University of Nottingham
UK | CHINA | MALAYSIA

Maths, language and learning

Clocking in on reading

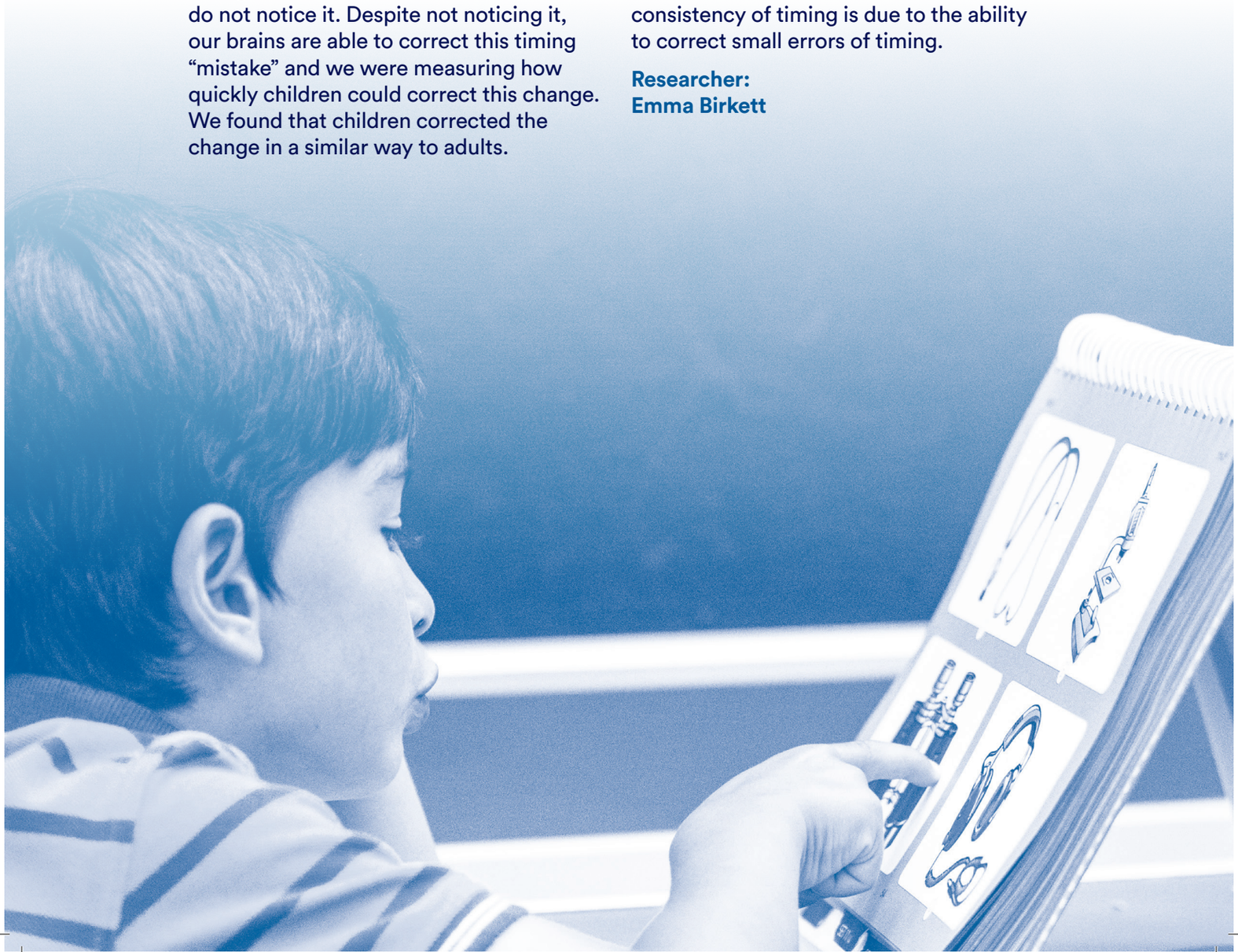
At summer scientist 2017 we were investigating how well children can keep in time with a beat.

We asked children to play a “machine operator game” in which they tapped their finger in time with a regular beat. From time to time we moved the beat slightly so that finger taps would miss the beat. The beat was only moved by 15 milliseconds, a change which is so small that most people do not notice it. Despite not noticing it, our brains are able to correct this timing “mistake” and we were measuring how quickly children could correct this change. We found that children corrected the change in a similar way to adults.

In the next part of this research we will be repeating the same activity with children who have a diagnosis of dyslexia to see if they differ in the way they respond to these beat changes. We know that children with dyslexia are less consistent when tapping along to a beat than children without dyslexia.

Overall the results from this study will tell us whether their difference in the consistency of timing is due to the ability to correct small errors of timing.

Researcher:
Emma Birkett



University of Nottingham
UK | CHINA | MALAYSIA

Maths, language and learning

Everybody counts!

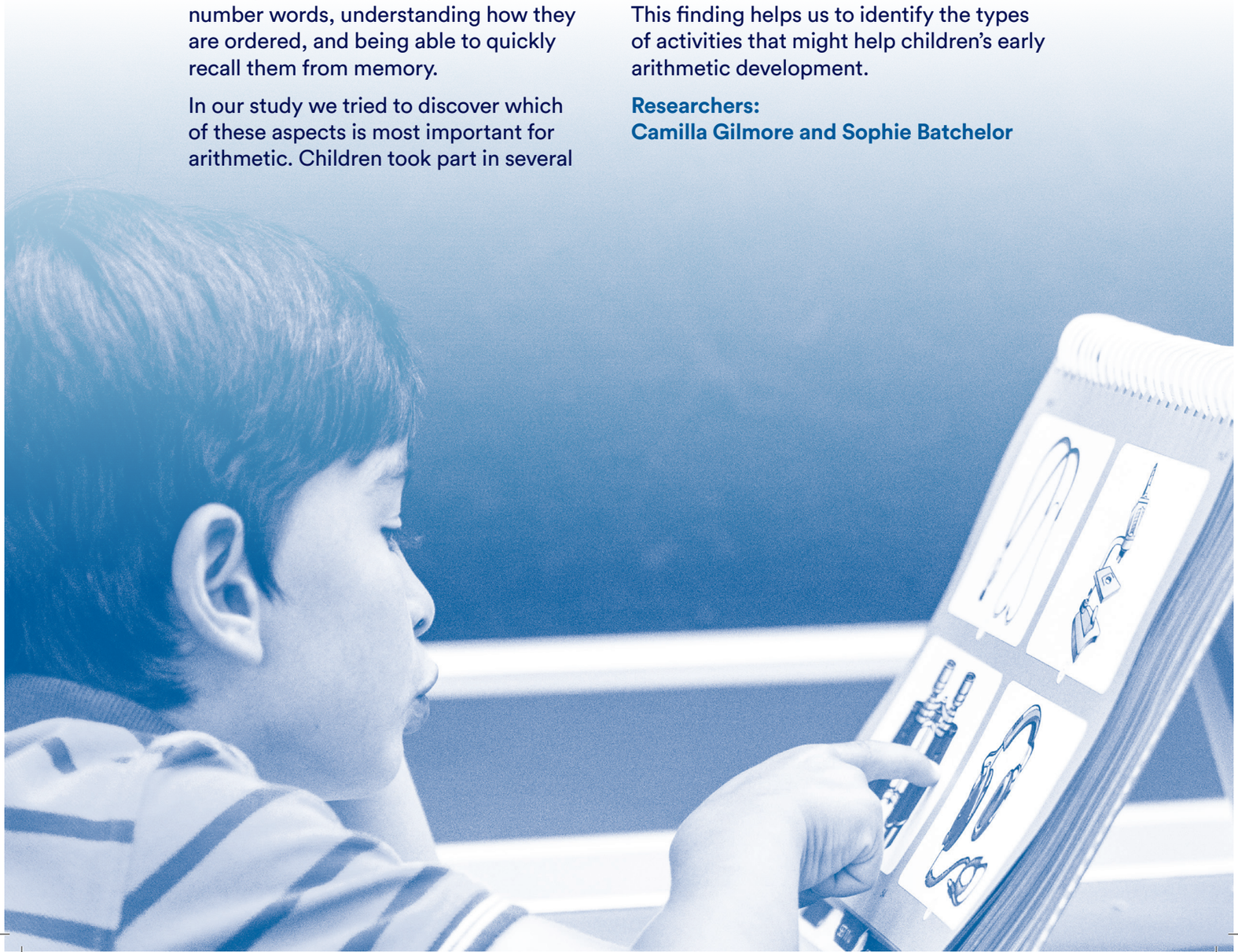
Some children find learning arithmetic easy and fun while for other children this can be quite a challenge. Psychologists are trying to discover why this is so that we can help all children to enjoy learning arithmetic.

One of the earliest number skills that children learn is how to count. Although this might seem like a simple task, it actually involves knowing the sequence of number words, understanding how they are ordered, and being able to quickly recall them from memory.

In our study we tried to discover which of these aspects is most important for arithmetic. Children took part in several games which measured how quickly they could recall number words, whether they could recognize numbers in order, and how well they knew the number sequence forwards and backwards. They also completed an arithmetic worksheet.

We found that children's knowledge of the structure of the counting sequence was the most important factor in explaining differences in arithmetic skill. This finding helps us to identify the types of activities that might help children's early arithmetic development.

Researchers:
Camilla Gilmore and Sophie Batchelor



University of Nottingham
UK | CHINA | MALAYSIA

Maths, language and learning

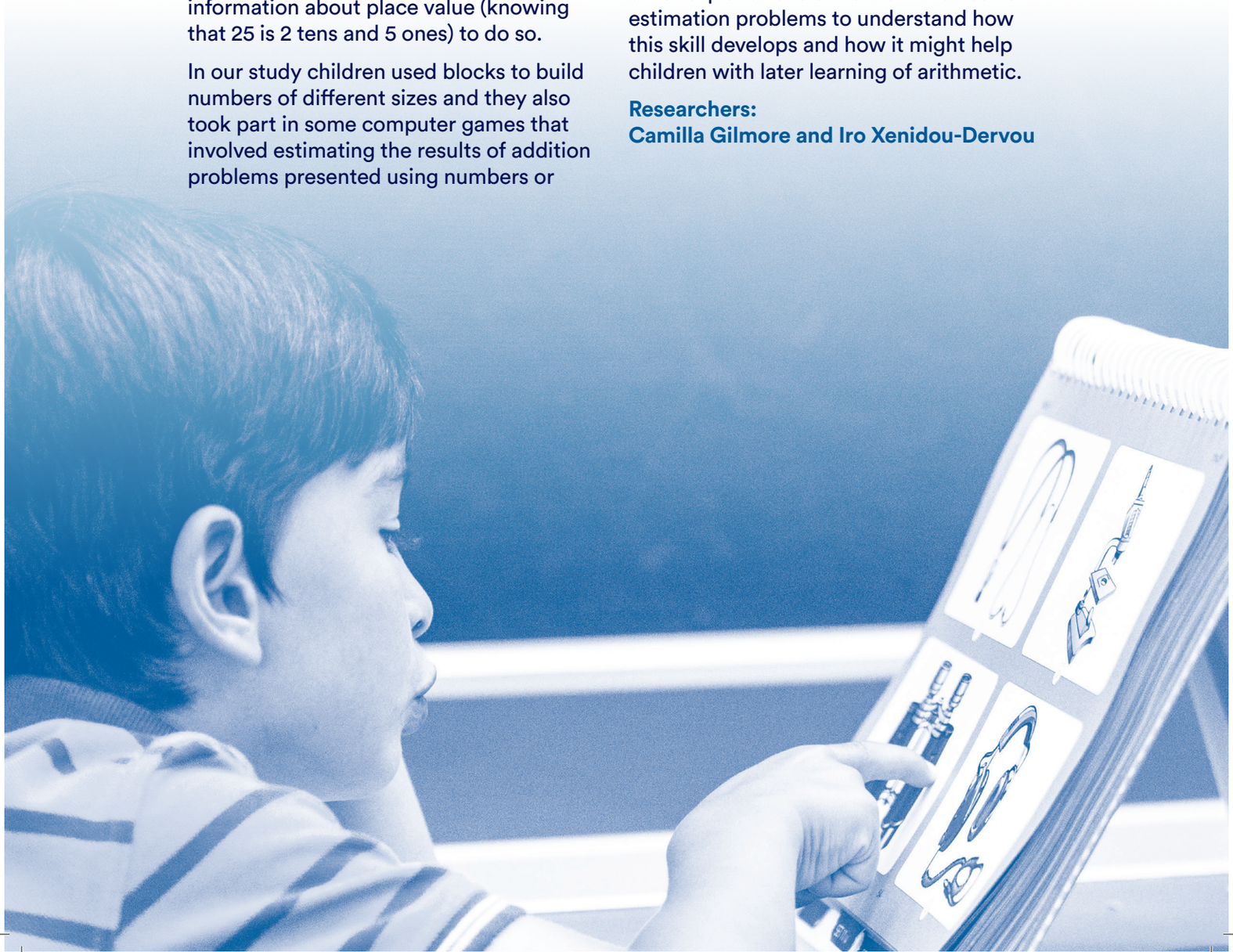
Building with numbers

Even before they learn arithmetic at school, young children have surprising abilities to estimate the results of addition and subtraction problems. For example, our previous work has shown that 5 year-old children can guess that 25 + 35 is bigger than 40, even if they can't work out the answer exactly. We are interested in how children are able to solve these problems and whether they use information about place value (knowing that 25 is 2 tens and 5 ones) to do so.

In our study children used blocks to build numbers of different sizes and they also took part in some computer games that involved estimating the results of addition problems presented using numbers or pictures of items. We found that the five-year old children in our study had good understanding of place value and were able to demonstrate this to us using building blocks. However, children's understanding of place value didn't seem to explain how they were able to solve the estimation problems.

In future studies we will investigate other explanations of how children solve estimation problems to understand how this skill develops and how it might help children with later learning of arithmetic.

Researchers:
Camilla Gilmore and Iro Xenidou-Dervou



University of Nottingham
UK | CHINA | MALAYSIA

Maths, language and learning

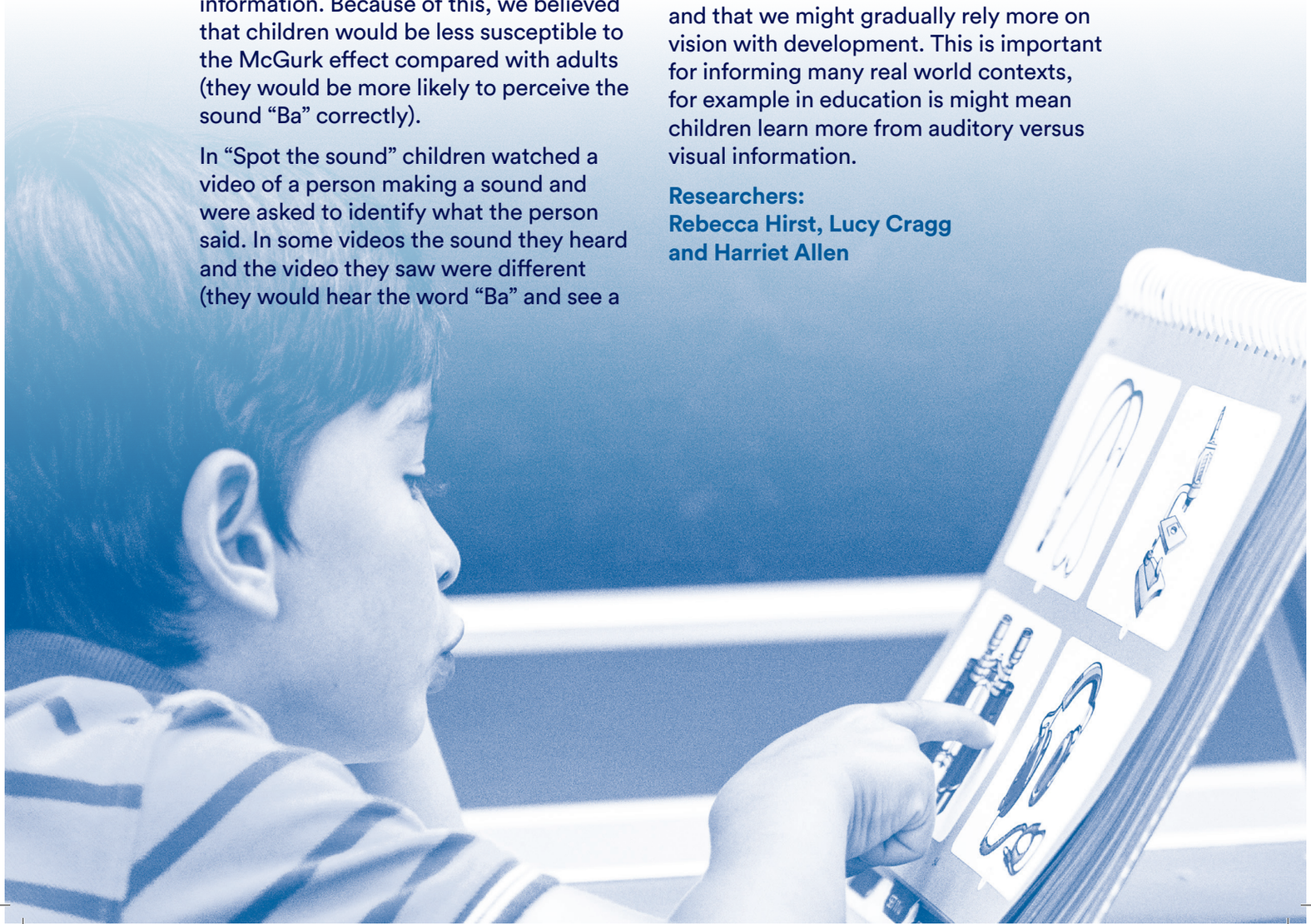
Spot the sound

When adults see someone making a “Ga” sound with their mouth whilst hearing the sound “Ba” they will usually say that they heard another completely different sound (“Da”). This effect, known as the “McGurk effect”, happens because what we see changes what we hear (we will think we heard “Da” even though the actual sound was “Ba”). This effect might be particularly strong in adults because vision dominates over other senses in adult life. However, children might place more importance on auditory information compared with visual information. Because of this, we believed that children would be less susceptible to the McGurk effect compared with adults (they would be more likely to perceive the sound “Ba” correctly).

In “Spot the sound” children watched a video of a person making a sound and were asked to identify what the person said. In some videos the sound they heard and the video they saw were different (they would hear the word “Ba” and see a “Ga” mouth movement). On these videos we found that the youngest children were more likely to perceive the sound correctly, whilst in older children and adults the mouth movement they saw altered the perception of the sound they heard. Children overall were more likely to correctly identify the sound compared with adults (they were less influenced by vision).

We believe this means that children might place more importance on auditory information versus visual information, and that we might gradually rely more on vision with development. This is important for informing many real world contexts, for example in education is might mean children learn more from auditory versus visual information.

Researchers:
Rebecca Hirst, Lucy Cragg and Harriet Allen



University of Nottingham
UK | CHINA | MALAYSIA

Maths, language and learning

An exciting twist on a game of snap!

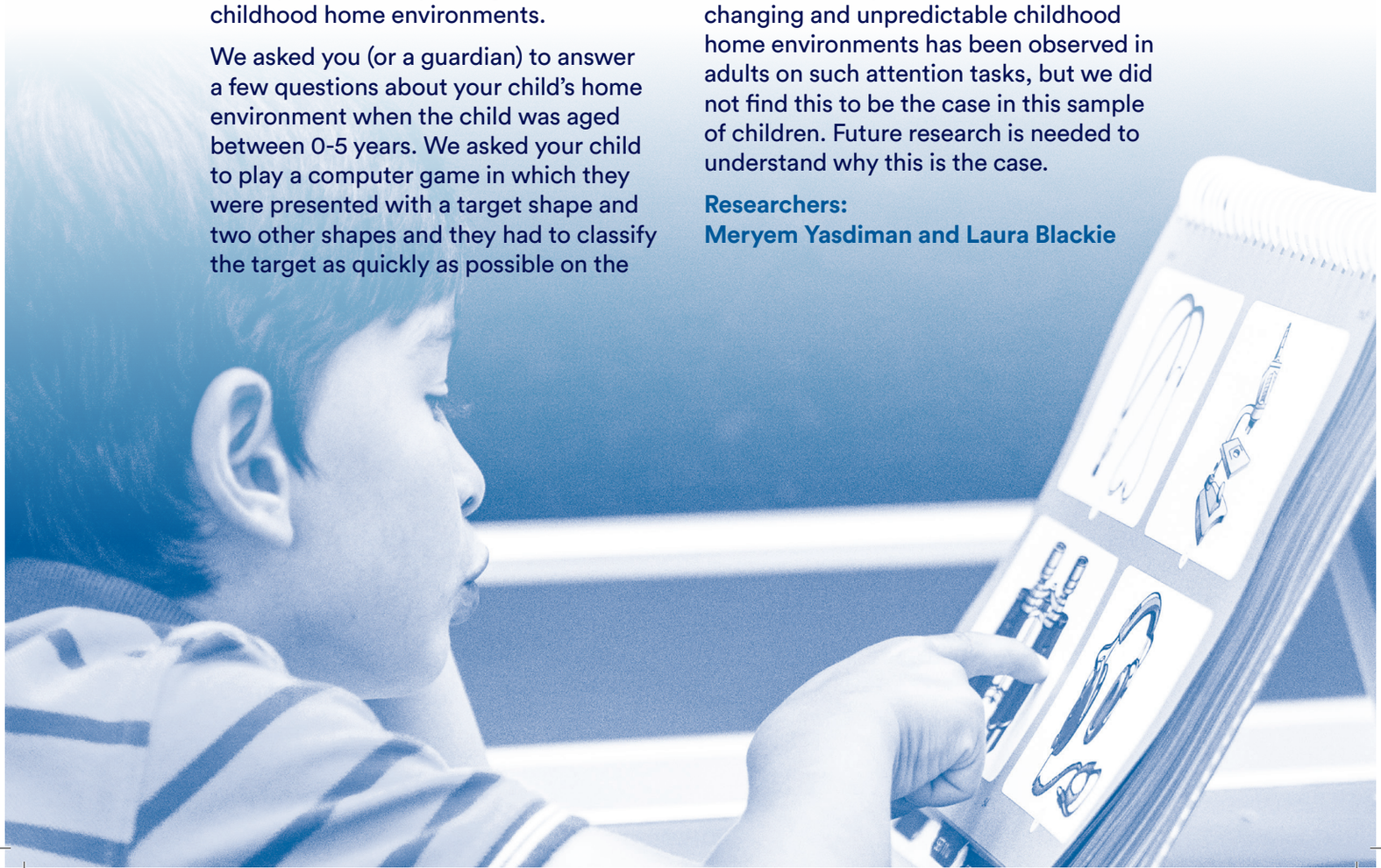
In this game, we were investigating whether changes in a child's home environment influences their ability to respond flexibly to the changing demands of a situation.

This study was based on previous research findings that have shown that adults who had experienced some degree of change and unpredictability in their home environments before the age of 10 were better able to shift their attention and respond to competing task demands, compared to adults whom had not experienced any changes in their childhood home environments.

We asked you (or a guardian) to answer a few questions about your child's home environment when the child was aged between 0-5 years. We asked your child to play a computer game in which they were presented with a target shape and two other shapes and they had to classify the target as quickly as possible on the basis of the shape or colour of the object. We assessed how easily your child could shift between two rules of classification by recording the time it took for your child to shift between two rules of classification (for example, the time taken to change rule and classify by colour instead of by shape as he/she had done the previous trial).

Contrary to past research, we did not find evidence of a relationship between the degree of change experienced in the child's home environment and their ability to flexibly shift between two response options. The impact of adapting to changing and unpredictable childhood home environments has been observed in adults on such attention tasks, but we did not find this to be the case in this sample of children. Future research is needed to understand why this is the case.

Researchers:
Meryem Yasdiman and Laura Blackie



University of Nottingham
UK | CHINA | MALAYSIA

Maths, language and learning

Picture word matching game

When children learn maths, they also need to learn the language which is important for understanding maths, such as 'add', 'square', 'minus'. The maths curriculum contains maths words which children should know in each school year.

We created a fun way of measuring how many maths words children know. We wanted to find out whether this was a good way of measuring children's knowledge of maths words. We also wanted to find out if children who were better at maths had better knowledge of maths words.

The researcher read out a series of questions, such as 'which picture is a circle?' and the children pointed to their answer from a selection of pictures. They then completed a quick maths assessment by answering as many arithmetic questions as they could in three minutes.

We found that for children in Reception year, the better their knowledge of maths words the better they were at arithmetic. For children in Years 1, 2 or 3, knowledge of maths words and arithmetic ability was not strongly linked. This suggests the association between maths language and maths ability is particularly strong in the early years and agrees with our findings from other small studies in Somerset and South Africa. The results also suggest our new measure for knowledge of maths words may be a useful tool for Reception teachers.

Researchers:
Paula Hubber and Nicola Pitchford