

How do we learn to read?

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100 years of life-changing discoveries

1. Is reading a special skill?

Learning to read involves sounding out words letter-by-letter
Letters usually have the same sound in different words

C-A-T c-æ-t C-A-P c-æ-p

Learning vocabulary is different - objects must be learned as wholes
Similar looking objects do not have similar names



cæt



cæp

Although learning to read and learning object names require different skills, children with dyslexia struggle with learning to read AND have subtle problems in naming objects.

Learning to read and learning object names: Same or different?

Our experiment

Adults learned to read made-up words written in unfamiliar symbols



and learned made-up names for novel objects



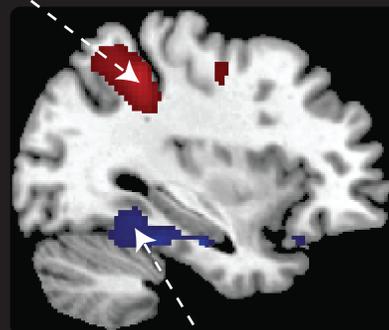
whilst in an MRI scanner!



Our results

parietal cortex

- more active for learning to read
- maps sequences of letters to sounds



fusiform gyrus

- more active for learning object names
- maps whole-items to their linguistic associations

Reading words as sequences of letters rather than whole items is crucial in the earliest stage of reading acquisition

2. English spellings are notoriously irregular!

Beware of heard, a dreadful word
That looks like beard and sounds like bird,
And dead: it's said like bed, not bead --
For goodness sake don't call it 'deed'!

But we still use letter-sound correspondence rules to read made-up words

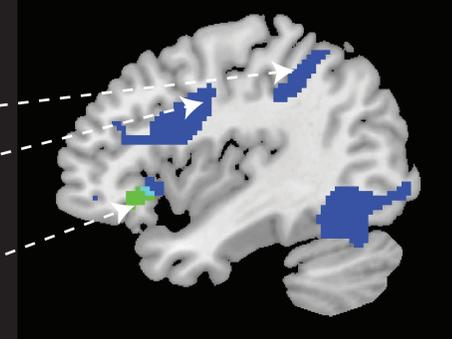
Twas brillig, and the slithy toves
Did gyre and gimble in the wabe:
All mimsy were the borogoves,
And the mome raths outgrabe.

How do we achieve these opposing skills?

Adults read English words in an MRI scanner

Regular words, e.g., crunch, sank, nerve
Irregular words, e.g., thyme, cough, shove
Nonwords, e.g., shurd, wabe, braim

- parietal cortex and precentral gyrus
more active for nonwords than real words
- inferior frontal gyrus (triangularis)
more active for irregular than regular words



Nonwords are unfamiliar and must be read as sequences of letters.

But irregular words create conflict "should I read SHOVE as *shuv* or *shoav*?"
Resolve conflict using oral vocabulary "I know the word *shuv* but not *shoav*."

Irregular word reading is difficult for:

Children with smaller vocabularies

Older people with dementia who have degraded knowledge of spoken words

Good oral vocabulary is essential for irregular word reading