

# Spelling Development and Mastery: Early, Late, or Never?

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# Spelling is important

Spelling = representation of spoken language as a series of printed symbols, in a conventional order

Fluent spelling is essential for

- making oneself easily understood
- appearing intelligent and literate (Gerber & Hall, 1987)
- keeping cognitive resources available to choose word/concept to express next (Bereiter, 1980)

# Spelling has been neglected

PsycINFO search for...

**“Spelling”:**  
12,620  
results

**“Reading”:**  
154,862  
results



# Spelling concerns us all



# Spelling concerns us all

- hi dr. kemp i no this is prob not ur area but if u could give me someones email who is that would be nice. i've been talking and their is a little conjecture as to if the essay plan and intro are on just the bio prespective or comparison of bio and cog prespectives? just wondering cheers sarah.

# Contemporary Writing Systems

1. **Logographic**: unique graphic symbol for each WORD
2. **Syllabic**: unique graphic symbol for each SYLLABLE
3. **Alphabetic**: unique graphic symbol for each PHONEME

# Alphabetic writing systems

- The alphabet transformed the ancient world, and has never been superseded
- > 75% of people live in a country that uses an alphabetic writing system
- “Top Three” systems:
- A more recent system:

# Three conditions for a true alphabet

1. Each phoneme must be represented

2. Ideally, one-to-one correspondences between graphemes and phonemes

3. Ideally, 20-30 graphemes:  
- Most people can memorise  
- All words can be written

## “Shallow” orthographies

Have one-to-one grapheme-phoneme correspondences

What you see is what you say

What you say is what you see

E.g., Italian (*formaggio, spaghetti*)

E.g., Finnish (*kiitos, professorina*)

## “Deep” orthographies

Have a variety of grapheme-phoneme correspondences

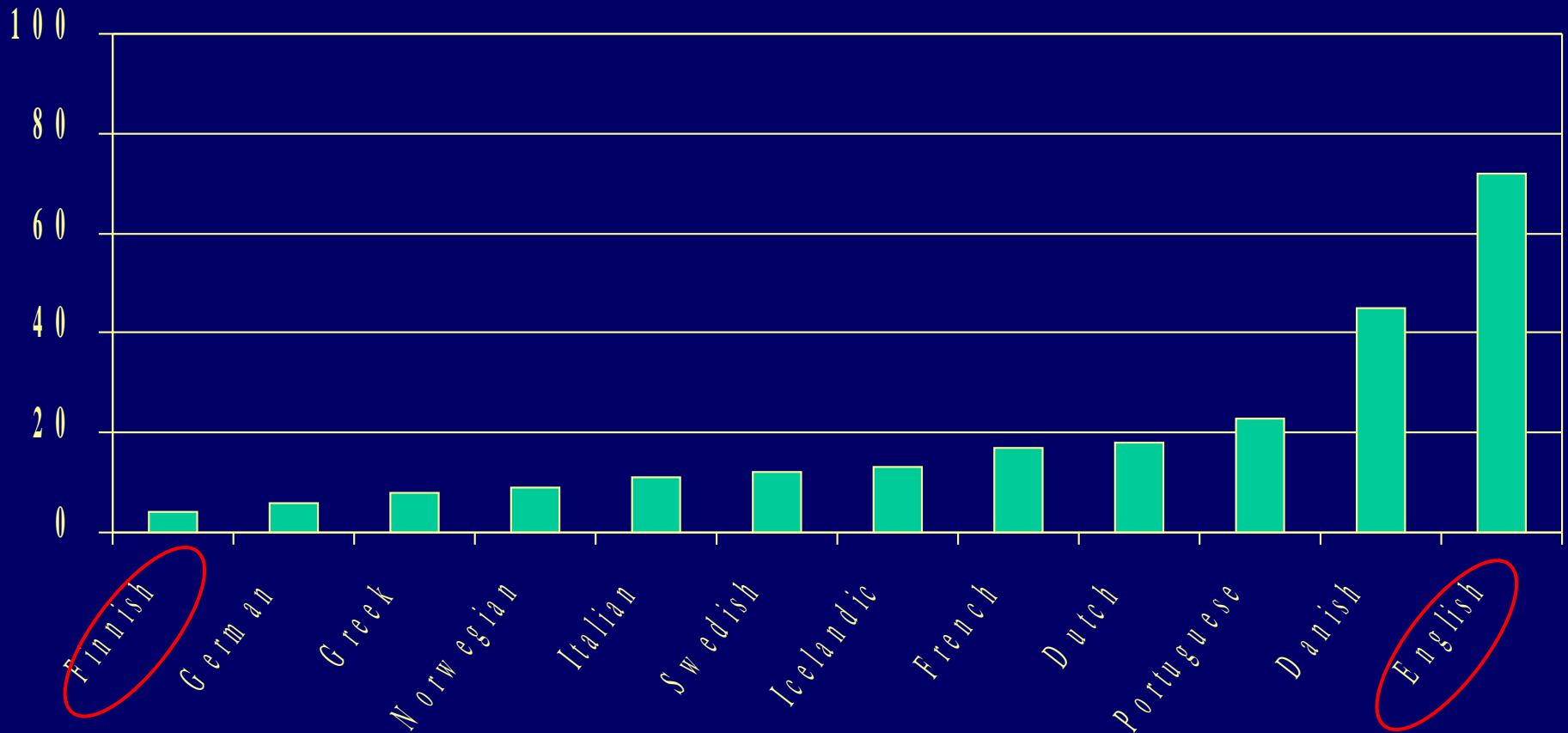
>1 way to write each phoneme

>1 way to say each grapheme

E.g., French (*elle, elles, bataille*)

E.g., English (*one, laugh, walked*)

# % error rates for familiar word reading by beginning readers in 12 European languages (Seymour, Aro, & Erskine, 2003)



So English is deep, right?

Yes!

# Multiple spellings for a single sound

- How many ways to spell /e/?
- How many ways to spell /sh/?

# Multiple sounds for a single spelling

- How many ways to pronounce -ave?
- How many ways to pronounce c, s, -ow?

# How did English spelling get that way?

- Spelling of many English words today is based on English spoken in 14<sup>th</sup> to 15<sup>th</sup> Cs
- In those times, consistency not prized, e.g.,
  - Shakespeare's own name
    - *l, ay, aye*
- So where did the idiosyncrasies of our current orthographic system come from?

# Some reasons...

- Some words contain traces of much earlier pronunciations, e.g., Old English:

– *cnēo*

– *cnīf*

- Old English sounds, e.g., *gh*, retained in

– *night*

– *knight*

# Some reasons...

- Various writing styles chosen by scribes
  - Scribes sometimes chose a final *e* as a “filler” to fill in the end of a printed line.
  - Fashion for angular writing made *u* and *v*, *n*, *r* hard to distinguish
    - → often changed *u* to *o*
    - → words such as *dove*, *worry*, *money*, *front*, *constable*...

# Some reasons...

- Invention of the printing press in the 15<sup>th</sup> C
  - Misspellings by non-native English printers
  - Spreading and “freezing” of archaic and idiosyncratic spellings through printing
  - But pronunciation went on – and goes on – changing
  - But there was still considerable variation between printers

# Some reasons...

- (Over)zealous spelling reformers
  - Some spelling changes made to better reflect pronunciation
  - But some made to conform to words' Classical Greek and Latin roots, e.g.,

Middle English spelling	Reformed spelling
-------------------------	-------------------

indite	
--------	--

dette	
-------	--

receit	
--------	--

oure	
------	--

# Some reasons...

- **Dictionaries: mid-18th C**
  - beginning of more rigid standards of correctness
  - have kept our system of spelling constant
  - despite continued pronunciation changes
- English spelling system is complex and opaque, BUT allows
- Continued ability to read old texts despite pronunciation changes

# What skills do we need to spell in English?

## 1. Phonology

Sound/the alphabetic principle/GPCs

## 2. Orthography

Letter-based patterns

## 3. Morphology

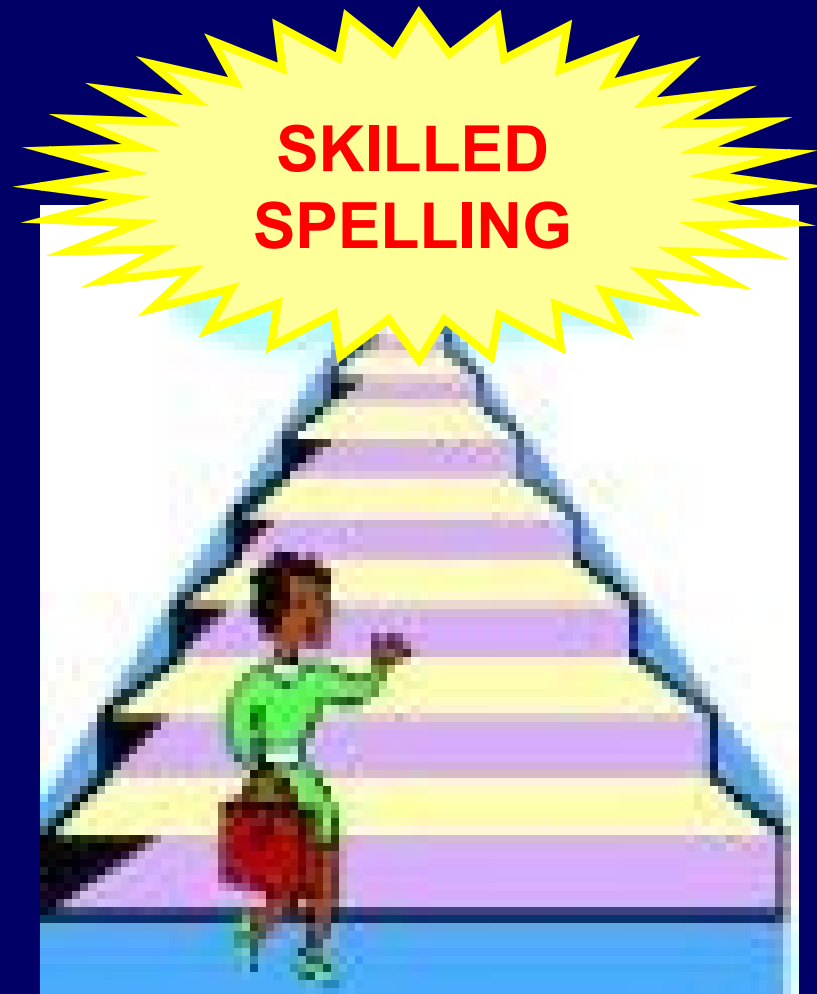
Meaning-based patterns

# Models of spelling development

- Propose a series of increasingly complex stages that children progress through over a number of years

# General sequence

- Pre-writing: scribbles
- Alphabetic principle
  - letters=sounds
- Common letter sequences and grammatical segments
  - *pre-*, *-ough*, *-ing*, *-ed*
- Using meaning to spell
  - *magician*, *discussion*



Mastery of one level before proceeding to the next

## **1. Phonology**

Sound/the alphabetic principle/GPCs

## **2. Orthography**

Letter-based patterns

## **3. Morphology**

Meaning-based patterns

# 1. Phonology

- English spelling is basically alphabetic
- A large number of words can be spelled according to their sound
- *dog, cat, banana, computer, intangible, antidisestablishmentarianism*
- Children do start off spelling by sound, and often show sophisticated sensitivity to sound patterns

# What do these words say?

- Chruk
- Chran
- Sgi

(Read, 1986; Treiman, 1993)

# Children's spelling by sound: Jingles about healthy eating

- Peana klarta. Its fresh its nachrel  
that aways make do something good.  
Peeeeena klater!
- Fruit salid in my tummy. I love fruit salid.
- fruit salid in your lockel shoping senter.
- Evry day we need food to servive! food  
glories food
- Lame chops eat some lame  
so good lamm!!!

# Christmas questions

- What do Santa and his reindeer eat?
  - fegdabools
  - Milke for Santa and ausoe carotes and vegderbelles for the raindiase
- How does Santa deliver the presents in one night?
  - The radeyus truy reley hud
  - He has chans for tashin
- How does Santa know who has been naughty/nice?
  - He wochs you
  - Elvs were coshtshoms and vedeuo them

# **1. Phonology**

Sound/the alphabetic principle/GPCs

# **2. Orthography**

Letter-based patterns

# **3. Morphology**

Meaning-based patterns

## 2. Orthographic conventions

Please spell the following pseudowords...

# Learning from the environment

- Organisms need to extract info from environment quickly and accurately
- Essential for survival
- Experience-independent learning
  - Evolved, constrained neural mechanisms
- Experience-dependent learning
  - Interaction with environment identifies important info + consequences of info-driven behaviours

# Statistical learning

- Some human learning: so automatic that it ‘must’ be exp-independent?
  - e.g., infant language acquisition
  - e.g., some children’s reading acquisition
- But growing evidence of human sensitivity to statistical features of the input:
- Statistical patterns/regularities occur **when a set of events or objects occur more often than would be expected by chance**

# Statistical learning in written language

- Can statistical learning explain the rapidity and accuracy of most children's reading acquisition, including acquisition of...
- Orthographic conventions
- Some orthographic patterns are taught:
  - 'magic'/'bossy' e
  - *i* before *e* except after *c*
  - doubled consonants after vowels

# Aren't we clever?!

- Many orthographic patterns are untaught
- Most people can't articulate them
- But growing evidence that people are nevertheless sensitive to, and use, various letter patterns in their reading/writing
- Evident from early childhood up to adulthood

Which looks more like a real word? Why?

- nnus *or* nuss?

- vvil *or* vill?

# Early knowledge of letter doubling

- Cassar and Treiman (1997)
- Participants: K, Gr 1, 2, 3, 6, 9, and adults
- **Task 1: Spelling choice:**
  - Which looks more like a real word?
  - soll vs. sohh      poss vs. poww
- **Task 2: Spelling:**
  - Participants asked to spell pseudowords
- **Results:** All Ps > chance → suggests early learning of untaught regularities

Which looks more like a real  
English word? Why?

- goak *or* goack?
- voch *or* votch?

# Spelling patterns and word position

- Hayes, Treiman, & Kessler (2006)
- Spelling of word-final consonants can depend on spelling of previous vowels
- E.g., sound /f/ is spelled more often with:
  - *ff* after one vowel letter (*cliff, puff*)
  - *f* after two vowel letters (*loaf, knife*)
- E.g., sound /k/ is spelled more often with:
  - *ck* after one vowel letter (*click, puck*)
  - *k* after two vowel letters (*leak, pike*)

- Participants in Gr 2, 3, 5 and university
- **Task 1: Spelling choice:**
  - Which looks more like a real word? yach / yatch
- **Task 2: Spelling production:**
  - Can you spell the new word /mok/?
- All Ps > chance on both tasks
- Performance improved with age
- Even Gr 2 children have ‘picked up on’ word-position-conditioned conventions about the spelling of English consonants

# But still not perfect at first...

- What do Santa and the reindeer eat?
  - Ckret
  - Crrt
- How do Santa and reindeer get from place to place?
  - They go in the slay relly qwicly
  - He is cwic
  - In a carggj
- How does Santa know who has been naughty/nice?
  - Becoz there are speshll efs that go on fiing thingz

# Your own orthographic knowledge

- Look at how you wrote the endings of the pseudowords dictated earlier.
- How did you decide how to spell them?
- Did you follow the convention?
  - Unextended spelling (*ch, f, k, l*) after two vowel letters
  - Extended spelling (*tch, ff, ck, ll*) after one vowel letter?

# **1. Phonology**

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# **2. Orthography**

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# **3. Morphology**

Meaning-based patterns

### 3. Morphological spelling: inflections

Spell these words exactly as they SOUND

### 3. Morphological spelling: inflections

- One-to-one letter-sound correspondences would mean a different spelling for each example:
- Consistent spelling signals that words belong to a particular grammatical category.

# Children do take time to learn inflectional endings

- Nunes, Bryant, & Bindman (1997):
- Longitudinal study of children's spelling of past-tense *-ed*. Went through stages:
  - Spelled by sound: *kist, wokt, nekst, wild*
  - Used *-ed*, but sometimes overgeneralised to non-verbs: *kised, wolked, necsed, wiled*
  - Used *-ed*, confined to verbs but not always correctly: *kissed, sleped, next, wild*
  - Learned to confine *-ed* to regular verbs

### 3. Morphological spelling: derivations

Spell these words exactly as they SOUND

# 3. Morphological spelling: derivations

- One-to-one letter-sound correspondences would mean a different spelling for each example: *sh*?
- “Inconsistent” spellings preserve link of meaning between base and derived forms

- What do Santa and the reindeer eat?
  - Lollys but they are not helthy
- How does Santa get down the chimney?
  - He gets skineyer and skinyer
- How do Santa and reindeer get from place to place?
  - They go in the slay relly qwicly

# Evidence for early morphological knowledge

- Treiman and Cassar (1996)
- Children often omit penultimate consonants (especially nasals) in early spelling, e.g.,
  - “*bed*” for *bend*
  - “*trid*” for *trimmed*
- Children hear nasal sound as part of vowel
- Think they’re representing both sounds with vowel spelling
- Children in Grades 1, 2, 3 spelled...

– inflected words

- e.g., *bars* (*bar* + *s*), *tuned* (*tune* + *ed*)

– uninflected words

- e.g., *Mars*, *band*

- If children spelling by **sound**: expect equal omission of consonants from both word types
- If children using by **morphology**: expect fewer omissions from inflected words
- Latter hypothesis supported: suggests much earlier use of morphology than spelling models would suggest

# So do adults understand the role of morphology in spelling?

- **Intervention study** looking at adult spelling of patterns determined by
  - Inflectional morphology
  - Derivational morphology
- **Participants:**
  - 87 Psych of Lang students (experimental group)
  - 33 of their friends (control group)
- **Design:**
  - Pre-test, Intervention, Post-test

Form pairs:  
one person close their eyes

- Say these words aloud to your partner
- Ask him or her to write them down:

# Inflectional morphology

- Some word endings: two plausible spellings
  - e.g., *adolescence*; *adolescents*
- Morphology can determine correct spelling:
- Plurals always have –s; singulars do not
  - **Plurals** such as *mints*, *chants*
  - Singulars such as *mince*, *chance*
  - **Plurals** such as *tacks*, *socks*
  - Singulars such as *tax*, *fox*

# Derivational morphology

- Words that are related by meaning are often spelled the same in base and derived forms
  - e.g., **refer-references**
  - (not *refrences*)
  - **psychology-psychopharmacology**
  - (not *psychapharmacology*)

# Task 1. Pseudoword spelling choice

- Choice determined by morphological status:
- **Inflected words (Nouns)**
- *Are the three blix / blicks ready yet?*
- **Derived words (preserving base spelling)**
- That concert was totally binic. I loved its binicity / binisity.

## Task 2. Dictation task of morphology-based real-word spelling

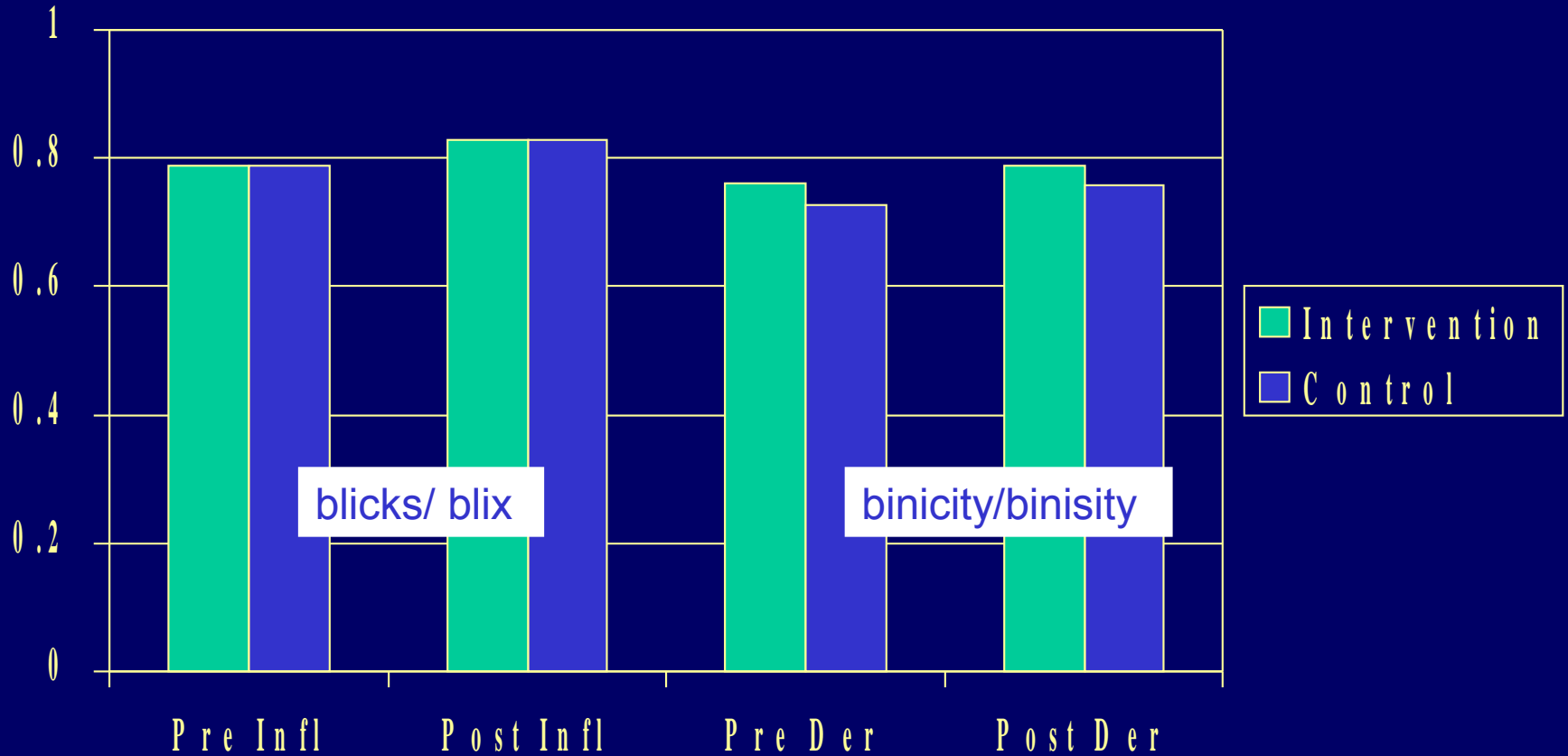
- 20 relatively difficult words
- Presented in a story context
  - Nouns
  - e.g., *phoenix*/*phoenicks*; *hammox*/*hammocks*?
  - Singular (*x*) or plural (*cks*)?

# 3 weekly Intervention sessions

- Designed to focus attention on morphological aspects of English spelling
- Included focus on spelling of:
  - morphologically-determined word-endings
  - apostrophes
  - possessive pronouns
  - base words in derived words...
- Through competitions, races, discussions, corrections, with prizes

# Results

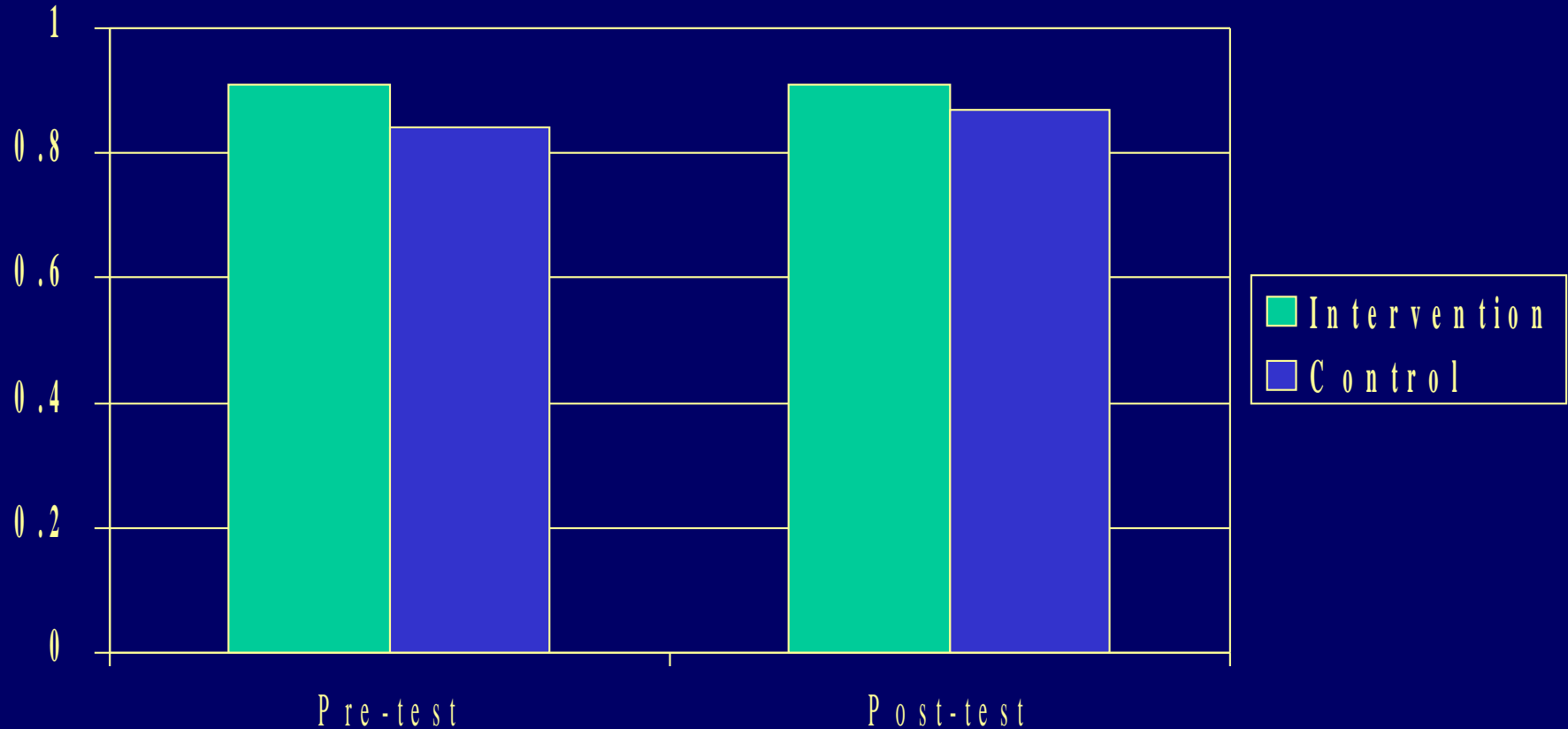
# Pseudoword spelling choice



Post-test > Pre-test,  $F(1, 119) = 17.4, p < .001$

Inflected > Derived,  $F(1, 119) = 17.0, p < .001$

# Morphology-based real word spelling



Intervention > Control,  $F(1, 117) = 8.8, p = .004$

Post-test > Pre-test,  $F(1, 117) = 19.8, p < .001$

# Results summary

- No improvement in spelling real words
- Improvement in choosing correct spelling of pseudoword pairs
- But shown in **both** groups, so can't be attributed to intervention
- Theoretical implication: Spelling models may overestimate the eventual accuracy that writers achieve

# Fill in the blanks to dictation

- Three \_\_\_\_\_ went shopping, and took their little \_\_\_\_\_ with them. One said “I want to look at their china \_\_\_\_\_”. But I want to find the \_\_\_\_\_ toilets first”. The other said “I want to go and look at the \_\_\_\_\_. My little \_\_\_\_\_ watch needs a new band”. Her friend said “Good idea. My \_\_\_\_\_ hour hand just broke”. On the way one said “Look at that \_\_\_\_\_ shoes – I can’t believe she can walk in them”.

- They found the homeware section, and one asked “Have you noticed? All of these \_\_\_\_\_ lids are cracked!”. Her friend agreed “And this \_\_\_\_\_ rim is chipped”.
- When they got to the jewellery department, the sales assistant said “These \_\_\_\_\_ prices are marked down today”. All three children were well-behaved all day, and the women were pleased with their \_\_\_\_\_ behaviour.

# Further evidence for late morphological knowledge: The case of apostrophes

- Apostrophes are easy, right?
  - Don't use them in plurals
  - Use them in possessives, after the thing that possesses something



The boys fish

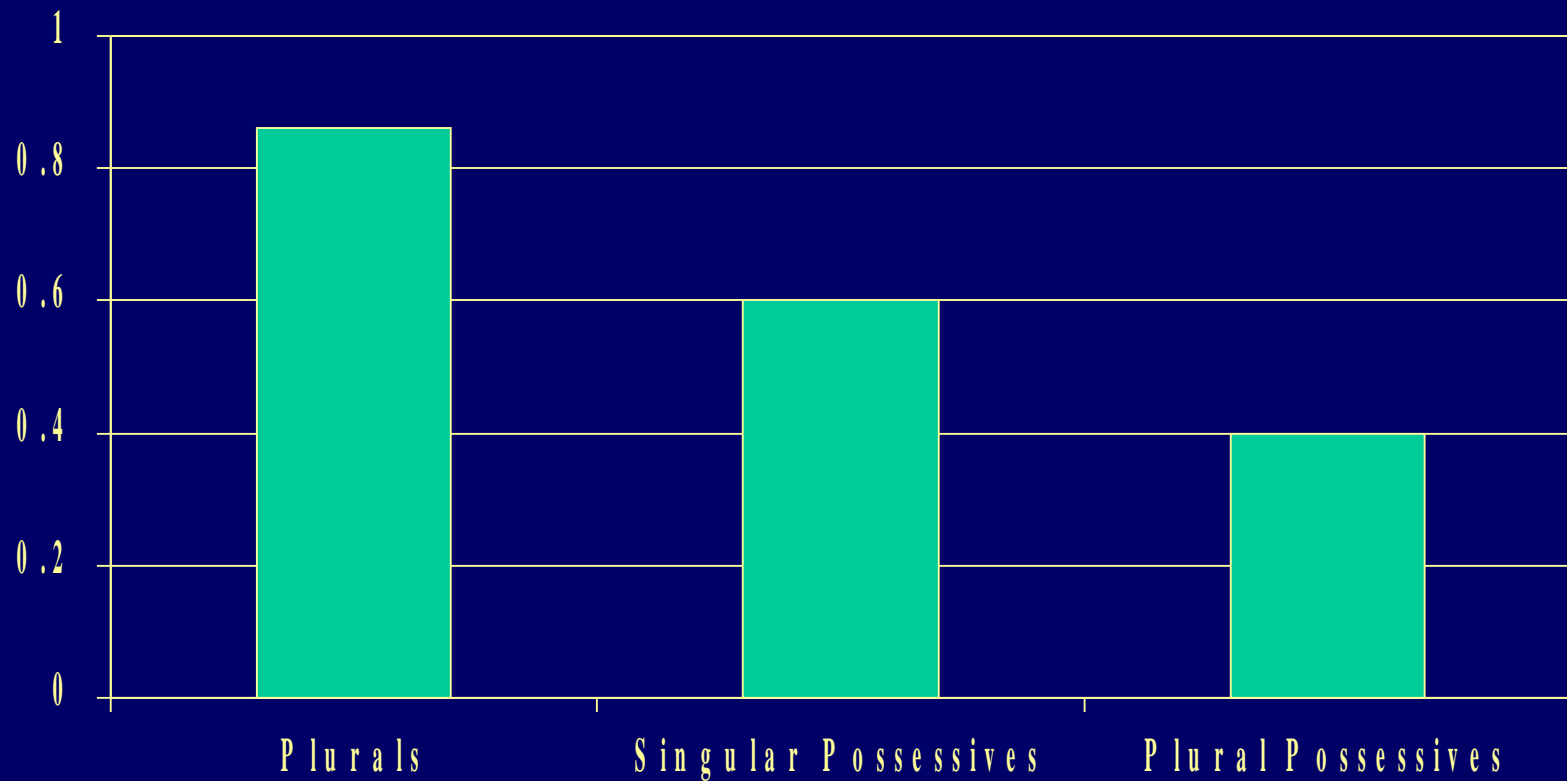


The boy's fish



The boys' fish

# University students' correct avoidance/use of apostrophes



*The ladies*  
went shopping

*That lady's*  
shoes

*The ladies'*  
toilets

# Conclusions about spelling models

- It does seem generally true that children start off spelling words as they sound
- Then learn common letter patterns
- And finally start to integrate relationships of grammar and meaning in their spelling
- BUT
- Some patterns are learned much earlier, and others much later than models might suggest
- And some might never be learned!

# So should we change the English spelling system?

- If English is so much harder to learn to spell than other alphabetic systems, should we change it to make it much simpler?
- Some would say we should...

# The Spelling Society: Objectives

1. To publicize the unnecessary difficulties of English spelling and the benefits that its simplification would bring.
2. To raise awareness of the alphabetic principle, its corruption during the long history of written English, and its more rational application in other languages.
3. To promote research on ways of reforming English spelling ... for relating word-forms more predictably to speech-sounds.
4. To help co-ordinate proposals for English spelling reform.
5. To persuade the public, opinion-formers, policy-makers and relevant agencies of the need for and practical possibilities of reforming English spelling.

- Do you agree with the Spelling Society's suggested reforms as you think about the various ways of learning to spell in English?
- Would we lose a lot of other levels of information if we spelled words just as they sounded?
- And think of the other potential problems...

# A consistent orthography: Pi in the sgy?

- Different dialects of English have different pronunciations.
- If we spelled as we sound, would we spell differently in every country/region?
- Whose spelling would we choose? How would we spell:
  - *neither, either?*      *castle, graph, grass?*
  - *hamburger?*      *new?*
  - *used?*

# And another question...

- Should words be spelled according to their pronunciation?
- Or should words be pronounced according to their spelling?
- How do you feel about.....
  - often
  - forehead
  - trait?

# “Spelling pronunciation”

- Written word often regarded with reverence
- Speech clearly has determined spelling
- But spelling can also influence speech
- 18<sup>th</sup> C: great debate over whether
  - Pronunciation determined by spelling OR
  - Spelling determined by pronunciation
- “Supreme authority” of dictionaries influenced some pronunciations, and many changed

# “Spelling pronunciation” examples

- Up until 18<sup>th</sup> C, many *h*-words were pronounced without /h/
  - E.g., *honest, hour, hotel, hospital, herb*
- More common words remained /h/-less,
  - because heard enough to remember pronunciation
- Less common words took on /h/s
  - Because people saw them written more than heard them said
- But some people still say *an hotel; an hospital*

# “Spelling pronunciation” examples

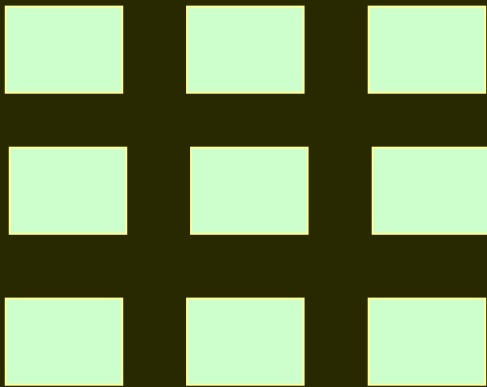
- Many *th* words formerly pronounced with /t/
  - E.g., *an**th**em, auth**or**, **th**eatre*
  - Seen in old nicknames:
    - *Kate**t**e; Bett**t**y*
    - *Art**t**; Tony*
- Other examples:
  - *forehead, waistcoat, dovecote* (older)
  - *mon**o**netary, wor**o**rry, oft**o**ten* (more modern)

Write down the following words...

# English spelling... where next?

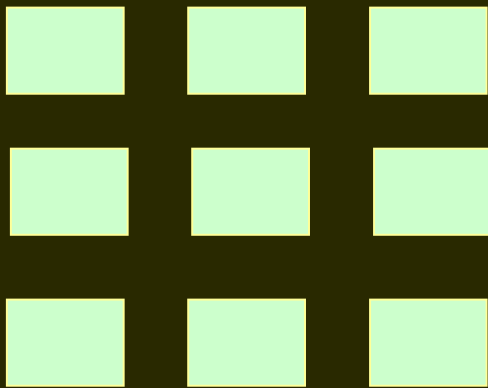
- English spelling has changed very little in the past 200 years
- BUT recent new wave of unofficial spelling change: driven especially by Instant Messaging and text-messaging
- What do you understand when you read these messages? How do you feel?

does NE1 wnt 2 c my  
pix? im ttly xited abt how  
gd they r. dnt no wot ull  
think, tho.



- Does anyone want to see my pictures? I'm totally excited about how good they are. Don't know what you'll think, though.

plz 4giv me if I dnt  
get bak in time 2 hlp  
u celebr8 ur bday, bc  
I cld b 18.



- Please forgive me if I don't get back in time to help you celebrate your birthday, because I could be late.

# Nearly everyone is texting

- Especially teenagers/young adults:

- 51% of Americans
- 90% of Australians
- 97% of British



- In industrialised nations, average:
  - number of text messages sent per day is 5-10
  - time spent on texting is about 30 mins

- James, 2007; Kemp, 2009; Ling, 2004

# Development of textese

- Text messaging developed with constraints:
  - Small screen
  - 160-character limit
  - Alphanumeric keyboard
    - multipress entry
- Obvious need to reduce:
  - number of characters (space, money)
  - number of key presses (time)
- Adaptation of abbreviated spelling method, “textese” from CMC



# How do u txt?

- How many messages do you send/receive per day, on average?
- How long per day do you spend on texting?
- Write down your two most recent messages (that you are comfortable sharing)
- Compare with others' messages
  - How have you written them?
  - What kinds of abbreviations have you made?
  - Do you write differently to different people?

# Naturalistic texting data

- First-year UTAS Psych students wrote down their 5 most recent messages
- Data from 142 Ss (109 F) analysed so far:
  - Mean age = 23 years (range 17-58 yrs)
  - Mean words per message = 10.8 (SD 5.2)
  - Mean proportion of textisms = .22 (SD .14)
  - (Max. prop. = 1.0, “Luv u 2 ☺ xxx”)
- How can textisms be categorised?

# Textism categories

(Plester et al., 2008, 2009; Thurlow, 2003)

Textism	Example	Textism	Example
Letter/number homophones	<i>r, u, 2moro</i>	Sound-based spell	<i>skool</i>
Clippings	<i>goin, hav</i>	Initialisms	<i>brt, btw</i>
Word shortenings	<i>tues</i>	Accent stylisations	<i>wiv, da</i>
Contractions	<i>txt, msg</i>	symbols	<i>:-)</i>

# Is texting ruining our spelling?

## Media concern

- Thurlow (2003): majority of media reports on texting paint an “overwhelmingly negative” view of effects of textese on written language

# Is texting ruining our spelling?

## Anecdotal evidence

- 7 out of 10 of the 100 directors polled by consultants of the Aziz Corporation said standards of written English had fallen as a result of increased use of text messaging.
- Director-general of Education Datuk Abdul Rafie Mahat recently attributed the drop in students' performance in last year's English exam to the popularity of SMS.
- Taylor's College Head of Language Centre Dr Wong Fook Khoon, who has been in the education industry for 40 years, said the decline in the standard of English was not only caused by the widespread use of SMS, but also e-mail and Internet chat programmes such as ICQ.

# Empirical evidence: children

- Greater use of textisms in 8- to 12-year-old British children associated with
  - better reasoning ability and spelling (Plester et al., 2008)
  - better reading, phonological awareness, vocabulary (Plester et al., 2009)
- 9- & 10-year-old British children given a phone to text on improved in reading more than non-phone peers over 10 weeks
- Texting helps encourage interest in writing

# Empirical evidence: teenagers

- Grade 8-9 Tasmanian students
  - De Jonge and Kemp (under review)
- More text-messages sent per day correlated with significantly poorer:
  - real word reading, nonword reading, spelling
- But (controlling for texting frequency) proportion of textisms used correlated with only significantly poorer:
  - nonword reading
- Problem is frequency more than textism use

# Empirical evidence: adults

- Uni students and self-reports:
  - No sig relationship spelling/reading ability and:
    - reported no. texts sent per day (Massengill Shaw et al., 2007)
    - reported use/non-use of textisms (Drouin & Davis, 2009)
- Uni students and actual texting behaviour:
  - No sig relationship between use of textisms and
    - reading, spelling, morph/phon awareness (Kemp, in press)
  - But *faster* composition of texts and *more accurate* reading of texts associated with
    - better reading and spelling scores (Kemp, in press)

# Why is textese hard?

- Use of textisms makes messages
  - Faster to write
  - Slower and more confusing to read (Kemp, in press)
- Experience with textese is vastly less than experience with conventional English
- Deciding how to read a textism requires deciding on which strategy is appropriate
  - Pronounce sounds, read out numbers or letter names, reinstate missing letters...?

# Switching strategies

does NE1 wnt 2 c my pix?

im ttly xited abt how gd they r.

dnt no wot ull think, tho.

# Some textisms can't be deciphered

- Of 61 uni student participants, only 8 made no errors in deciphering textisms in given text messages of ~ 40 words (Kemp, in press)
  - 8 made 1 error, 40 made 2-4 errors, 5 made 5-9 errors
- Most misunderstood:
  - **initialisms** (brt, bbs, np, bfn, bc, bf)
  - some **contractions** (tim, shl, ttly, dnt)
  - textisms that **combined categories** (BN, d, aQr8, parz, xamz)

# But people still use textese

- Practical and social reasons
- It's quicker for the writer
- Accepting textese messages gives you licence to create them
- Naturalistic messages are probably less dense with textisms than those given in experiment-based messages

# So texting doesn't mask or cause literacy problems?

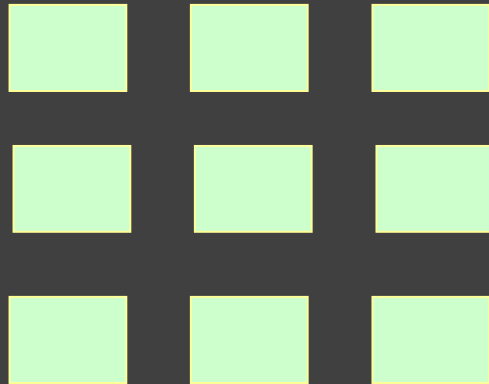
- Sending more text-messages might be associated with poorer literacy, BUT
- Greater use and understanding of textisms seems **neutrally** or **positively** correlated with other literacy and language skills
  - People with better lang. skills generally better at anything language-related, including textisms
    - More creative when producing textisms
    - More strategic when deciphering textisms

# Further research: Different adult populations

- What about participants who struggle with literacy, or have dyslexia – is textese:
  - A great way to hide spelling difficulties
  - Another confusing way to try to read words
  - Both?
- Can texters modify their use of textisms to suit different receivers? (a peer, a child, an older person, a professor?)

# Tk-hm msg

its ok 2 keep txtng 4  
now w/o ruinN ur  
spellN :-)



# Summary

- Spelling is important, but it's hard in English
- To succeed, we need phonological, orthographic, and morphological skills
- Evidence suggests we don't just learn these in a simple stage-like progression
  - Children learn some earlier than thought
  - Adults learn others later, or never!
- English contains too much rich info and variation to ever make it purely sound-based

# Summary

- A new spelling system, “textese”, is emerging in digital communication
- Despite widespread concern, relationships between use of textese and scores on traditional literacy skills seem to be neutral in adults, and positive in children
- Fast-growing area of research, with a lot of scope for further investigation!