The nature of spelling errors in deaf and hearing adults

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Acknowledgments

Karen Emmorey

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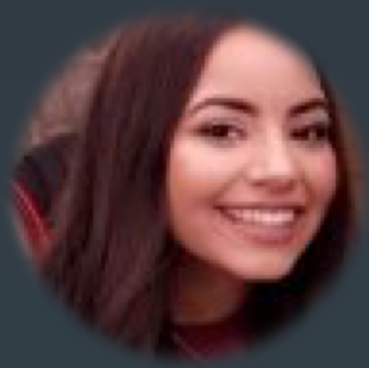

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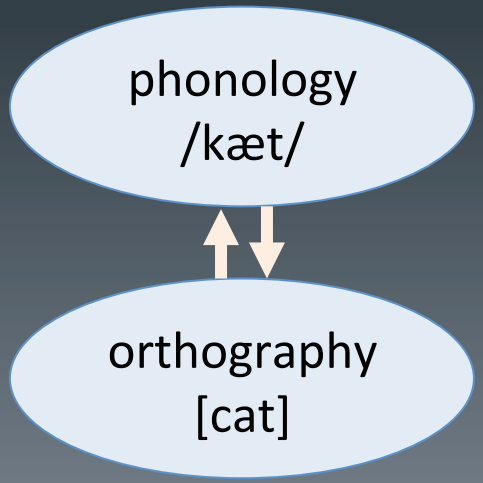
Cindy Farnady

Kiana Billot-Vasquez

All deaf & hearing participants!

Orthographic representations in hearing readers

- Build on spoken language experience
- Precise orthographic representations depend on fully specified phonology
- Play a key role in reading success

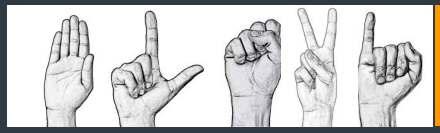


What is the nature of orthographic representations in deaf readers?

- Does attenuated access to the ambient spoken language reduce orthographic precision?
- What are the guiding principles that underlie spelling errors in deaf readers?
- Role of phonology for reading success in deaf individuals has been debated!

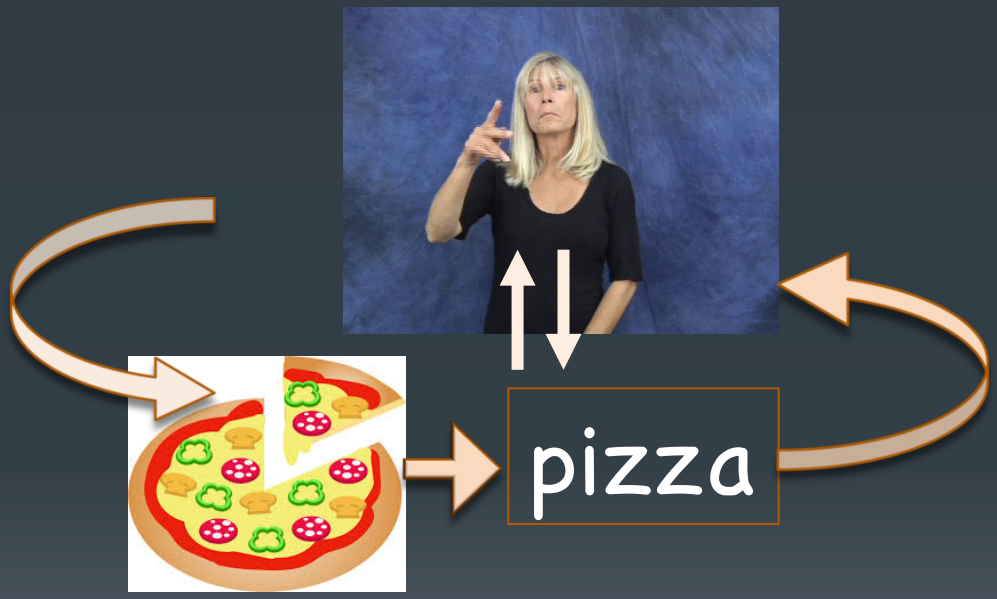
Poster #3124
by G. Meade

Sevcikova Sehyr & Emmorey (2017); Belanger (2012); Waters & Doehring (1990); Conrad (1979); Chincotta & Chincotta (1996)



ASL Fingerspelling

"Chaining" method



- Shared orthographic representations between fingerspelling and print?

Kelly (1995); Humphries & MacDougall (1999)

What do deaf readers' spelling errors reveal about orthographic representations?

- Receptive skills better than productive skill
- Errors were sensitive to orthographic constraints:
  - e.g., misspellings were orthographically legal, permissible sequences, adhered to syllabic structure
- May reflect less phonologically legal renderings of target word segments

E.g.: Deletions (*"orng"* → *"orange"*), reversals (*"sorpt"* → *"sport"*), consonant errors, doubling errors (*"ticet"* → *"ticket"*)

Hanson et al. (1984); Sutcliffe et al. (1999); Leybaert (2000); Olson & Caramazza (2001)

Participants

- 91 deaf ASL signers
  - Mean age = 31; SD = 10
  - 51 female
  - 45 native ASL signers

- 106 hearing English monolingual speakers
  - Mean age = 25; SD = 8
  - 67 female

Materials

- Productive and receptive spelling, fingerspelling
- Additional measures:
  - Reading comprehension (Peabody Individual Achievement Test PIAT – Revised)
  - Phonological Awareness Test (Hirshorn et al., 2016)
  - Non-verbal reasoning (Kaufman Brief Intelligence Test KBIT2)

Orthographic knowledge

(1) Productive spelling test

- 30 target words
- Write down the missing word

Hint: Part of your body where your arm is connected.

She carried a backpack on one s_____.

Adapted from Hanson et al. (1983), Olson & Caramazza (2004)

Orthographic knowledge

(2) Receptive spelling test

- 88 target words
- Identify misspelled words

PLEASE CIRCLE ALL ITEMS BELOW THAT YOU THINK ARE SPELT INCORRECTLY

attitude	**critisism**	**benafit**	**refrences**
misary	**psycology**	**political**	**glamourous**
reciept	**available**	**addmission**	**tounge**

Andrews & Hersch (2010)

Orthographic knowledge

(3) Fingerspelling repetition test

- 45 target words (real words only)
- Repeat fingerspelled words to the camera

Morere & Allen (2012)

Overall test performance

- No group differences on receptive spelling
- Recognition more accurate than production
- Deaf participants performed worse on production than hearing participants

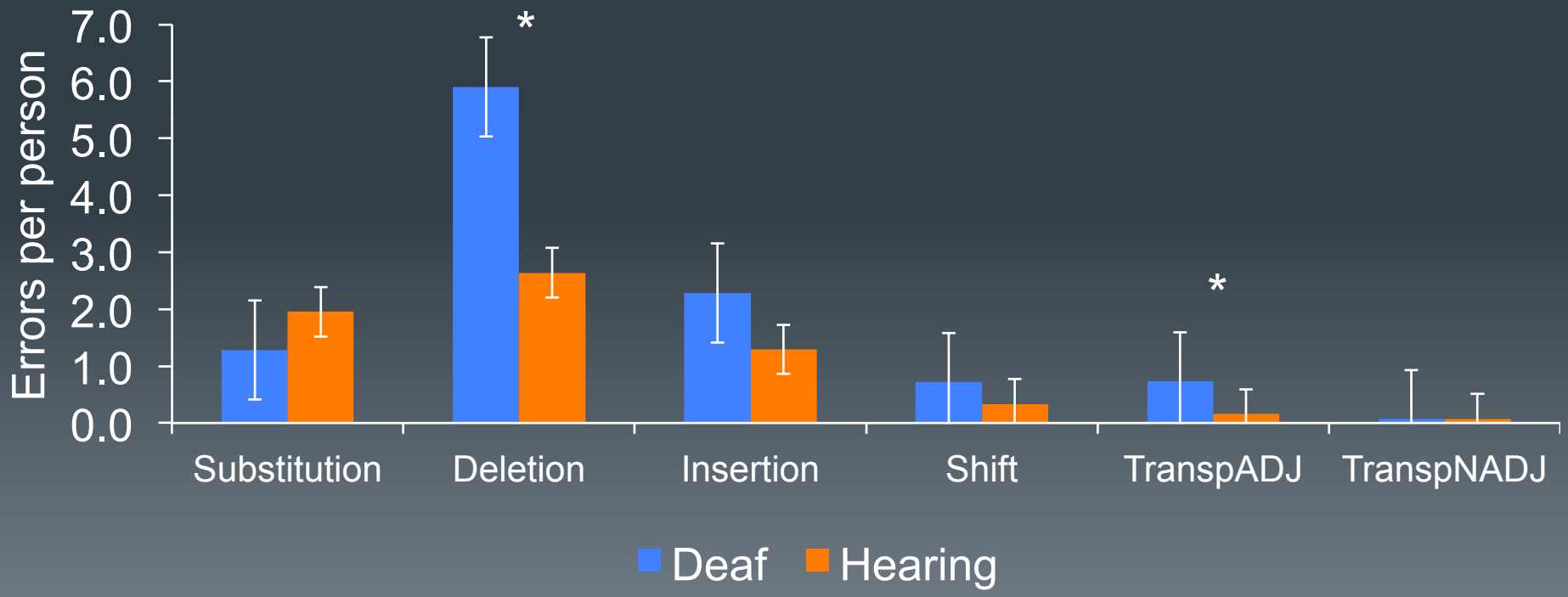
	Deaf (N=91)	Hearing (N=106)	F (*p*) sig.
Orthography: Production	67%	77%	19 (.000)***
Orthography: Recognition	85%	84%	<1 (.345)
Orthography: FS (real words)	83%	-	-
Reading comprehension	82%	88%	12 (.001)***
Phonology	64%	90%	207 (.000)***
Nonverbal reasoning	106	107	<1 (.774)
Age	31	25	24(.000)***

Spelling production: error types

	Target	Example error
Substitution	janit**o**r elep**h**ant	janit**e**r elep**l**ant
Deletion	cham**p**agne	cham-agne
Insertion	torpedo although	torped**e**o alth**r**ough
Letter shift	came**r**a	ca**r**mea
Transposition Adjacent	cre**sc**ent	cre**cs**ent
Transposition Non-adjacent	bio**l**o**g**ist	bio**g**o**l**ist

Spelling production: error types

- Deaf signers made more deletions & adjacent transpositions than hearing nonsigners

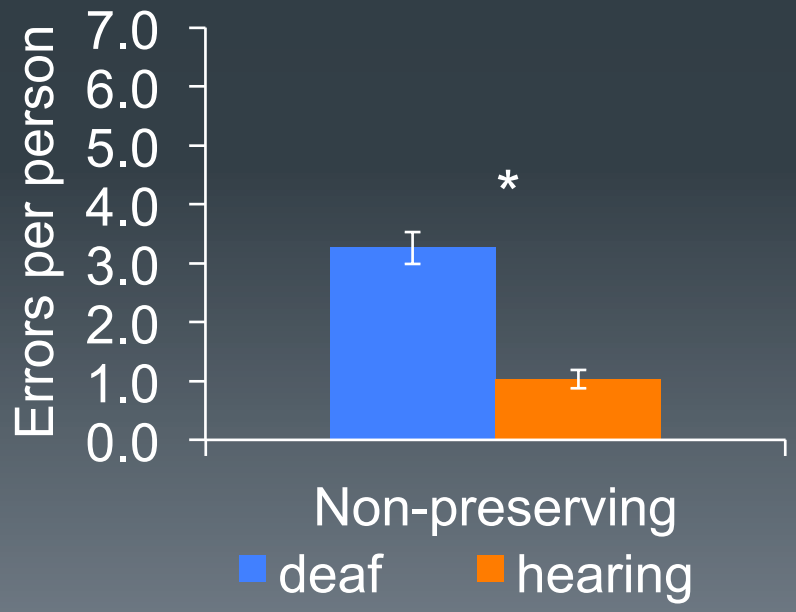


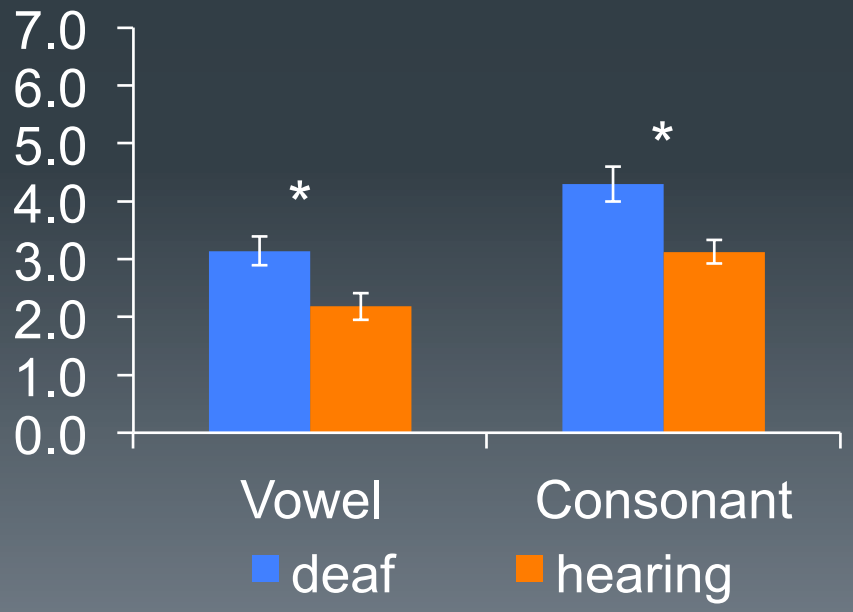
Spelling production: phonological legality errors

		Target	Example error
Pronunciation	Preserving	vineg*a*r vacu*u*m	vineg*e*r vacum*e*
	Non-preserving	r*o*deo came*r*a	r*e*deo ca*r*mea
Segment	Vowel	digest*i*ble	digest*a*ble
	Consonant	plum*b*er chau*ff*eur	plum*m*er chau*f*eur

Spelling production: phonological legality errors

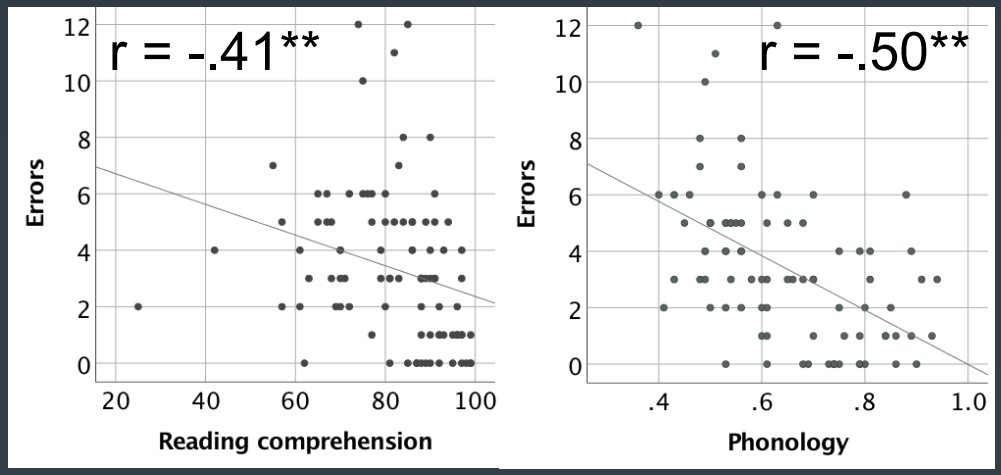
- Deaf signers more often violated the pronunciation of the target than hearing controls
- Both groups made more errors on consonant than vowel segments



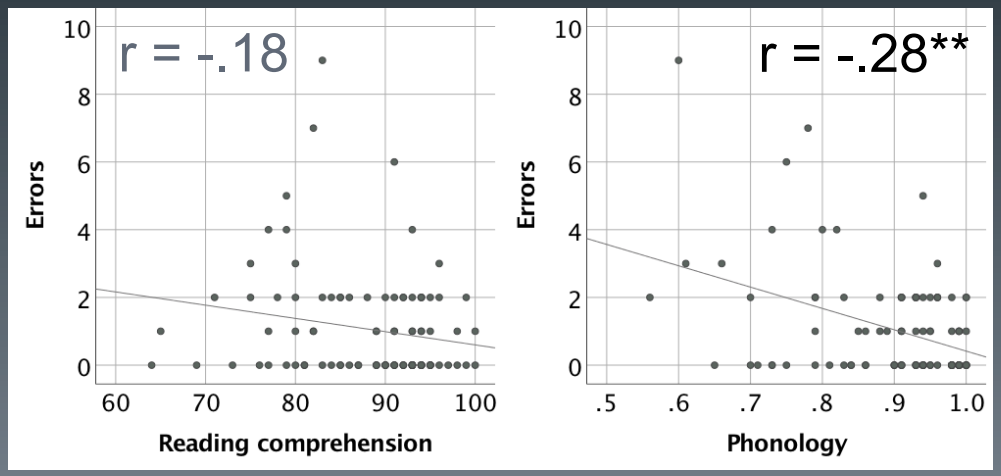


Spelling proficiency in relation to other language factors

- Deaf: Poorer reading & phonology skills lead to pronunciation non-preserving errors

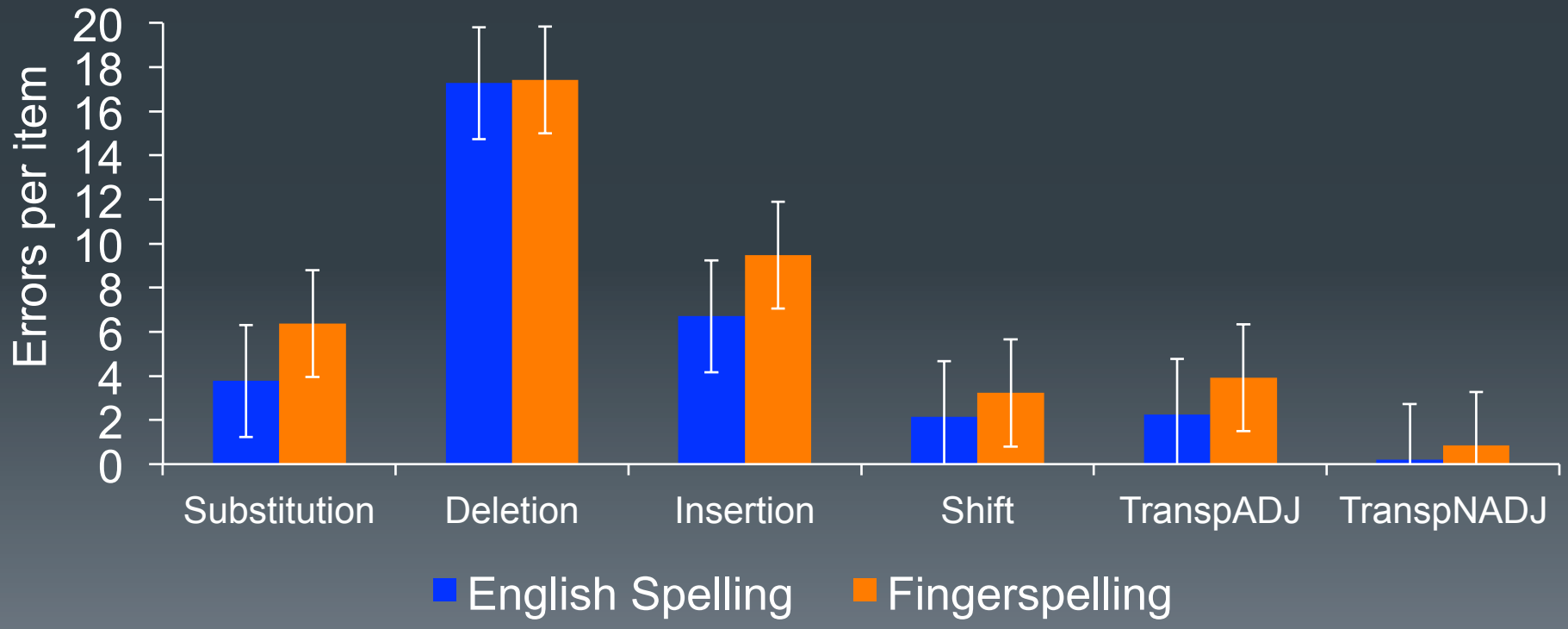


- Hearing: Only poorer phonology, not reading skills, lead to phonological violations



Print and fingerspelling: similar error patterns

- Similar orthographic representations may be accessed in print and ASL fingerspelling



Take-home points

(1) Phonology may play a greater role in spelling production than recognition

- Greater implication for productive (writing) than receptive (reading) orthographic skills?

Take-home points

(2) Abstract constraints, not derived from reduced access to speech, govern organization of orthographic knowledge

- Deaf readers' misspellings showed distinct sensitivities to orthographic structures; no detriment to spelling recognition

Take-home points

(3) Error patterns suggest that deaf readers have a coarser-grained orthographic code that may be optimized for faster access to semantics

- Deletions, reversals and pronunciation non-preserving errors point to more flexible representations

Take-home points

(4) Similar orthographic representations are accessed in both written English and fingerspelling

Take-home points

(5) Spelling error ‘forensics’ offer a useful and cost effective way to examine orthographic precision across large samples and data sets

What next?

- Do spelling errors by deaf readers violate morphological boundaries?
- Do letter deletions in fingerspelled words inform deletions in print?
- Develop a standardized spelling production test suitable for deaf adults (vary stimuli by transparency, length, frequency etc.)

Thank you!

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