**Clinical Question:** In children with disabilities, does the use of pictures support literacy development?

**Citation:** Singh, N.N. & Solmon, R.T., *A Stimulus Control Analysis of the Picture-Word Problem in Children Who are Mentally Retarded: The Blocking Effect.* *Journal of Applied Behaviour Analysis* 1990, 23, 525-532, Number 4 (Winter 1990)

**Design / Method:**
- An alternating treatments design (used to compare the effects of four experimental conditions in word recognition)
- 70 five-letter nouns were chosen from the instructional reading level of the students. All words and the corresponding black and white pictures were tested twice for recognition.
- As a result, 16 words were chosen as the stimulus words for the study, each beginning with a different letter.
- Each word was printed in lowercase black letters and along with its corresponding picture.
- The words were allocated in a random manner, four for each condition for each child. No two children had the same set of words in any one condition.
- The study was conducted in a special resource room at the subject’s school.
- Two elementary school teachers were provided with additional training in the implementation of experimental procedures.

**Participants:**
- Eight children (4 females, 4 males); ages 7 -9 years; able to read about ten words;
- Diagnosed as moderately mentally retarded based on the American association on Mental Deficiency criteria
- Each subject had received approx. 10 -15 minutes of individualised reading instruction three times per week on word recognition by a teacher or teacher’s aide during the previous three months – this was discontinued for the period of the study.

**Experimental Group:**
The four training conditions:

**Condition A – Blocking of the word by the picture**
- The first slide was a single stimulus, picture
- The second slide was a compound stimulus, the picture on the top 2/3 and the word on the bottom 1/3. (Picture was enhanced in size.)

**Control B – Control for condition A**
- A word presented as a single stimulus on the bottom 1/3 of slide (word 2.5cm)

**Condition C – Reduction of the blocking effect of the picture**
- Word presented as single stimulus on first slide
- Second slide, the word on the top 2/3 and the picture on the bottom 1/3 (word enhanced 5 cm)
Experimental Group (cont.):  
**Condition D – Control for condition C**  
- Single stimulus with word (5 cm, twice the size of condition B) on top 2/3 of slide without the picture  
- Each session consisted of four experimental conditions and a daily post-test. This lasted no longer than 20 minutes.  
- Intervention continued until each subject responded correctly to all four words in any one experimental condition during three consecutive post-tests.  
- The experimental condition found to be most effective in the intervention phase for each student was substituted for the other three conditions in the remediation phase.  
- Remediation was terminated when each student correctly responded to all 16 words during three consecutive post-tests.

Control Group: None

Results:  
- All students had the lowest rate of learning under condition A (the maximum blocking condition) in which the size of the picture was enhanced compared to the word.  
- Six students had the fastest rate of learning when the word was presented alone (condition B or condition D).  
- The remaining two students had the fastest rate under condition C (reduced blocking effect – reduced by enhancing size of word).  
- Results indicate that prior association of the picture with its verbal equivalent inhibits the learning of an association between the same picture and its written equivalent (printed word)

Comments:  
**Strengths**  
- Study clearly presented  
- Able to be replicated  
**Weaknesses**  
- No control group  
- No statistical analysis

Level of Evidence (NH&MRC): Level IV

Appraised By  
Clinical Group: AAC  
Date: August, 2007