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Analysing Children's Awareness of the Cultural Rules of Numerals in the World around them

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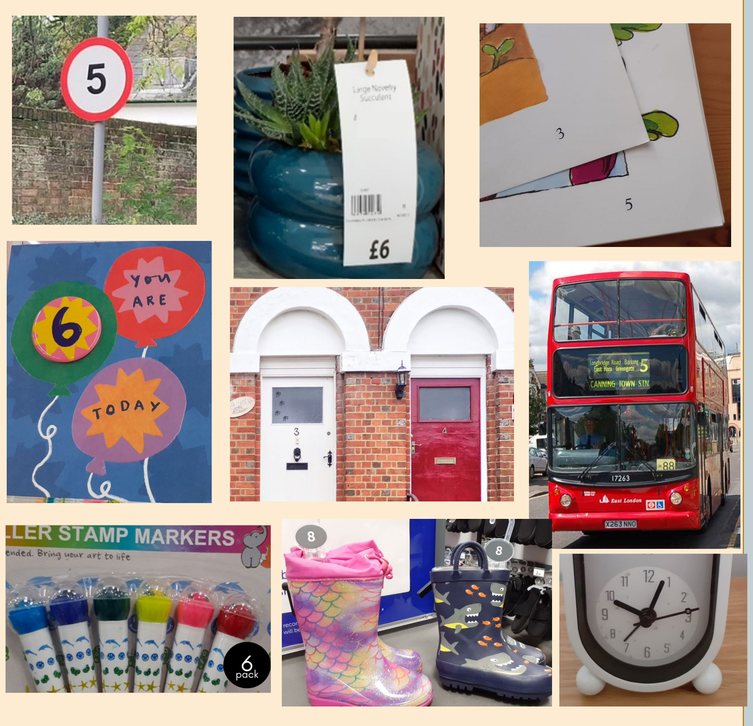
Numerals in everyday life



➢ **Primary rules**
Mathematical rules of the written number system – taught at school

➢ **Cultural rules**
- How numbers are used in our culture?
- What do numerals tell us?
- Who uses them?

(Munn and Kleinberg, 2003)

Research question

What is the range of qualitative variation in preschool children's conceptions of the meanings of numerals in the world around them?

Methodology: Phenomenography (Marton, 1981)
Mapping out *qualitative variations* in children's awareness of the use of written numbers and revealing the *structure* of variations.

Sample
37 preschool children, Mean age: 4.01 years

Methods

Number Spotting game
Families taking photos of numerals that children noticed in their environment.

Photo-elicitation, individual, video-recorded interviews with children
Focusing on photos of numerals captured by family and photos from researchers' photo bank.

Analysis processes [437 interview extracts]

1. Coding extracts

Based on links between the numeral and:
- **the object** on which the numeral appears
- **the context** depicted in the photograph associated with the object and the numeral
- **any other symbol** that appears next to the numeral.

2. Grouping extracts

Forming emerging Categories of Description

Based on differences and similarities in expressed meaning and purpose of the numeral.

(Han & Ellis, 2019)

Findings

Categories of Description	Extract example
1 - No expressed meaning and / or purpose of numeral.	**Extract related to car number plate** Interviewer: OK, so why are those numbers on the car? Child: 'cause it's lovely to do drawing on cars.
2 - Description of actions associated with the context and object, rather than number-focused meaning of numeral	**Extract related to size label on t-shirt showing '6 years'** Interviewer: Why is that there, do you think on the T shirt, that 6? Child: Because you have to wear it.
3 - Meaning and / or purpose of numeral misaligned with object and context.	**Extract related to poster showing date: 20 May** Interviewer: And that one [pointing to the 20]? Child: Uh, it's 20. There might be 20 things in it or if it's a book or something, there's 20 pages.
4 - Meaning and / or purpose of numeral linked to the object but misaligned with context.	**Extract related to £1 sticker on bag of sweets** Interviewer: Why is that number on the candy, do you think? Child: Because there's a lot.
5 - Recognition that the numeral has a meaning and / or purpose, but the specific communicative message of the numeral not expressed.	**Extract related to bus number** Interviewer: So, why is that 6 there on the bus? Child: Because that's the number of it.
6 - Meaning and / or purpose not fully expressed but recognition of a specific communicative message in line with culturally shared rules.	**Extract related to size label on t-shirt showing "size 9"** Interviewer: Why is that number there on your T shirt? Child: So you can see if it's big, or small or medium.
7a - Fully expressed meaning and / or purpose implicitly drawn from symbol (e.g., £) accompanying numeral.	**Extract related to £1 sticker on bag of sweets** Interviewer: What does that number 1 mean on that bag? Child: Because there's nothing else, it might be one pound.
7b - Fully expressed meaning and / or purpose of numeral in line with culturally shared rules.	**Extract related to number on LEGO box** Interviewer: So, what does that mean, that there? Child: There's 25 pieces?
8 - Fully expressed meaning and / or purpose of numeral, in line with culturally shared rules, with examples provided.	**Extract related to numerals on alarm clock** Child: There's numbers round it, because the hands can get to them to tell you what time it is…for instance, if the hand is at 12 o'clock, it's 12 o'clock, lunch time.

Critical Aspects of Variation underpinning children's Expanding Awareness

1. **recognising** the **numeral** as a number and recognising the **object**, **context** and/or other **symbol** associated with the numeral

2. **making a connection between** numeral, object, context and/or symbol **and using this connection** to express meaning

3. **expressing meaning that is aligned** with object, context or symbol dimensions at **the specific occurrence of the numeral** (in the discussed photograph)

4. **expressing meaning that is aligned with the broader, culturally shared rules** that underpin the meaning of the numeral in everyday life.

References

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