BRIGHT SPARKS

What did you find out from the research activities at Bright Sparks?

Multisensory learning project

The aim of the multisensory learning project is to explore and identify the best sensory modality(s) for learning across childhood. For example, do children learn best with tactile, visual or auditory information, or a combination of the different senses, and how does this change with development?

What we did
In the study, we examined 5- to 10-year-old children's ability to 'incidentally' learn (without being told explicitly to learn) where different families of frogs lived, using a fun 'catch the frog' computer game. Children were either given visual, auditory or audiovisual information about where each frog lived (once frogs were caught they travelled to their home; either a lily pad, a log, a tree, or toadstools). The study investigated whether presenting children with multisensory cues (both auditory and visual information about family membership) on the task facilitated learning more than unisensory cues (auditory or visual information alone). This was tested in a knowledge task administered after the game.

What we found
We are continuing to collect data for this particular study with many other primary school children, so sadly we don't have any findings to share with you just yet! However, this study is a more challenging version of a previous study we ran using only two categories (lily pad and log). In that study, we found that 5- to 10-year-old children's incidental learning of categories was facilitated by multisensory information (presented with both auditory and visual information) more than with unisensory cues. However, learning was slightly different across development. In the youngest group (Year 1s), children only found multisensory information to be more helpful than auditory-only information, suggesting visual information is the most relevant to incidental learning at this age. Older children (years 3 and 5), however, found multisensory information to be more helpful than both auditory-only and visual-only information.

Face Recognition

Most of us can effortlessly extract a wealth of information from even a brief glance at a face (eg identity, expression, focus of attention), which helps us navigate our complex social world. A number of factors are known to contribute to these abilities including genetics and our general visuo-perceptual skills. With this study, we are particularly interested to see whether individual variability in social interest (how rewarding children find it to look at faces) might also play a role.

What we did

Over 15 minutes, children completed 2 computerised face processing games. “Choose who to view” involves viewing faces that vary in features like gender, attractiveness, emotional expression and orientation (upright vs inverted).

Children control the time each face is shown on the screen with keypress responses: if they want to increase the time over a default 3 seconds they can “a” repeatedly, or can decrease it by pressing “z” repeatedly. The Cambridge Face Memory Test for Children also measured children’s ability to recognize learned face identities across changes in lighting, viewpoint and with the introduction of visual noise.

What we found

With our analyses, we will look to see whether the extent to which children wanted to look (or avoid!) the different types of faces is related to their face processing abilities on the memory test.

Space Thinking

What we did

Some children who came to Bright Sparks took part in the “Brain Space'' project. For this project, children played a matching game which tested their ability to rotate animal pictures in their head. We tested whether children were better at the game after watching a specially designed instructional video. The video used a funny animation to outline how to complete mental rotation. To test how useful the video was, some children watched a video that did not include any mental rotation. These children acted as the comparison group.

Spatial skills like navigation, mental rotation and spatial scaling, are very important in everyday life. They are also useful to us when we are learning mathematics. Previous research has suggested that spatial training can improve children’s performance on spatial tasks. However, this is the first experiment to use instructional videos for spatial training. Instructional videos are quick and easy to administer. What’s more, they are great fun to watch.

What we found

The results indicated that there was a significant improvement in performance on the mental rotation game (spatial game) after watching the instructional video. Children who watched the instructional video had significantly improved performance compared to those who watched the control video. This suggests that instructional videos could act as a novel and fun way of training spatial thinking.

Face Perception

What we did

Children were shown different computer generated faces with “funny” eyes and asked to decide where the faces were looking. The eyes were blurred and became more so depending on the child’s performance, increasing the uncertainty of gaze direction. The children were then shown two different faces in succession and asked to determine which face was looking more in a certain direction. Gaze perception in children develops over time. Interpreting gaze accurately is an important indicator for what people plan to do. Adults have a tendency to think ambiguous eye gaze is directed at them. We were interested in how accurately children of different ages perceive eye gaze in faces of all ages and if they have the same interpretation bias as adults.

What we found
Initial findings suggest the children look at faces of children differently to how they look at faces of adults. Specifically, children look more to where an adult face is looking, but they don't seem to do this with other children's faces.

Hopping, hands, and hanging in there!

The aim of our study was to test a range of physical abilities in children aged 5 to 12 years, focussing on how fine motor skills (the coordination of small muscles for movement) and gross motor skills (larger movements made with the arms, legs or whole body) develop.

What we did
All children completed an array of activities, some involving the use of their hands to complete intricate tasks; some more energetic ones involving throwing and catching, and aiming at targets; and finally some quite tricky balancing tasks.

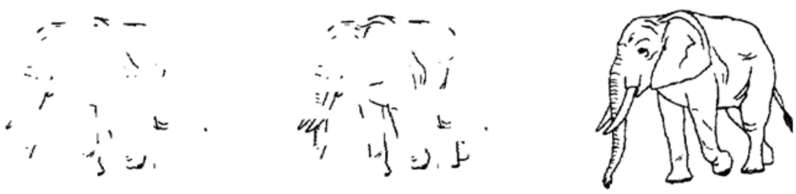
The aim was for the children to perform the tasks as best as they could, and challenges arose when they sometimes had to swap from using their preferred hand (e.g. right) to their non-preferred hand to complete the tasks.

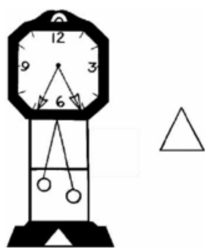
What we found
Preliminary analysis suggests that older children were faster and better able to perform tasks involving fine motor skills (small, intricate movements). We also found that higher parent ratings of children's gross motor skills related to improved performance in throwing and catching, and balancing tasks.

The next step is to collect eye movement data, and relate this to physical ability. This, and what has been collected so far will be compared with the results from a group of children diagnosed with Developmental Coordination Disorder, to try and better understand why children with this condition are susceptible to both poor motor and perceptual development.

Field Independence and maths

What we did
The children completed a shape game, where they had to find a triangle shape in a picture. This measured their ability to separate a target from its context, known as field independence. They also did a fragmented picture game, where they saw pieces of a picture which looked like it had been rubbed out. The picture gradually had the missing gaps filled in and the children had to identify the picture as quickly as they could. This measured their ability to put pieces together to recognise a whole.





The children also completed some maths reasoning questions, and tasks to measure IQ, working memory, and inhibitory control (where children had to respond quickly to identify which animal was bigger in real life, ignoring the size of the pictures).

What we found

As expected, we found that higher maths scores were achieved by children with higher scores in both the IQ tasks and the working memory activities. There was no association between maths and the inhibitory control task. We found that children who were quicker at finding the shape hidden in the picture achieved a higher score on the maths questions. Children who were quicker at identifying the fragmented pictures, scored higher in the IQ tests and the visuo-spatial working memory activity. However, there was no relationship between scores on the fragmented pictures game and maths reasoning scores.

This suggests that field independence (being able to separate a target from its context) has a positive relationship with maths reasoning. In contrast, being able to visually put pieces together to create a whole, does not have a significant relationship with maths reasoning.

Imagination

For our research we are trying to learn more about children's creative abilities and how these abilities change over time. One important aspect of creativity is known as 'divergent thinking', which means generating lots of ideas from a single prompt. Measuring this ability involves tests which don't have a 'right' answer; instead they are designed to see how broadly children can use their experience and different strategies to generate new ideas.

For example, we all know that a pencil is normally used for drawing or writing, but what other interesting and unusual uses could the children come up with for what a pencil could do?

What we did

We asked 30 children to do this and between them they generated nearly 300 ideas. These included ideas as varied as 'get something from under the sofa that your dad couldn't reach' to 'use the lead to poison someone'.

We also did similar games with pictures. Children were given a piece of paper with several sets of two parallel lines; we asked them to use the lines as a starting point for objects or pictures and we asked them to try and think of things that no-one else would think of. Again the children generated a huge variety of ideas – from 'someone walking on stilts' to 'a huge towerblock of flats' to 'a brand new swimming costume'.

What we found

With many aspects of children's cognitive development, there is a steady, gradual improvement with age. However, in these divergent thinking tests, we found that young children (5-7 year olds) often performed as well as older children (8-11 year olds); they often generated as many ideas and scored as highly for originality. The areas in which older children tended to score more highly was in terms of their elaboration – adding further details to their initial concept – and, thanks in part to their developing language skills, in the abstractness of the titles they chose.

We are going to look further into how these abilities develop with age, and also into the extent to which divergent thinking is related to children's other cognitive abilities.