiveness | Interviewee perceives observation that DVA does not always react to voice commands with verbal responses (e.g. although lights go on after wake word, no verbal response is provided) as an indicator for actual machine behaviour (i.e. absence of active human control) | 2 |
| *Nature of responses* |  |  |
| Accuracy of responses | Interviewee perceives accuracy of DVA-responses (e.g. providing exact quantities in response to a question) as an indicator for actual machine behaviour (i.e. absence of active human control) | 4 |
| Familiarity with standardised responses | Interviewee expresses familiarity with the exact wordings of standardised DVA responses, especially standardised failure response (e.g. “I do not have an answer, unfortunately!”) and perceives this as an indicator for actual machine behaviour (i.e. absence of active human control) | 5 |
| *Notes.* Tables shows detailed code book of the inductive thematic analysis that was applied to the focus group data (i.e. transcripts as well as audio-visual recordings). Each row represents a node within a theme, including the node’s name, its description, examples as well as its frequency in the data. The analysis was conducted in NVivo 12. |