

## Thank you!!!

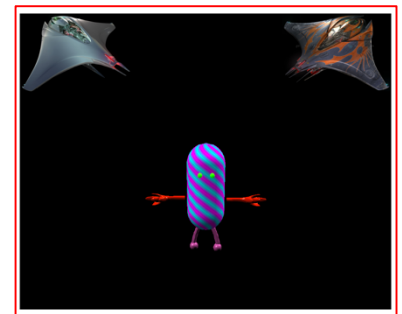
Thank you to all the schools, teachers, parents and children who have taken part in our research studies. With your help we have worked with over 2000 primary school children and advanced our understanding of how children learn in a multisensory world. Please see below for a summary of our research. If you would like to know more, or take part in research in the future, please email [babylab@bbk.ac.uk](mailto:babylab@bbk.ac.uk).

## Research Findings

### Study 1- Alien Families

**Aims:** To examine whether children learn about category membership (where a cartoon alien lives) more efficiently when both visual and auditory information is provided together (multisensory), or with visual-only or auditory-only information (unisensory). Also, is there a preferred sense (modality)? How does this change with age?

**What we found:** Performance on the learning task differed with age; 5-year olds learnt most efficiently with multisensory information (both visual and auditory together). 7-year olds' learning was not influenced by the type of information given- they performed equally well in the multisensory and unisensory conditions. 10-year olds learnt most efficiently with auditory-only information, compared to multisensory information or visual-only information.



### Study 2- Alien Beanies

**Aims:** To examine whether children learn about category membership (where an alien beanbag lives) more efficiently when both visual and tactile information is provided together (multisensory), or with visual-only or tactile-only information (unisensory). Also, is there a preferred sense (modality)? How does this change with age?

**What we found:** All three age groups (5-, 7- and 10- year olds) performed more poorly when given visual-only information. They performed just as well with tactile information alone as they did with both tactile and visual information together.



### Study 3- Catch the Frog

**Aims:** To investigate the effects of multisensory information on 5-9 year-old's sustained attention. Children were asked to concentrate and catch cartoon frogs whilst ignoring other animals when presented with 1) visual-only, 2) auditory-only, 3) synchronous visual and auditory (at the same time), or 4) asynchronous auditory-visual information.

**What we found:** The use of visual and auditory information together (synchronous multisensory) improved children's performance compared with auditory alone. However, presenting primary school children with multisensory information separated by a 300ms gap (asynchronously) helped all children's performance on the attention task more than when children were presented with synchronous multisensory information or with just unisensory information. This shows that children across these ages use information from a different sense to cue performance and support perception.



### Study 4- Catch the Frog Distractors

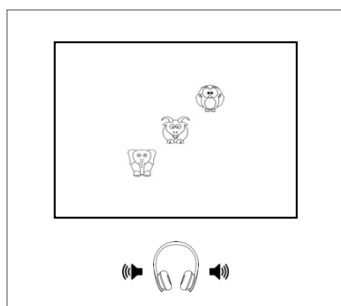
**Aims:** In a similar task to Study 3, children were asked to hold their attention and catch cartoon frogs. In this task however, children were sometimes also presented with distracting animal sounds (auditory distractors), animal pictures (visual distractors), or animal pictures and sounds (multisensory audiovisual distractors) surrounding the central image. This was to examine the effect of uni- and multi-sensory distractors on attention across childhood.

**What we found:** Older children were more affected (shown by slower reaction times) by visual distractors compared to no-distractors than 5 year-olds. However, the youngest children (5 and 7 year-olds) made more inhibition errors (pressing when a frog was not presented) on multisensory distractor trials than on no-distractor trials. All groups caught fewer frogs on trials with audiovisual distractors.

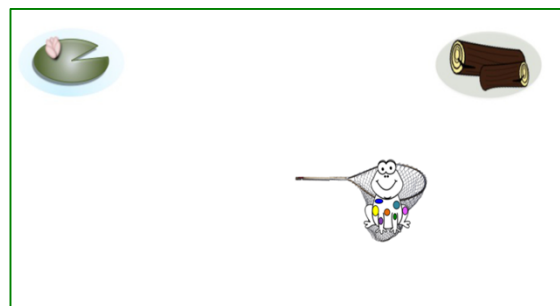
### Study 5- Catch the Frog Families

**Aims:** Children played the 'catch the frog' game as in studies 3 & 4 but here we examined children's ability to 'incidentally' learn (without being told explicitly to learn) where each frog lived (once frogs were caught they travelled to their home; either a lily pad or a log). The study investigated whether presenting children with multisensory cues (auditory and visual information about family membership) on the attention 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:** 5-10 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 1), 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.



Study 4: Catch the frog with distractors



Study 5: Incidental category learning

## Summary and future directions

Our research has started to provide some insight into how multisensory information effects children's attention differently across the primary school years, and how this may change depending on whether learning is explicit or incidental. It is not yet clear as to what sensory information is most beneficial to children and how this changes with age, but this is likely to also be context dependent. Our next studies aim to investigate this further and to examine how flexible children's sensory preferences are and also how multisensory learning is affected when children are multi-tasking.

## How you can be involved...

If you, your school, or any other schools you know would like to know more or take part in future projects please contact [babylab@bbk.ac.uk](mailto:babylab@bbk.ac.uk). We are always in great need of schools to take part and will of course offer an assembly on the brain as thanks!