

# Discovering the secret of words: How morpheme knowledge improves literacy

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# Acknowledgements

- ERSC
- MRC

# Why do morphemes matter to literacy?

Two forms of word-attack strategies

- ★ Phonological strategies
- ★ Morphological strategies

Young poor readers (age 6) are disadvantaged at phonological but not morphological knowledge

The question is: can we just teach to their strengths?

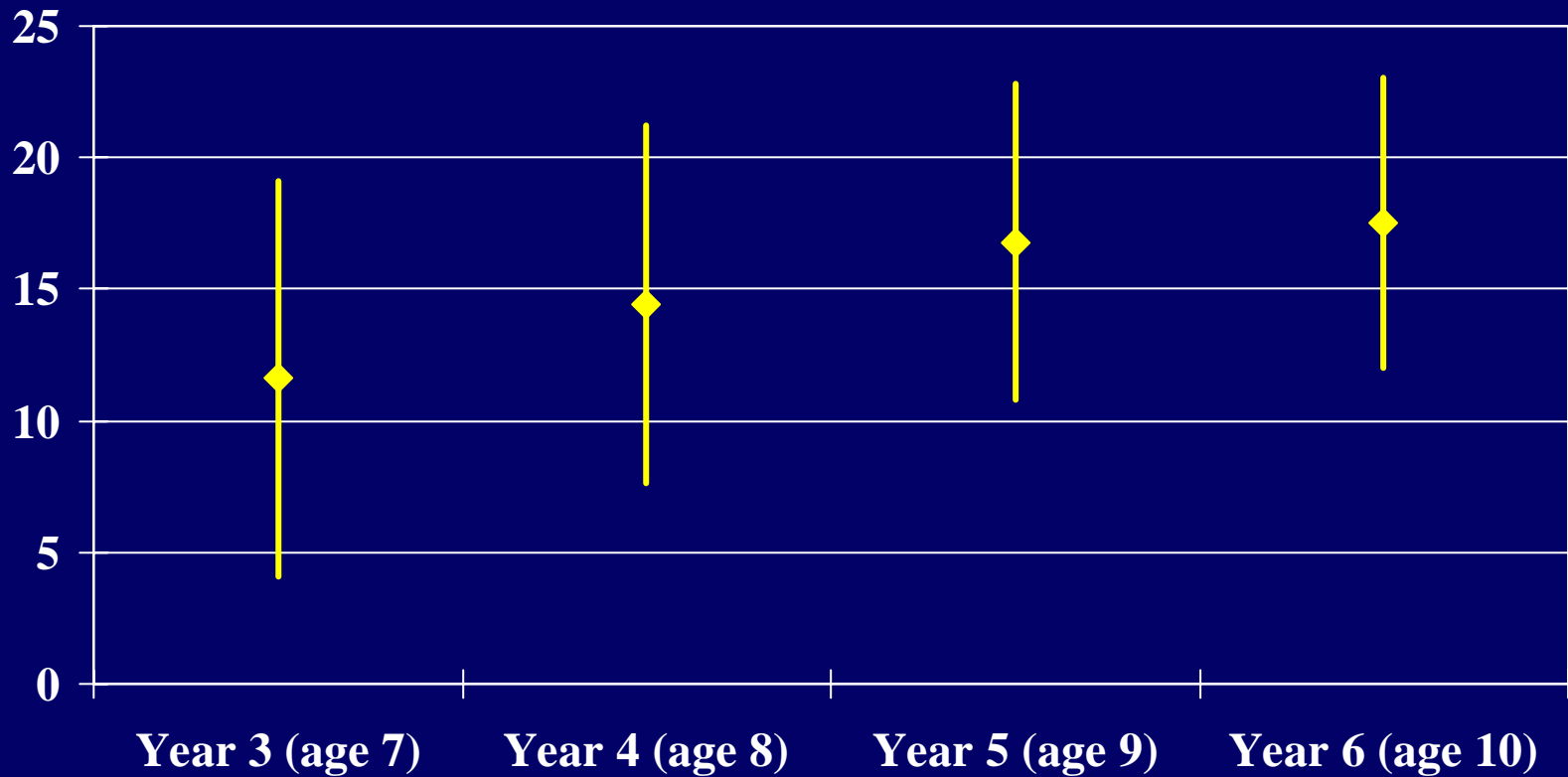
# The phonological route

- Children use their understanding of the alphabet to read and spell new words
- There is more to the phonological route than simple letter-sound correspondences

**cuter**

- Even 10-year-olds are not at ceiling on reading long vowels when they cannot use lexical information in words or pseudo-words

# Mean correct in reading long vowels by Year Group (Maximum score 25)



Diamond shows mean; bar marks 66% of performance for Year Group.

# The importance of conditional rules for word reading

- We designed a short assessment for Years 3 and 4 (ages 7 and 8) by choosing three types of words:
  - simple, short vowel words and pseudo-words
  - short words and pseudo-words with the V\_E split digraph
  - words and pseudo-words with the V\_E split digraph followed by a morpheme (cuter, smaped)
- With only 9 words, the assessment had a correlation of about .8 with the Schonell Word Reading on the same occasion and about 6 months later

# Conclusions

- There are two different forms of phonological word-attack strategies
- From about age 7 most children are very competent with alphabetic strategies
- Conditional rules continue to be difficult
- In order to compare the effectiveness of phonological and morphological strategies, instruction must be age-appropriate

## The morphological connection in English orthography: the morpho-phonetic level

- Regular relations not just between sounds and letters but also between morphemes and letters
- Sometimes phonology cannot account for morphological regularities

## Ways in which the morphological connection goes beyond letter-sound rules

- Two or more acceptable ways of spelling the same sound: “*box*” “*socks*” ; morphology determines the correct one
- A morpheme may be silent in spoken language but signalled in writing: “*the boy’s drink*” “*the boys drink*”
- Stems preserve their spelling although pronunciation changes: “*magician*”
- Suffixes have meaning and a fixed spelling (“*ian*” for persons, “*ion*” for abstract nouns)

## Ways in which the morphological connection goes beyond letter-sound rules

- Morphemic spelling flouts accepted letter-sound rules: “*kissed*” “*list*”; “*magician*”
- Morphemes indicate different ways of parsing the word when reading: “*uninformed*” “*uniform*”; “*fished*” “*misheard*”
- Contextual rules apply at morpheme boundaries: “*statement*” “*loved*”

# Language awareness and learning to read and spell

- Phonological awareness is connected with learning to use letter-sound relations
- Training in phonological awareness paired with writing improves pupils' reading and spelling

# Language awareness and learning to read and spell

- Morphological awareness correlates with word recognition, spelling and pseudo-word decoding after controlling for age and vocabulary (Fowler & Liberman, 1995)
- There was no research about the relative effectiveness of teaching advanced phonological and morphological word-attack strategies

# The first intervention study: all children in the classroom

## The training groups

- Phonological training only, no writing (PO)
- Phonological training with writing (PW)
- Morphological training only, no writing (MO)
- Morphological training with writing (MW)

## Training during the “literacy hour”

Comparison group: unseen but with the same amount of teaching

# Activities we used in the intervention study

- Instruction was designed to involve children in problem solving and developing awareness of the units (of sound or meaning)
- Same cognitive processes (classification, analogy, addition, deletion) applied to either phonological or to morphological segments
- In both cases, the children were involved in solving problems about language and making decisions, not repeating a pattern over and over

## Examples from the phonological training

- Classifying words by sounds
  - I will say a word, you will say whether it has a long or short vowel (after examples, a fast game): hat - fate - snake – etc
- Analogies in changing words
  - If I say a word with a short vowel, you will change it to a long vowel; if I say a word with a long vowel, you change it to a short one: hat - fate - snack – etc

# Examples from the morphological training

- Classifying words by class
  - We explained the meaning of nouns, verbs and adjectives by asking the children to think of sentences as frames where some words fit but not others: they made judgements (After school we always .....
- Analogy in changing words
  - Changes from base form to agents: a person who sings is a? a person who works in science is a ?
  - Making abstract nouns with different endings (ness, ion, ity)

# Participants

- 8 schools, 4 intervention and 4 control
- pupils in Years 3 (age 7) and 4 (age 8)
- 218 children in the intervention groups and 225 children in the control group
- in intervention schools, children in the same class were randomly assigned to one of four treatments

# Procedure

- Teaching delivered in groups (one quarter of each class) once a week by researcher
- About 12 lessons, 10 designed with new activities and last two were revision sessions

# Pre-test measures

- Our reading and spelling tests (assessing advanced phonological strategies)
- Spelling of suffixes
- IQ to be used as a control

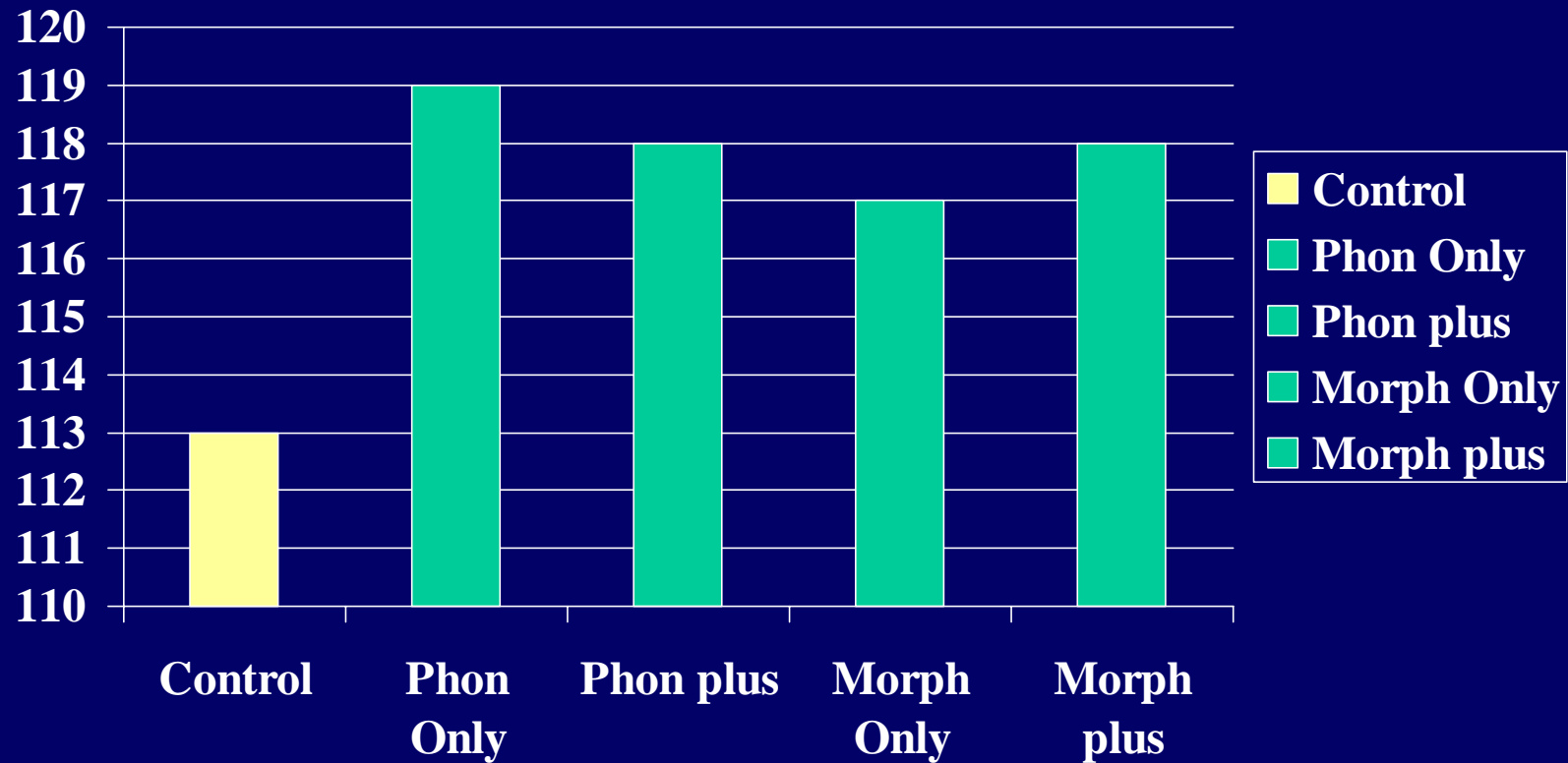
# Post-test measures

- Schonell Word Reading
- Schonell Word Spelling
- Spelling of suffixes

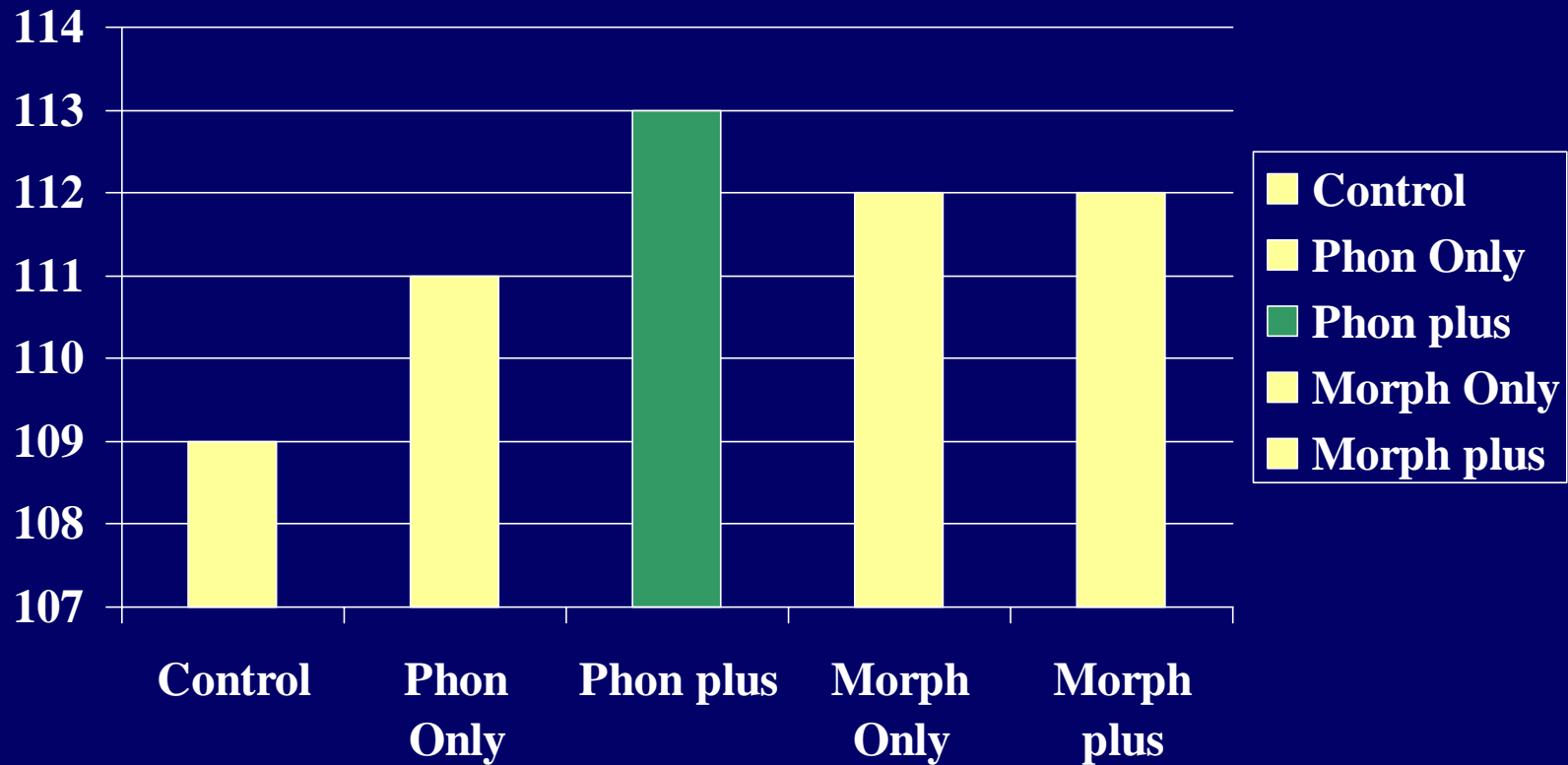
# Results

- All groups showed improvement from pre- to post-test
- Results presented are statistical comparisons with control group
- Analysis of covariance controlling for IQ and pre-test performance in relevant test (e.g., impact on word reading controlling for word reading in pre-test)
- Bars in different colours show significant differences

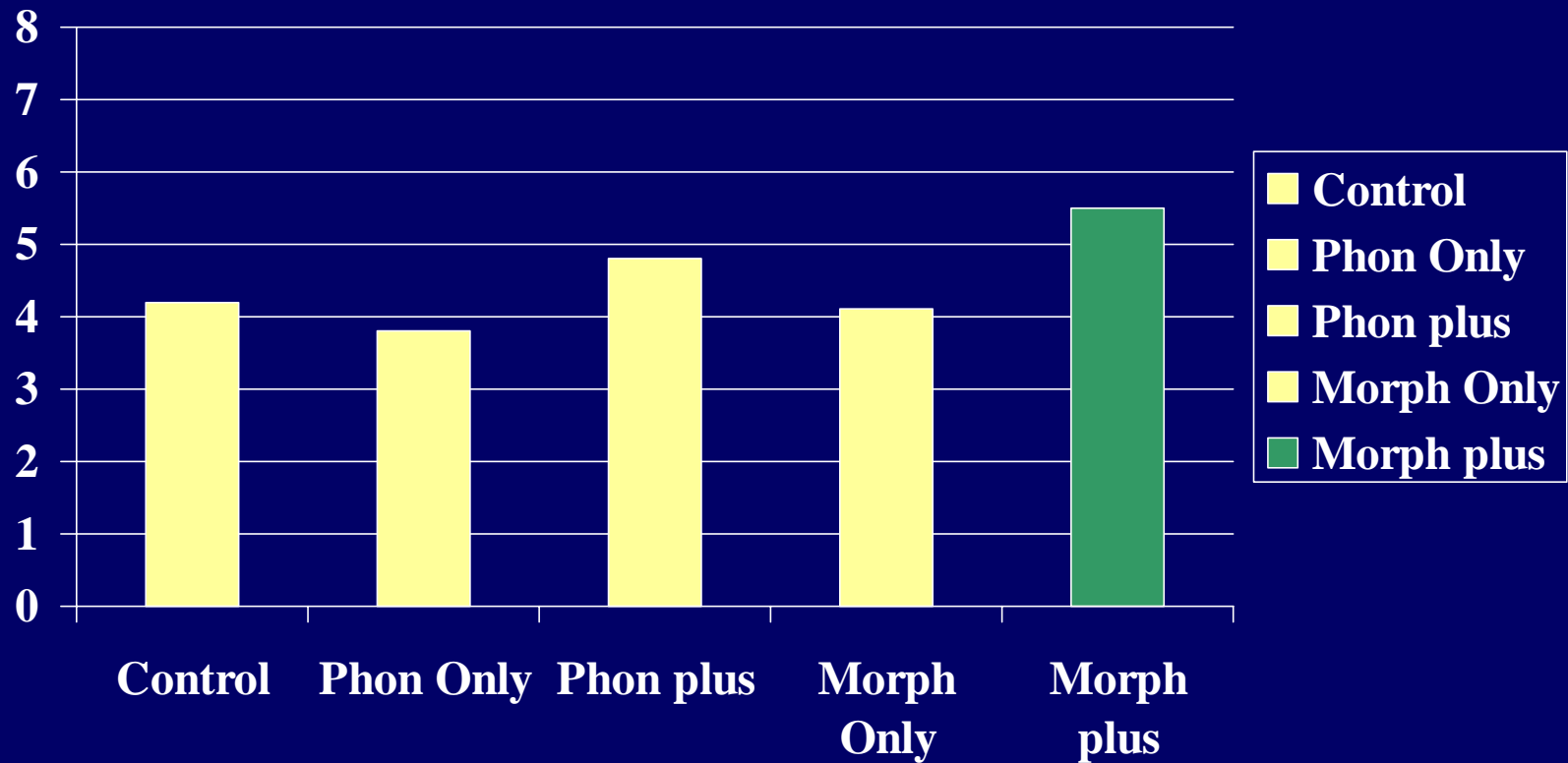
# Adjusted mean reading age in the Schonell Word Reading



# Adjusted mean spelling age in the Schonell Word Spelling



# Adjusted means in the spelling of suffixes



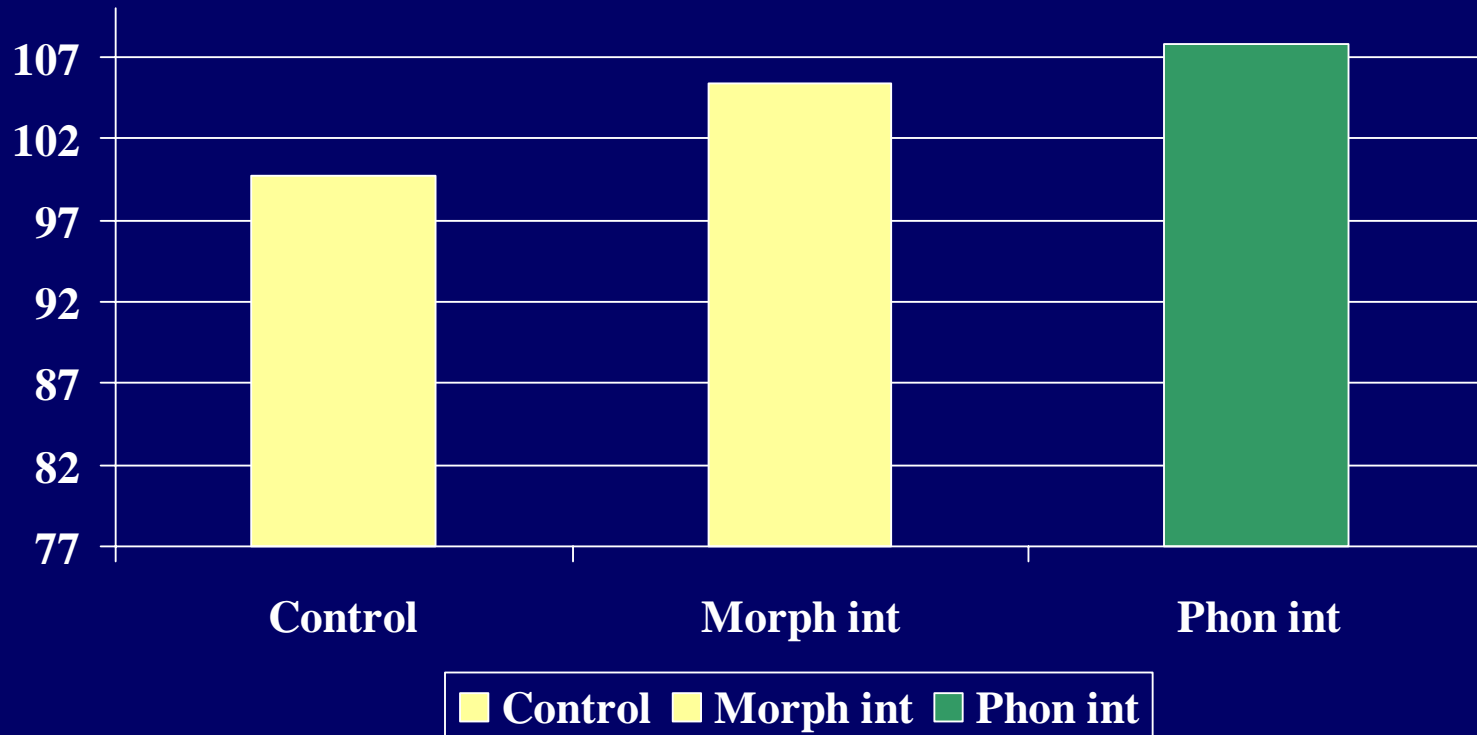
# An intervention with poor readers (with Pretzlik and Hurry)

- 56 children aged 9 to 11 with at least an average delay of 18 months in reading and spelling
- Mean standardized reading age 77.5 (mean for population is 100)
- Mean standardized spelling age 76.2 (mean for population is 100)
- Average reading delay 27 months and spelling delay 29 months

# An intervention with poor readers

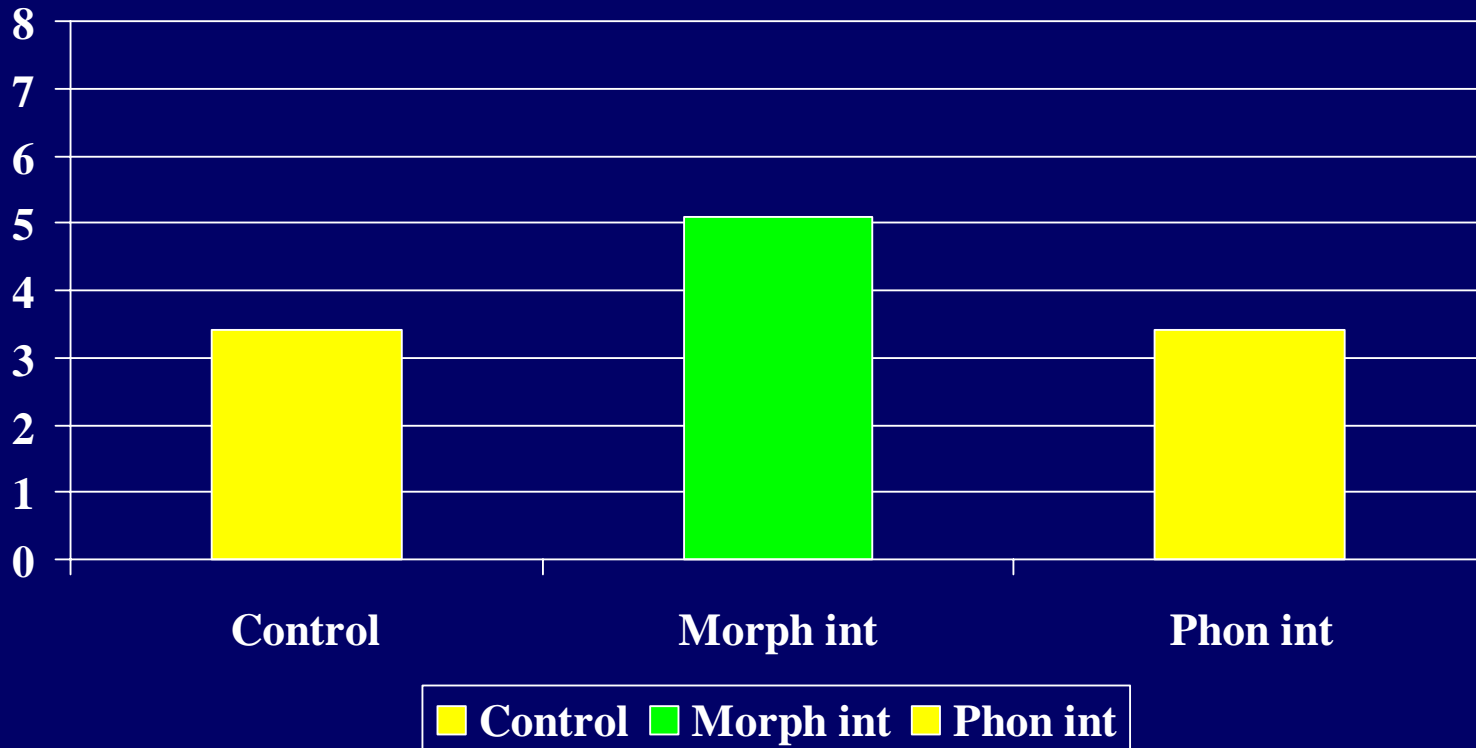
- For inclusion participants had to meet a criterion of mastery of basic letter-sound knowledge; 3 participants had to be excluded
- Random assignment in each school to control (n=15), phonological (n=21) or morphological (n=20) intervention
- Larger numbers assigned to intervention to increase benefit to participants
- Progress in reading age after 6.5 months: 7.4 months for control group; 11.7 for morphological group; 13.1 for phonological group

# Adjusted means in reading age after the intervention



Effect size: 0.55

# Adjusted means in spelling suffixes after the intervention



Effect size: 0.69 in comparison to control and 0.66 in comparison to phonological intervention

# Conclusions

- Both phonological and morphological intervention showed benefits in word reading for normal readers
- Only phonological intervention produced significant effects for poor readers
- Only morphological intervention produced significant effects in improving suffix spelling for both normal and poor readers
- Morphological training had specific effects

# Morphological interventions in the classroom

- 7 schools used a morphological intervention program prepared for the classroom
- Approximately 6 to 8 lessons of about 45 minutes were planned in the form of game-like tasks that could be played in the classroom using a computer and projector
- Two programs, one with increased focus on spelling and the other with emphasis use of spelling
- Different numbers of children took different pre-, post- and delayed post-tests

# Discovering the secret of words

- Activities involve different cognitive operations (analogy, changing words, classifying words, adding or subtracting morphemes, counting morphemes)
- Children may give individual answers and discuss these with a partner or be asked to agree an answer with the partner
- Awareness of morphemes and their role in meaning is seen as important

er ist

Example: making agents

A person who cleans is a cleaner.



er ist ian

magician



ness ion

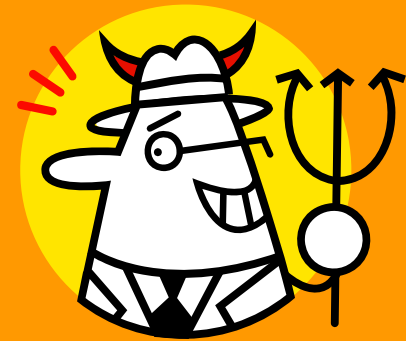
He can't lift the weight  
because of his

**weakness**



ness ion

The evil villain was planning  
world **domination**



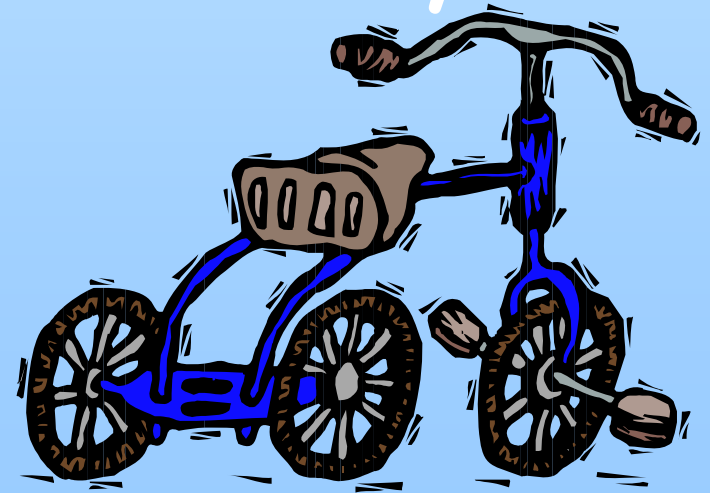


# Bicycle

What is it about the word that gives you a clue about this difference?

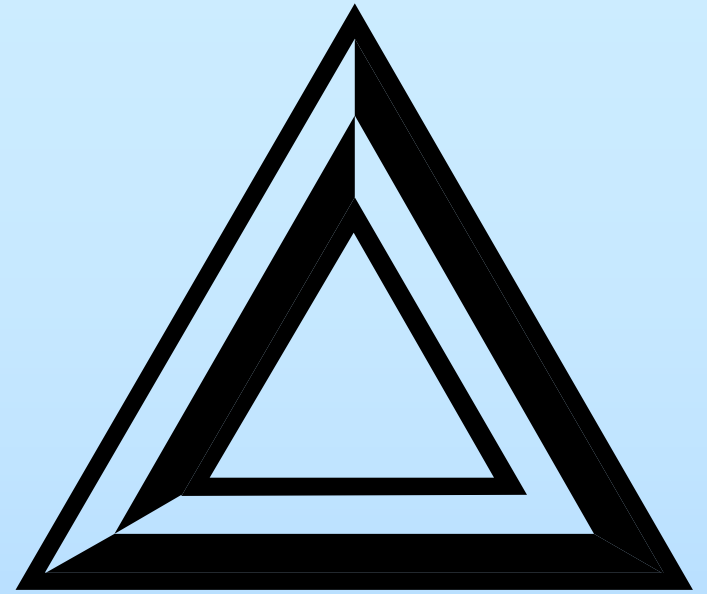
What is the most important difference between a bicycle and a tricycle?

# Tricycle





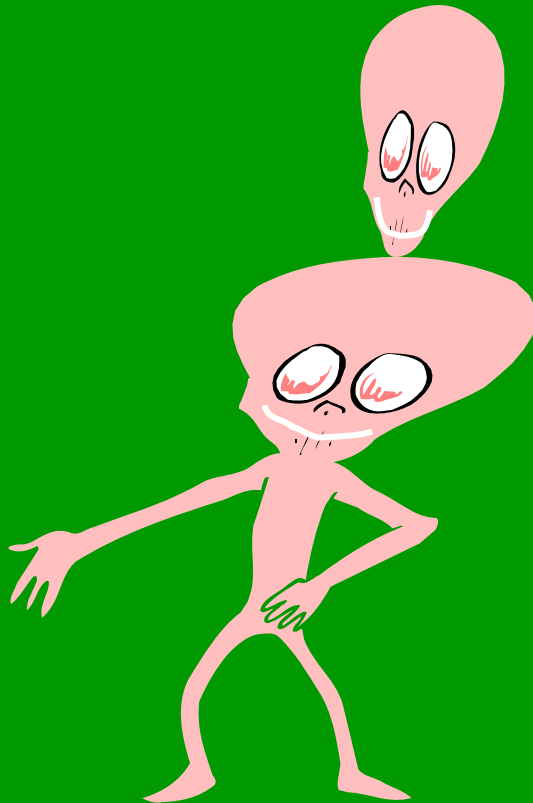
Binoculars



Triangle

What is it about these words  
that gives you a clue about  
their meaning?

Today in town I saw a **biheaded** martian. Draw a biheaded martian.



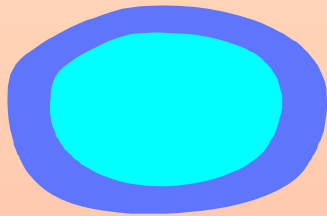
# What jobs do people do on Mars?



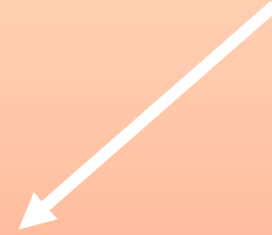
# What jobs do people do on Mars?



What do spammers do?

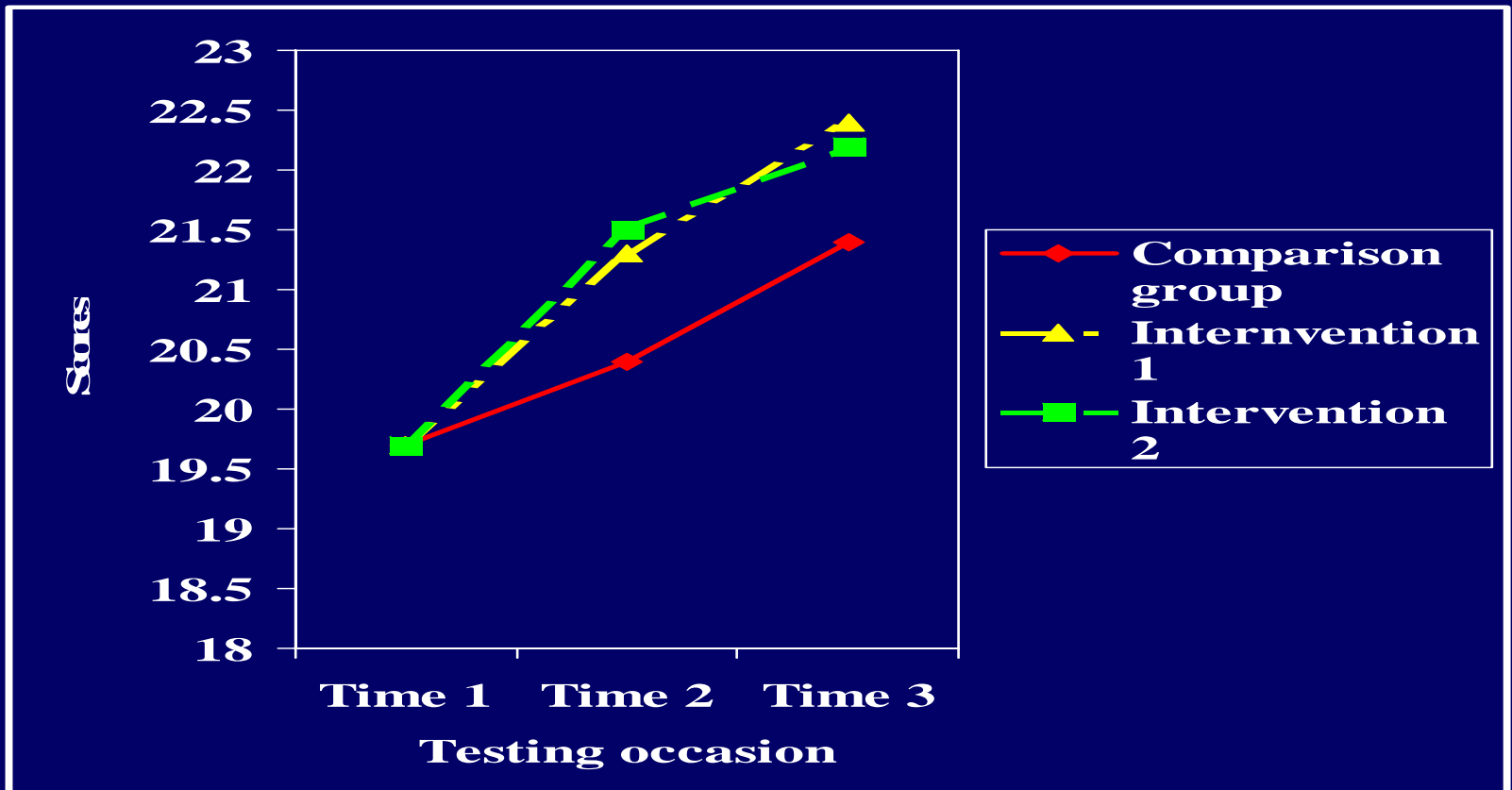


They are  
spammers



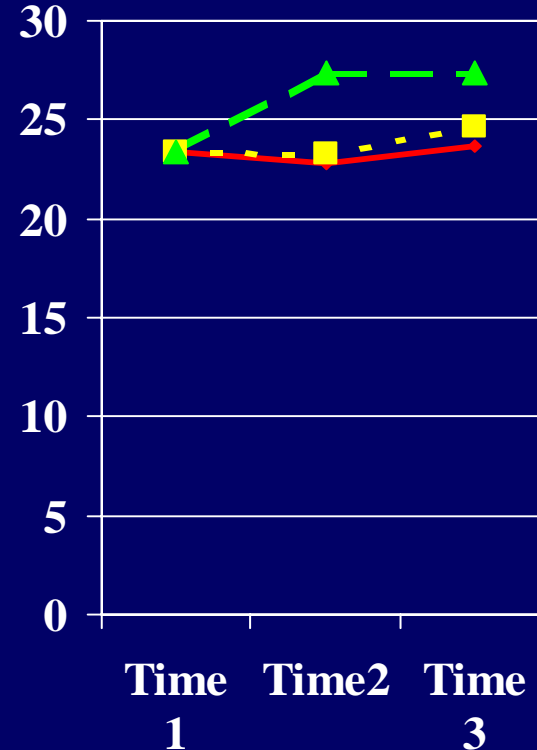
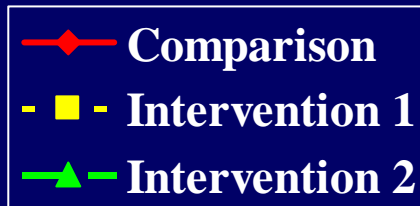
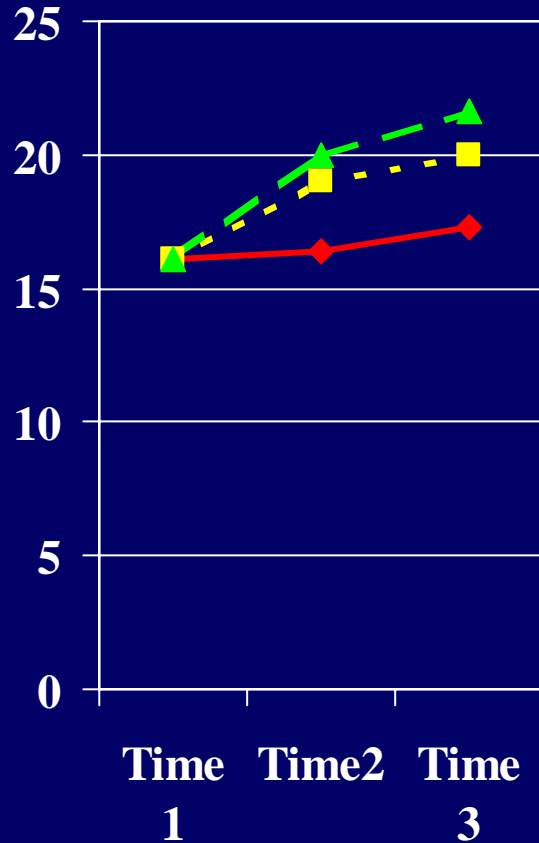
They spamt the spaceship for  
flying too low

# Scores on a vocabulary test (max 40)



N= 121 comparison, 205 intervention 1 and 61 intervention 2 (with added focus on spelling)

# Scores on a vocabulary test

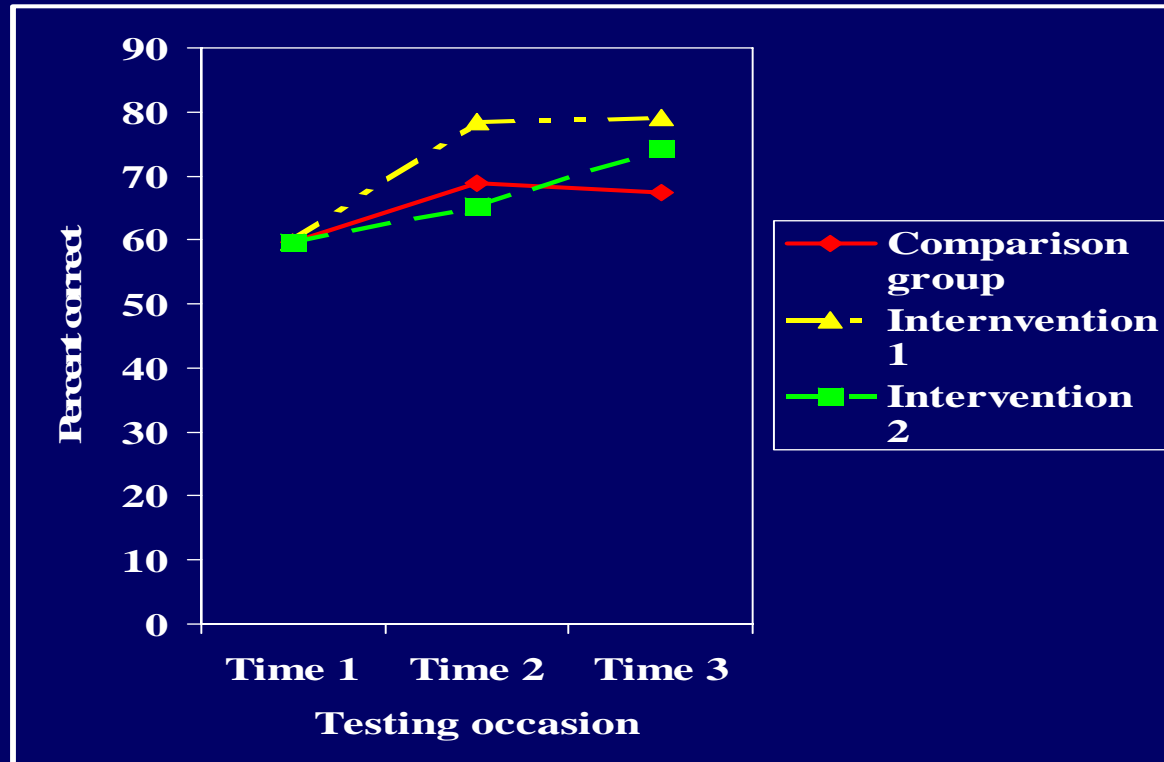


Left: up to the mean at pre-test

Right: above the mean at pre-test

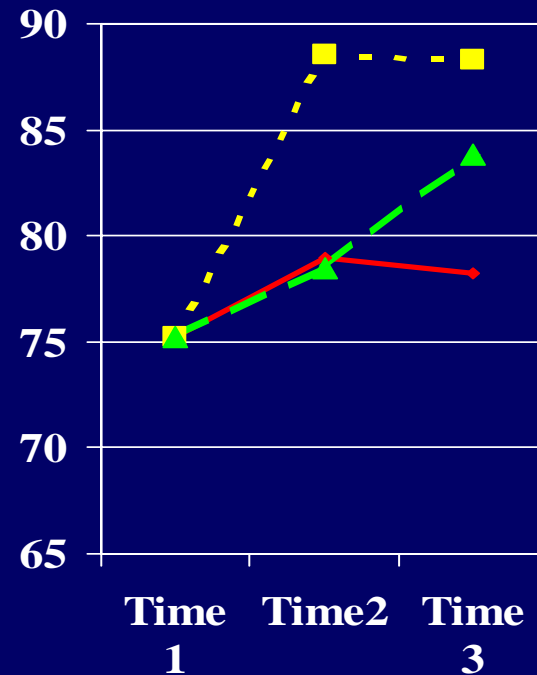
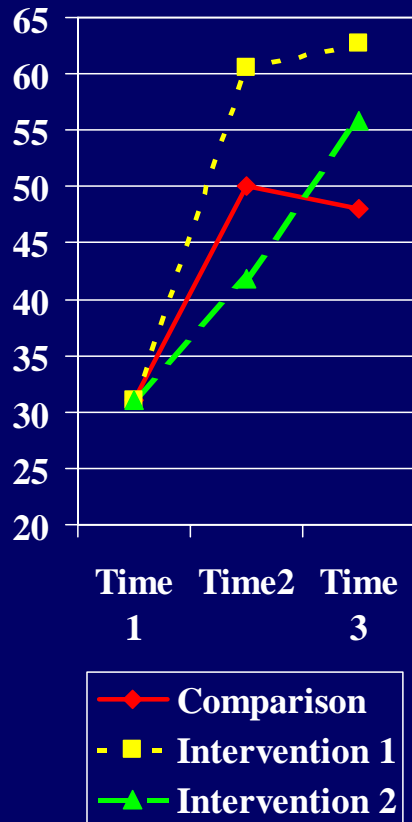
# Percent correct on pseudo-word definition

Tell me what these made-up words mean: chickener; uncomb etc



N= 104 comparison, 170 intervention 1 and 59 intervention 2 (with added focus on spelling)

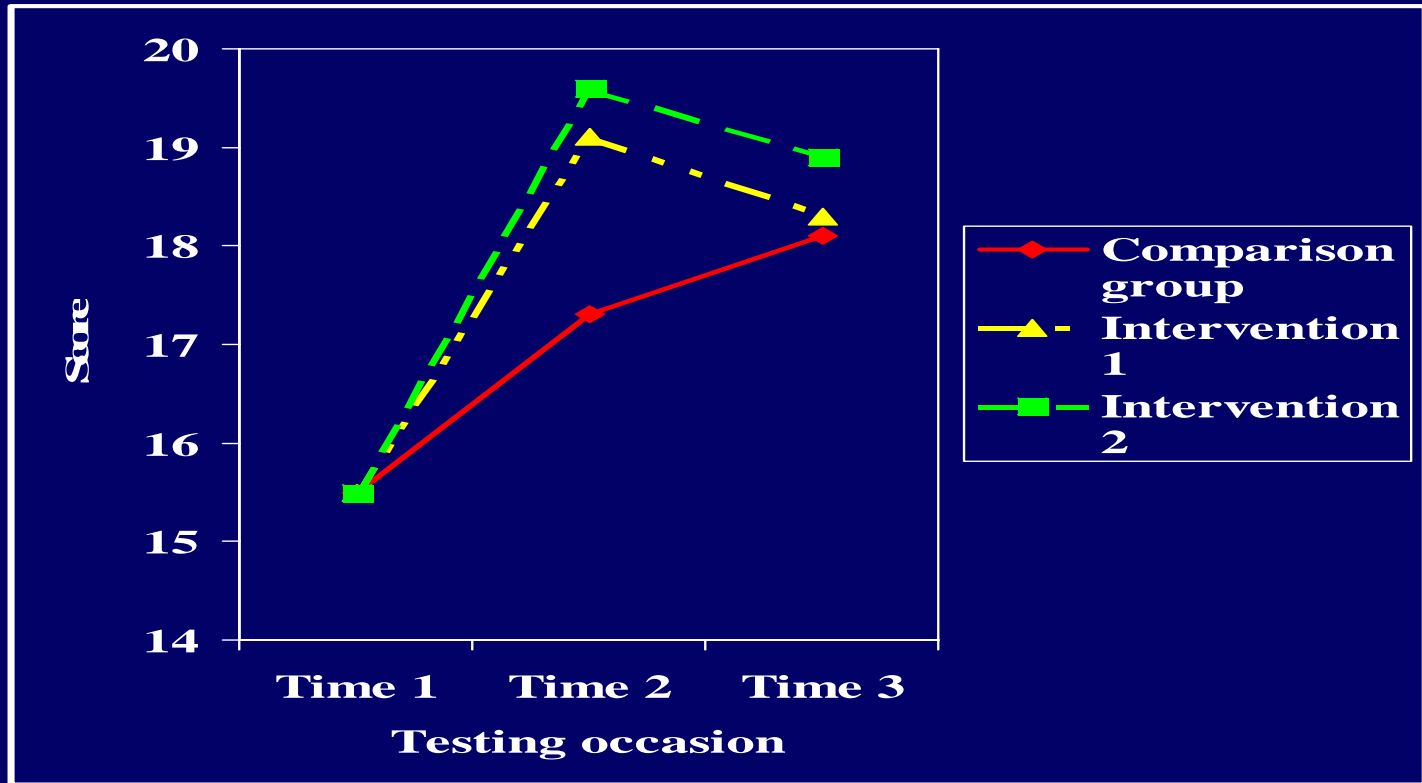
# Percent correct pseudo-word definition



Left: up to the mean at pre-test

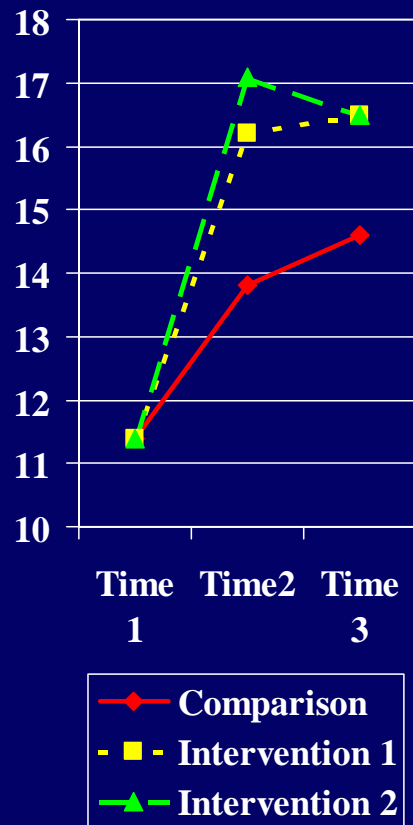
Right: above the mean

# Score on a suffix spelling task (max 26)



N= 86 comparison, 51 intervention 1 and 59 intervention 2 (with added focus on spelling)

# Score on a suffix spelling task (max 26)



## General conclusions

- Teaching about morphemes can be effective for normal and poor readers
- For normal readers, it was as effective as a phonological program in improving word reading but for poor readers the phonological program was more effective
- It has specific effects on spelling words that cannot be spelled on the basis of sounds
- It has positive results on vocabulary growth