



Grasping Data: Ways to Help Children Understand and Navigate Their Increasingly Digital World

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Children,
Interaction,
& Design

Madeira

2026



2014

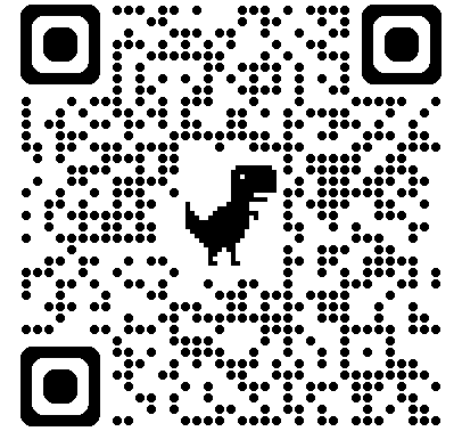




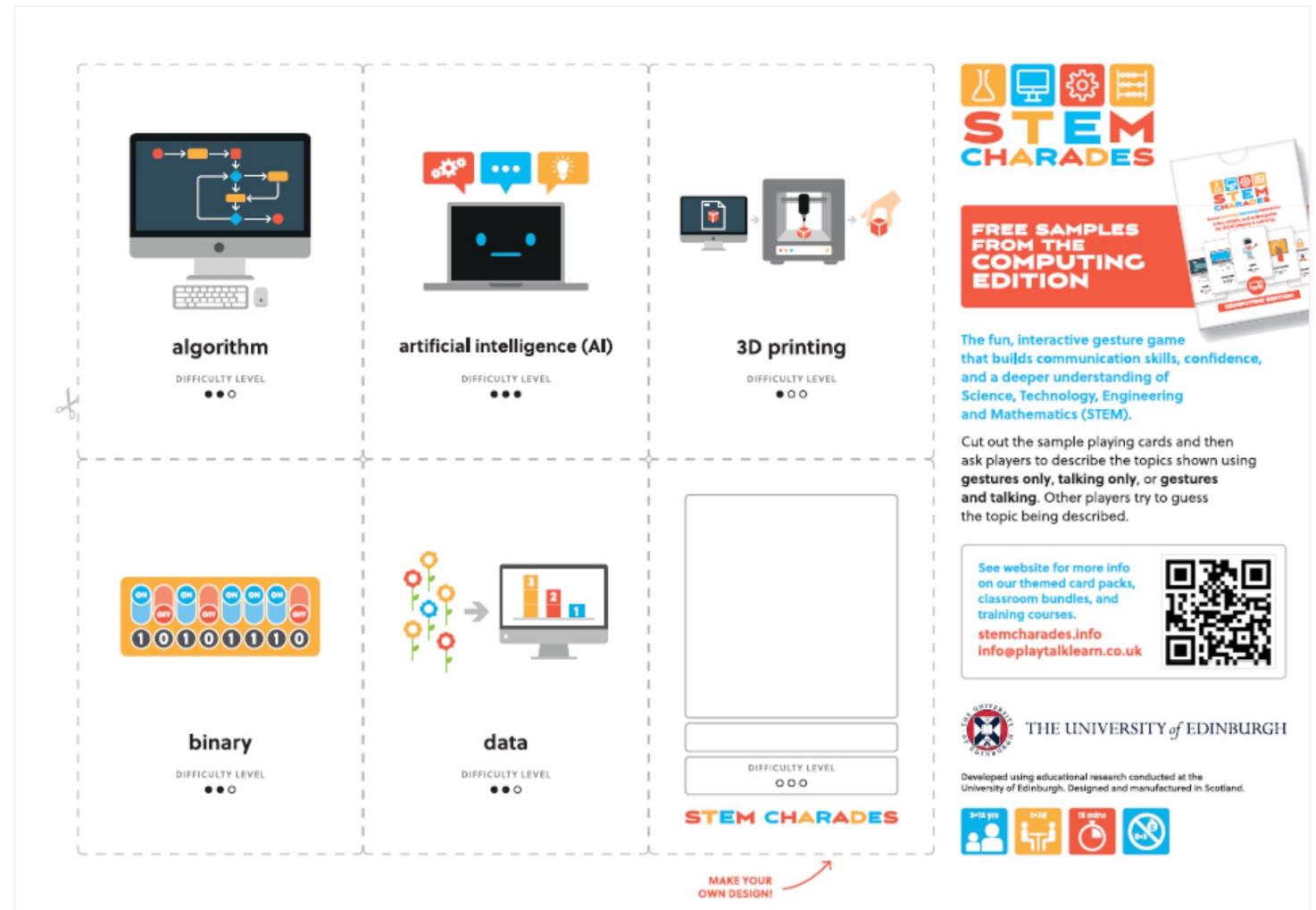
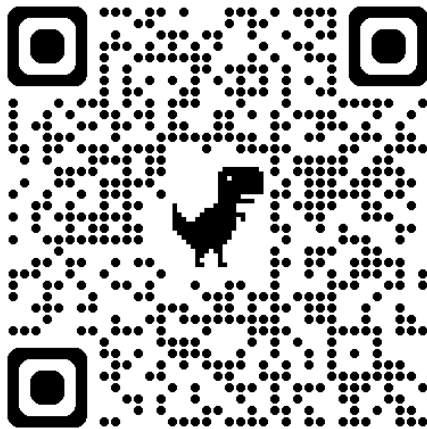
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Embodiment theory



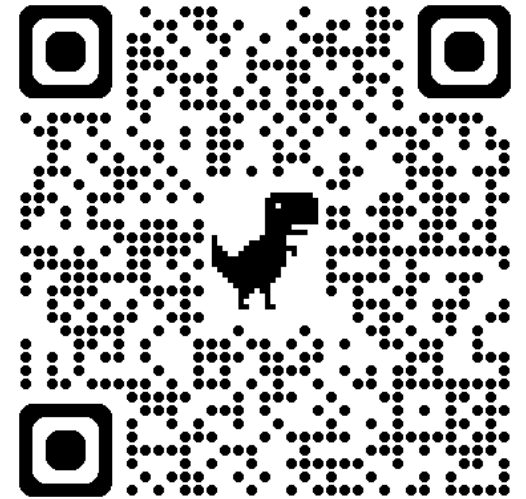
Embodied metaphors in how we think



Research to Design



AI projects



NUMBUKO



**ARTIFICIAL INTELLIGENCE (AI)
FOR THE EARLY YEARS**



CHILDVOICEAI



GRASPING DATA

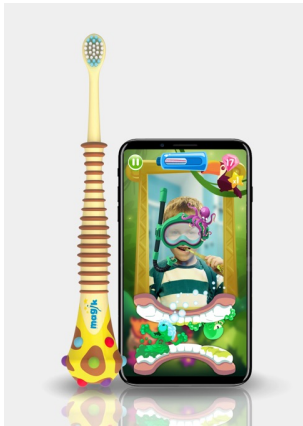
GRASPING DATA



- Manches, A., Plowman, L., Atabey, A., Perera, D., Ramirez-Duque, A., Lechelt, S., Hinrichs, U., Vines, J., & Brewster, S. (in press). Beyond privacy: A framework for personal data literacy in early childhood. *European Early Childhood Education Research Journal*



Evolving technologies: data-driven





Hope?

- Legislation (e.g., Digital Services Act: 'Private-by-default')
- Industry guidance (e.g., Child's rights by design, 5Rights)
- Parents/practitioners?
- Children?



CHILD RIGHTS BY DESIGN PRINCIPLES

	1: Equity and Diversity Be inclusive, treat everyone fairly and provide for diverse needs and circumstances
	2: Best Interests Embed children's best interests in product development and design.
☐ ✓ ☐ ✗	3: Consultation Engage and listen to the views of children in product development and design
	4. Age Appropriate Develop products that are age appropriate by design and consider using age assurance
	5. Responsible Comply with legal frameworks, provide remedies as needed and conduct a Child Rights Impact Assessment
	6. Participation Enable children's participation, expression and access to information
	7. Privacy Embed privacy-by-design and data protection in product development and use.

Children's understanding of personal data

- Older children (8+) “There is a dearth of research on 0- to 7-year-olds”
- Online screen-based
- ‘Given’ data
- Data **Privacy** Literacy

e.g., Livingstone, S., et al. (2019) Children's data and privacy online: growing up in a digital age: an evidence review.

Personal Data Literacy

Domain	Key question
Data Identification	What are personal data?
Data Understandings	What are the origins, circulations and uses of these different types of personal data?
Data Reflexivity	What are the implications of these different types of personal data for me and others?
Data Uses	How can I manage and make use of these different types of personal data?
Data Tactics	How can I do personal data differently?

Pangrazio, L. and N. Selwyn (2019). "'Personal data literacies': A critical literacies approach to enhancing understandings of personal digital data." *New Media & Society* 21(2): 419–437.



UK Research
and Innovation

GRASPING DATA



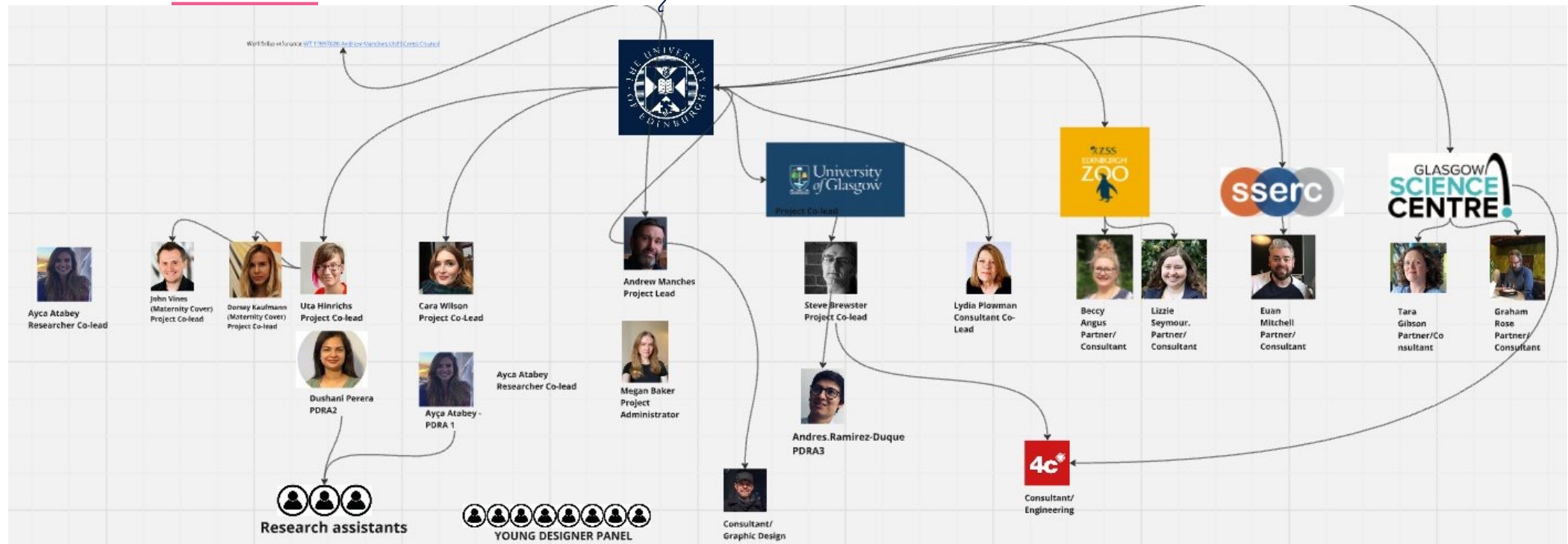
- to help young children (3-6 years) to create, explore, understand, and directly benefit from their personal data



Children,
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UK Research and Innovation



Contexts

- WP1 Schools

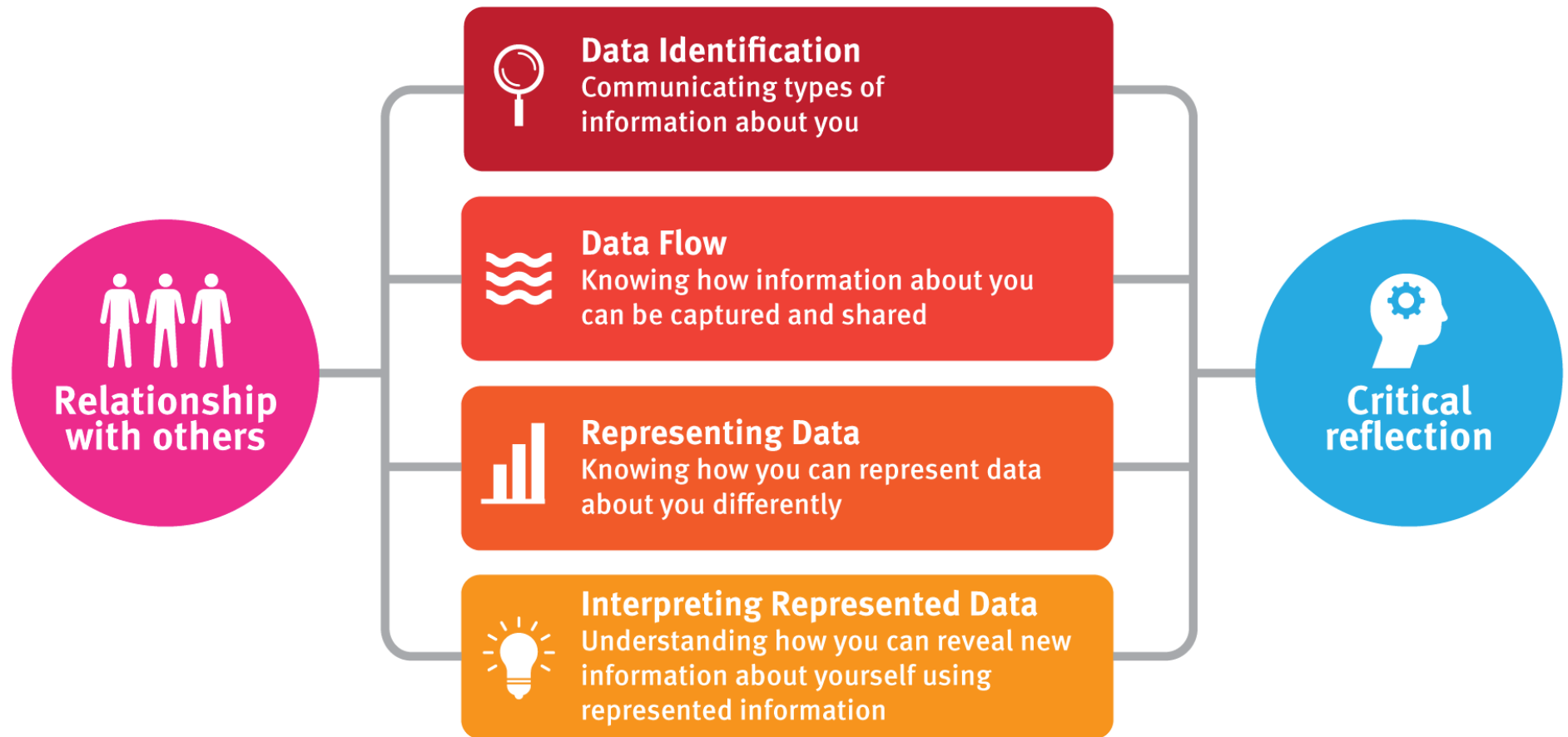


- WP2 Zoo



- WP3 Science Centre





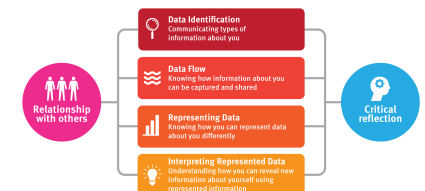
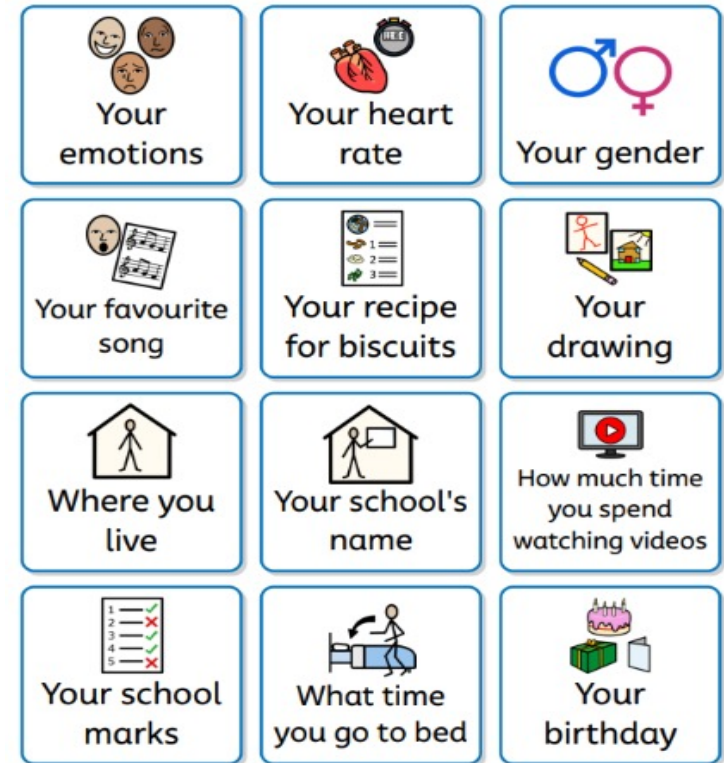
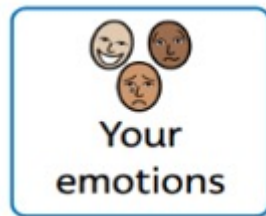
Personal data literacy for early childhood



Data Identification

Communicating types of information about you

- Different types
- Richness of description
- Example:



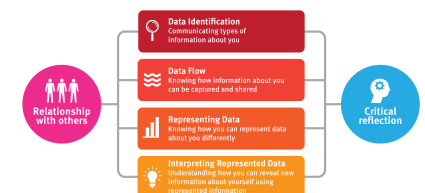
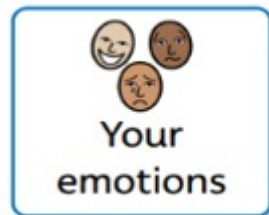


Data Flow

Knowing how information about you can be captured and shared

- Capturing (e.g., observing, asking, using a device)
- Sending information (e.g., telling, emailing)
- Storing information (in a book, your memory)

- Example:

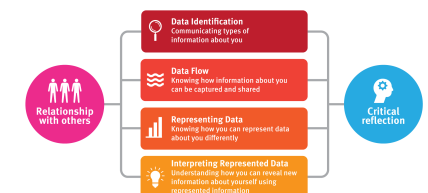
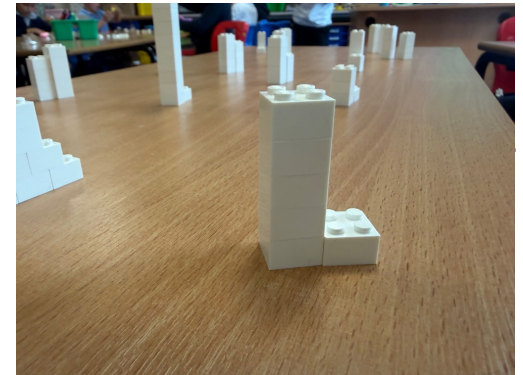
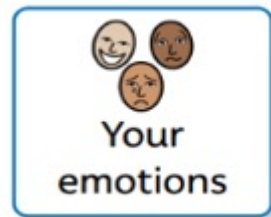




Representing Data

Knowing how you can represent data about you differently

- Constructing representations
- Quantitative / qualitative
- Example:

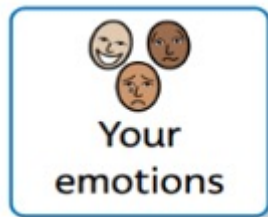




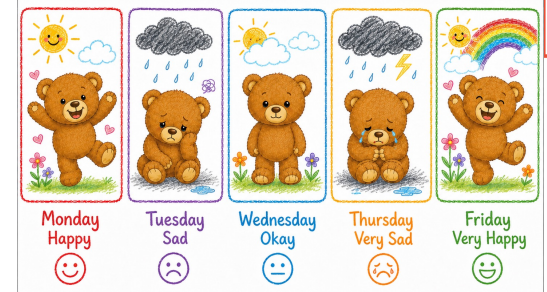
Interpreting Represented Data

Understanding how you can reveal new information about yourself using represented information

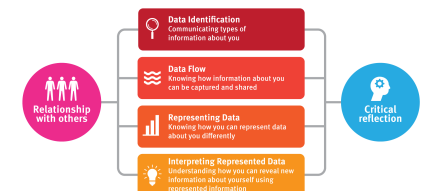
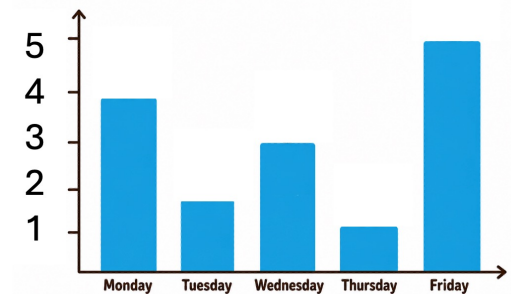
- Reveal personal insights
- About others (e.g., teddy) or about you (self-knowledge)
- Example:



How Teddy Felt This Week

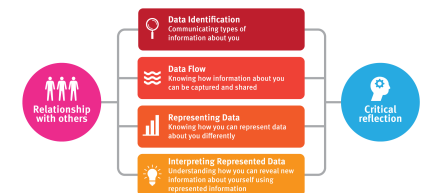
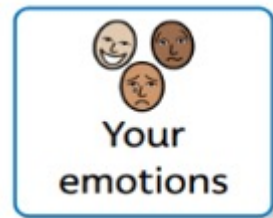


How Teddy Felt This Week



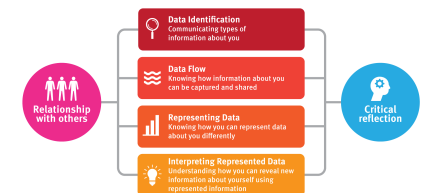
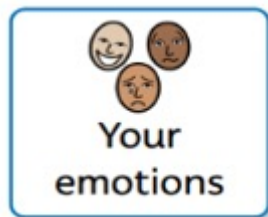


- Comparing data (e.g., class birthday/behaviour charts)
- Personal, interpersonal, organisational
- Example:





- Critical reflection at all levels (e.g., which data, how describe data, how represent, what infer, to whom)
- Example:



Summary

- We can, and should, support Personal Data Literacy from the youngest age
- We should help children engage with, enjoy, participate and value their personal data **before** teaching them how and why to keep private
- The practitioner is key to helping children navigate this

Design work for Grasping Data

- WP1 Schools

- WP2 Zoo

- WP3 Science Centre



Nuance

- Data technologies are not all bad; e.g. providing knowledge that is personally meaningful
- ‘Challenge of catch-all terms: ‘Personal Data’, ‘AI’, ‘Screens’, ‘Real-world’



Provocation

- Can we, and should we, think more about future technologies **with** children and enable them to play a greater role in their design?
- How can our work help make that happen?



Thank you!



References

- Ramirez-Duque, A., Perera, D., Kaufmann, D. B., Atabey, A., Hinrichs, U., Manches, A., & Brewster, S. (2026, April). From Squishing to Meaning: Exploring Data Physicalization Through Children's Embodied Experiences. In Proceedings of the 2026 CHI Conference on Human Factors in Computing Systems (pp. 1-18).
- Livingstone, S., et al. (2019) Children's data and privacy online: growing up in a digital age: an evidence review.
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