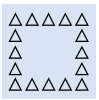
Thank you once again for taking part in my recent PhD study
examining the role of global and local processing on science and maths achievement.

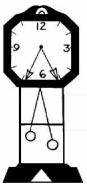
Global processing is when we look at the whole, and local processing is when we look at the details.
For example, a forest might be the global level, and a single tree would be the local level.

In this study, global and local processing was measured using 'Navon' figures:



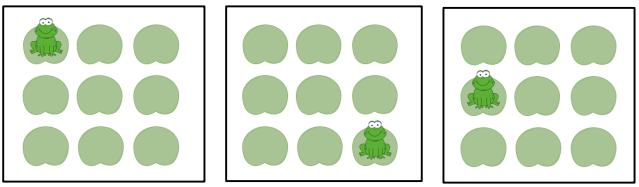
Here, the global shape is a square, and the local shape is a triangle.

The children also completed activities which measured how well they could separate a target from its context (known as field independence), like in this example where they had to find the identical triangle shape in the picture.



The parent questionnaire measured systemizing and empathizing. Systemizing is a measure of the drive to analyse and apply rules. For example, sorting rocks, or understanding train timetables, or finding out how things work. Empathizing is a measure of empathy and social communication.

The children also completed activities looking at general measures; for example IQ and memory.



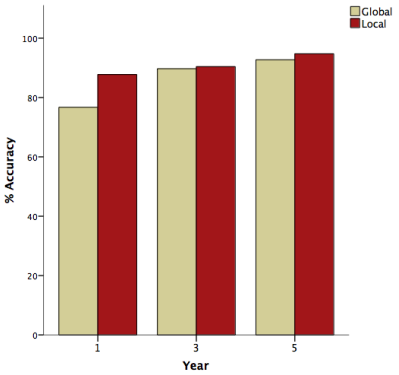
There were **3 main research questions**:

- How does children's global / local processing develop through primary school?
- How does children's global / local processing relate to science and maths performance?
- How does children's global / local processing relate to their systemizing and empathizing traits?

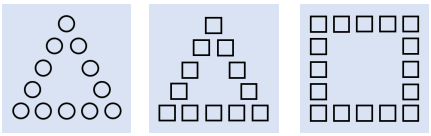
How does children's global / local processing develop through primary school?

Previous research has found that younger children have a preference for local processing, and then develop a more global processing preference with age.

Selective attention



In this task, children identified the shape at either the global or local level.

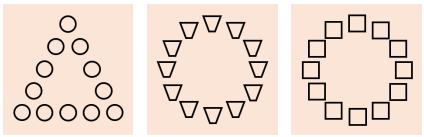


Is the big shape a triangle or a square?

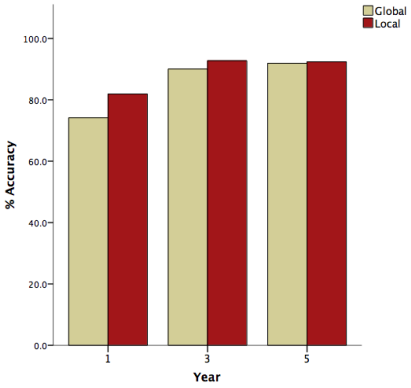
Children in year 1 are more accurate when they are asked to look at the local level than the global level.

Divided attention

In the divided attention task, children had to identify whether the circle appeared at the global or local level.



Is the circle the big shape or the small shape?



The younger children are less accurate than the year 3 and 5 children. The year 1 children are also less accurate on the global level responses than local level.

In summary, the results show that children in year 1 are better at the local processing tasks than the global tasks, but there is little difference in the year 3 and year 5 responses.

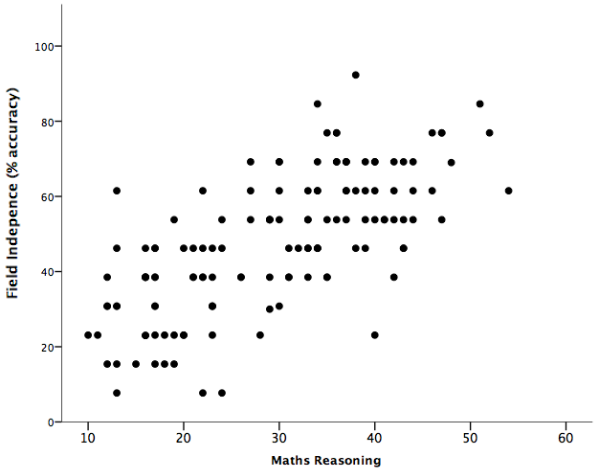
How does children's global / local processing relate to science and maths performance?

The relationship between global and local processing, and science and maths hasn't previously been explored. Previous research has found that those scoring higher on field independence tasks (separating a target from its context), also have better academic scores.

Global / local processing, and science and maths

The results show that children who have higher scores in the science and maths questions, also have fewer errors on the global and local tasks. However, this pattern disappears when age is taken into account.
Therefore, there is not a strong relationship between the scores on the global and local processing activities, and science and maths scores.

Field independence, and science and maths



When children score higher on the field independence task, they also tend to score higher on the maths reasoning task. A similar pattern was found with the science scores, and the written calculation maths task.

In fact, field independence scores explain about 60% of the individual differences in the children's science and maths scores.

In summary, global and local processing does not have a strong association with maths and science scores.

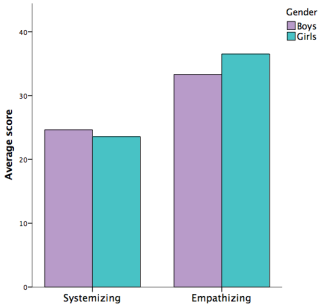
However, there is a strong association between field independence and maths and science. Much of this association is shared with children's differences in IQ and working memory.

How does children's global / local processing relate to their systemizing and empathizing traits?

Previous research has shown a positive association between systemizing scores and field independence. Also, some research has shown that higher systemizing scores are measured in those who have a local processing preference.

Local processing, and systemizing and empathizing scores

There are no associations between systemizing / empathizing scores, and visual perceptual processing measures. Nor are there associations between systemizing / empathizing and field independence measures.



There are no significant differences in the systemizing / empathizing scores depending on gender. Previous research has found that, on average, girls score significantly higher than boys on empathizing, and significantly lower than boys on systemizing.

In summary, the overall results did not show an association between systemizing scores, and global / local processing or field independence.

Final summary:

- There are many factors which *can* lead to variation in science and maths scores, including IQ, memory, and spatial abilities. This study found that a preference for either global or local processing, does not have a strong association with science and maths scores.
- Field independence has a strong positive association with science and maths. Those who are better at visually separating a target from its context, also tend to score higher on science and maths tests.
- My next study will use eye tracking equipment to find out whether there are differences in children's looking patterns which might relate to differences in science and maths scores. This will help us understand why field independence is associated with science and maths achievement.

If you have any questions, please contact me on suzanne.morris.14@ucl.ac.uk