

This study investigated whether children with autism and typically developing children are more successful at learning words from colour pictures or non-colour pictures. We investigated how children extended words from pictures to objects and measured whether they could remember the names after a short delay. We predicted that children with autism would benefit from colour pictures because they are more visually similar to the objects they represent than non-colour pictures.

Children were taught the names for unfamiliar pictures by encouraging them to use a linguistic principle called 'mutual exclusivity' (the assumption that a word has only one meaning). This was achieved by presenting an unfamiliar picture alongside two familiar pictures that children had names for (e.g. a cat and a ball), and asking children to identify the referent of an unfamiliar word (e.g. a "blicket"). As children already know the names of the familiar pictures, they infer that the new word must refer to the unfamiliar picture. When stimuli are presented in this way, children with autism – including minimally verbal children – are very good at identifying the meanings of new words. This was observed in Natalie's study: children correctly paired new words with both colour and non-colour unfamiliar pictures with over 95% accuracy.

Children's memory of the new words was then assessed after a five-minute delay. Previous research has demonstrated that typically developing children often forget new words after 5 minutes, suggesting that *identification* and *retention* of word meanings are separate processes. Natalie's study introduced some additional complexity – when learning from pictures, children need to understand that words refer to the items they symbolise (not just the pictures themselves). We measured two kinds of learning: retention and generalisation. Retention involved presenting pictures and objects that matched the previously-introduced unfamiliar pictures on shape and colour. Generalisation involved presenting pictures and objects that matched the previously-introduced unfamiliar pictures on shape but *not* colour (enabling us to explore children's understanding of how categories work).

We found that children with ASD and TD children showed more accurate retention when they were (a) taught with non-colour pictures rather than colour pictures (contrary to our predictions), and (b) tested with pictures rather than objects. We also found that they were less accurate when generalising words from non-colour pictures to objects that are coloured. Children with ASD did not differ on retention or generalisation accuracy when compared with typically developing children with similar receptive vocabularies.

Importantly, these findings show that children with ASD can learn new words from pictures as effectively as typically developing children under the right conditions (and when expectations are based on ability rather than age). The learning advantage for non-colour pictures may imply that colour may be distracting or increase the difficulty of encoding representations of the new words' meanings. It makes sense that children would respond more accurately when tested with pictures than objects, as the words were paired with pictures in the first place. That being said, both groups demonstrated understanding that names for pictures should also be extended to objects that match on shape. It should be noted, however, that previous research has shown that minimally verbal children may rely on colour (in addition to shape) when identifying relationships between pictures and objects. As children's language skills develop, so too does their understanding of pictures, and their ability to use "less iconic" and more abstract pictures improves.