Arizona Battery for Reading and Spelling (ABRS)

compiled and tested by Pélagie (Pagie) Beeson, Kindle Rising, and our many colleagues in the
Aphasia Research Project
Department of Speech, Language, and Hearing Sciences
University of Arizona, Tucson, Arizona

We generated the Arizona Battery for Reading and Spelling (ABRS) during the early 2000s to meet our clinical research need for a common list of words to test single word reading and spelling. Because we were focused on acquired alexia/agraphia associated with left perisylvian damage versus extrasylvian damage, we needed an efficient and consistent set of stimuli to contrast regularly (regular versus irregular words) and lexicality (real words versus nonwords).

We generated and tested healthy adults and those with acquired language impairment on a 100-item battery that contains 40 regularly spelled words, 40 irregularly spelled words, and 20 nonwords. These stimuli have proven useful to characterize alexia/agraphia subtypes due to focal damage or progressive disease and to capture changes following behavioral treatment. The stimuli were included in an appendix in Beeson et al., 2010.

Beeson, P.M., Rising, K., Kim, E. & Rapcsak, S.Z. (2010). A treatment sequence for phonological alexia/agraphia. *Journal of Speech, Language, Hearing Research, 53*, 450-468. doi.org/10.1044/1092-4388(2009/08-0229)

In this packet are the formatted word lists to test oral reading, followed by score sheets for reading and spelling. Responses can be scored as correct or incorrect, but we also include scoring guidelines for coding error types.

ABRS Reading/Spelling List 1: 20 regular and 20 irregular real words
ABRS Reading/Spelling List 2: 20 regular and 20 irregular real words
ABRS Nonword List: 20 nonwords
ABRS Reading/Spelling Short List: 10 regular and 10 irregular real words

The same lists can be used for testing oral reading and written spelling. To avoid immediate priming effects, a given list might be tested in one modality per day. For example, use List 1 for oral reading and List 2 for written spelling, and on a subsequent day, use List 2 for oral reading and List 1 for written spelling.

Alternative testing modalities include **oral spelling** when there is evidence of peripheral writing impairment (e.g., allographic impairment or apraxic agraphia). Similarly, **recognition of oral spelling** can be administered when there is potential visual impairment or disconnection (as in pure alexia).

Note that spoken repetition is requested before the written or oral spelling tasks to ensure that the item was heard correctly. The repetition score also provides an index of speech production abilities apart from reading ability (i.e., peripheral speech impairment).

Arizona Reading/Spelling by Regularity Short List (20 items)

Name_____   Date_____

Circle Modality: Read   Write   Oral Spelling[1]   Recognition of Oral Spelling[2]
Reading: Provide typed list for oral reading.
Spelling: Say word aloud and ask person to repeat[3]; then write the word (or spell aloud).

	Target	Repeat +/-	Response	Score +/-	Error type	Regularity		# letters
1	eagle					Reg		5
2	grumble					Reg		7
3	circuit						Irreg	7
4	spring					Reg		6
5	branch					Reg		6
6	yacht						Irreg	5
7	group						Irreg	5
8	fresh					Reg		5
9	grave					Reg		5
10	sure						Irreg	4
11	trade					Reg		5
12	friend						Irreg	6
13	dust					Reg		4
14	blood						Irreg	5
15	answer						Irreg	6
16	magnet					Reg		6
17	subtle						Irreg	6
18	wish					Reg		4
19	shove						Irreg	5
20	choir						Irreg	5
Sum	Repeat _____ (for spelling task only)		Score out of 20 _____			Reg ____ Irreg ____		

[1] Test oral spelling when peripheral writing impairment suspected (e.g., allographic impairment or apraxic agraphia).
[2] Test recognition of oral spelling with there is potential visual impairment or disconnection (as in pure alexia).
[3] Spoken repetition provides index of speech production abilities apart from reading ability (i.e., peripheral speech impairment).

Arizona Reading/Spelling by Regularity List 1 (40 words)

Name_____ Date_____

Circle Modality: Read / Write / Recognition of Oral Spelling / Oral Spelling
Reading: Provide typed list for oral reading.
Spelling: Say word aloud and ask the person to repeat it, then write the word.

	Target	repeat +/-	Response	Score +/-	Error type	Regularity		Freq		# letters
1	broom					Reg			LF	5
2	hard					Reg		HF		4
3	eagle					Reg			LF	5
4	gang					Reg			LF	4
5	mile					Reg			LF	4
6	doubt						Irreg	HF		5
7	lose						Irreg	HF		4
8	grumble					Reg			LF	7
9	drive					Reg		HF		5
10	honest						Irreg		LF	6
11	circuit						Irreg		LF	7
12	spring					Reg		HF		6
13	branch					Reg		HF		6
14	learn						Irreg	HF		5
15	rough						Irreg	HF		5
16	yacht						Irreg		LF	5
17	routine						Irreg		LF	7
18	group						Irreg	HF		5
19	hunch					Reg			LF	5
20	fact					Reg		HF		4
	Subtotal 1-20	_____		_____		___ Reg ___ Irreg		___ HF ___ LF		

[1] Test oral spelling when peripheral writing impairment suspected (e.g., allographic impairment or apraxic agraphia).
[2] Test recognition of oral spelling with there is potential visual impairment or disconnection (as in pure alexia).
[3] Spoken repetition provides index of speech production abilities apart from reading ability (i.e., peripheral speech impairment).

	Target	repeat +/-	Response	Score +/-	Error type	Regularity		Freq	# letters
21	slate					Reg		LF	5
22	sword						Irreg	LF	4
23	chant					Reg		LF	5
24	island						Irreg	HF	4
25	point					Reg		HF	4
26	bowl						Irreg	LF	5
27	grave					Reg		LF	4
28	twenty					Reg		HF	7
29	charge					Reg		HF	5
30	give						Irreg	HF	6
31	sure						Irreg	HF	7
32	vague						Irreg	LF	6
33	field						Irreg	HF	6
34	bump					Reg		LF	5
35	debt						Irreg	LF	5
36	pint						Irreg	LF	5
37	trade					Reg		HF	7
38	gross						Irreg	LF	5
39	friend						Irreg	HF	5
40	plastic					Reg		HF	4
	Subtotal 21-40	_____		_____		___ Reg	___ Irreg	___ HF	___ LF
	Subtotal 1-20	_____		_____		___ Reg	___ Irreg	___ HF	___ LF
	Total	_____		_____		___ Reg	___ Irreg	___ HF	___ LF

Arizona Reading/Spelling by Regularity List 2 (40 words)

Name_____ Date_____

Circle Modality: Read / Write / Recognition of Oral Spelling / Oral Spelling
Reading: Provide typed list for oral reading.
Spelling: Say word aloud and ask the person to repeat it, then write the word.

	Target	repeat +/-	Response	Score +/-	Error type	Regularity		Freq	# letters
1	dust					Reg		LF	4
2	sister					Reg		HF	6
3	machine						Irreg	HF	7
4	head						Irreg	HF	4
5	laugh						Irreg	HF	5
6	kept					Reg		HF	4
7	storm					Reg		LF	5
8	count					Reg		HF	5
9	glacier						Irreg	LF	7
10	bribe					Reg		LF	5
11	blood						Irreg	HF	5
12	tone					Reg		LF	4
13	chef						Irreg	LF	4
14	answer						Irreg	HF	6
15	magnet					Reg		LF	6
16	cough						Irreg	LF	5
17	grill					Reg		LF	5
18	land					Reg		HF	4
19	tomb						Irreg	LF	4
20	subtle						Irreg	LF	6
	Subtotal 1-20	_____		_____		___ ___ Reg Irreg		___ ___ HF LF	

[1] Test oral spelling when peripheral writing impairment suspected (e.g., allographic impairment or apraxic agraphia).
[2] Test recognition of oral spelling with there is potential visual impairment or disconnection (as in pure alexia).
[3] Spoken repetition provides index of speech production abilities apart from reading ability (i.e., peripheral speech impairment).

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Arizona Reading/Spelling by Regularity List 2 (continued)

	Target	repeat +/-	Response	Score +/-	Error type	Regularity		Freq		# letters
21	shampoo					Reg			LF	4
22	castle						Irreg	HF		6
23	summer					Reg		HF		7
24	blame					Reg			LF	4
25	pine					Reg			LF	5
26	thief						Irreg		LF	4
27	ghost						Irreg		LF	5
28	north					Reg		HF		5
29	prove						Irreg	HF		7
30	breath						Irreg	HF		5
31	reach					Reg		HF		5
32	wish					Reg		HF		4
33	shove						Irreg		LF	4
34	worm						Irreg		LF	6
35	talk						Irreg	HF		6
36	compact					Reg			LF	5
37	broad						Irreg	HF		5
38	round					Reg		HF		4
39	fresh					Reg		HF		4
40	choir						Irreg		LF	6
	Subtotal 21-40	_____		_____		___ Reg	___ Irreg	___ HF	___ LF	
	Subtotal 1-20	_____		_____		___ Reg	___ Irreg	___ HF	___ LF	
	Total	_____		_____		___ Reg	___ Irreg	___ HF	___ LF	

Arizona Reading/Spelling by Regularity Short List (20 items)

Name_____   Date_____

Circle Modality: Read   Write   Oral Spelling[1]   Recognition of Oral Spelling[2]
Reading: Provide typed list for oral reading.
Spelling: Say word aloud and ask person to repeat[3]; then write the word (or spell aloud).

	Target	Repeat +/-	Response	Score +/-	Error type	Regularity		# letters
1	eagle					Reg		5
2	grumble					Reg		7
3	circuit						Irreg	7
4	spring					Reg		6
5	branch					Reg		6
6	yacht						Irreg	5
7	group						Irreg	5
8	fresh					Reg		5
9	grave					Reg		5
10	sure						Irreg	4
11	trade					Reg		5
12	friend						Irreg	6
13	dust					Reg		4
14	blood						Irreg	5
15	answer						Irreg	6
16	magnet					Reg		6
17	subtle						Irreg	6
18	wish					Reg		4
19	shove						Irreg	5
20	choir						Irreg	5
Sum	Repeat _____ (for spelling task only)		Score out of 20 _____			Reg ____ Irreg ____		

[1] Test oral spelling when peripheral writing impairment suspected (e.g., allographic impairment or apraxic agraphia).
[2] Test recognition of oral spelling with there is potential visual impairment or disconnection (as in pure alexia).
[3] Spoken repetition provides index of speech production abilities apart from reading ability (i.e., peripheral speech impairment).

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Arizona Reading/Spelling Nonword List (20 items)

Name_____   Date_____

Circle Modality: Read / Write / Recognition of Oral Spelling / Oral Spelling
Reading: Provide typed list for oral reading.
Spelling: Say nonword aloud and ask the person to repeat it, then write the nonword.

	Target	repeat +/-	Response	Score +/-	Error type	# letters
1	flig					4
2	hoach					5
3	snite					5
4	glope					5
5	boak					4
6	cheed					5
7	smode					5
8	dusp					4
9	prane					5
10	grest					5
11	dringe					6
12	mofer					5
13	andon					5
14	barcle					6
15	merber					6
16	manver					6
17	nace					4
18	wape					4
19	trad					4
20	squate					6
	Total	____	Total	____		

ABRS **Nonword Reading** Scoring Guidelines

Nonword	Acceptable Response Examples	Error Examples & Error Type
flig	/f l I g/, /f l ai g/, /f l I dZ/, /f l ai dZ/	/f l i g/ PIN
hoach	/h o tS/, /h o A tS/, /h o S/	/h au tS/ PIN
snite	/s n aI t/, /s n aI t i/, /s n I t i/, /s n I t/	
glope	/g l o p/, /g l o p i/, /g l A p/, /g l A p i/	
boak	/b o k/, /b o A k/	
cheed	/tS i d/, /S i d/	/tS E d/ PIN /S E d/ LEX
smode	/s m o d/, /s m o d i/, /s m A d/, /s m A d i/	
dusp	/d ʌ s p/, /d u s p/,	
prane	/p r e n/, /p r e n i/, /p r æ n/, /p r æ n i/	
grest	/g r E s t/, /g r i s t/	/g r I s t/ PIN
dringe	/d r I n dZ/, /d r I n dZ I/, /d r I ᵑ i/, /d r I ᵑ/, /d r I n g ə/	/d r I N k/ LEX
mofer	/m o f ər /, /m A f ər/, /m o f i r/	/m u f 7/ PIN
andon	/æ n d ən/, /æ n d I n/, /æ n d A n/, /ae n d o n/	
barcle	/b ar k əl/, /b ar k l i/, /b ar s əl/	
merber	/m ər b ər/	
manver	/m æ n v ər /, /m e n v ər/	
nace	/n e s/, /n e s i/, /n æ s/, /n æ s i/, /n e k/, /n e k i/, /n æ k/, /n æ k i/	
wape	/w e p/, /w e p i/, /w æ p/, /w æ p i/	/w ai p/ LEX
trad	/t r æ d/, /t r A d/	/t r e d/ LEX
squate	/s k w e t/, /s k w e t i/, /s k w A t i/	/s k w A t/ LEX

Acceptable responses listed from most common/plausible responses on the left to more
unusual/atypical responses on the right.
PIN = phonologically implausible nonword
LEX = lexicalization

ABRS **Nonword Spelling** Scoring Guidelines

Nonword	Acceptable Response Examples	Error Examples & Error Type
/f l I g/	flig, fligg, flyg, flige, fllig	falig PIN
/h o tS/	hoach, hotch, hotche, hoch, hoche, houch	hooch, hosh, hotsh PIN
/s n ai t/	snite, snight, snyte, snit, sneight	
/g l o p/	glope, gloap, glowp, glop, gloup	gloop, globp PIN
/b o k/	boke, bok, boc, boak, boce, boac, bouk, boach	book LEX
/tS i d/	cheed, chead, chede, ched, chied	sheed PIN shed LEX
/s m o d/	smode, smoed, smowed, smoad, smod	smood PIN
/d ʌ s p/	dusp, duspe	
/p r e n/	prane, pran, prain, prayne, prein	
/g r E s t/	grest, greste, gressed	gresed PIN
/d r I n dZ/	dringe, drinj, drynge, drindge, dring	
/m o f ər/	mofer, mopher, mofur, mofir, moffer, moufer	moofer PIN
/æ n d ən/	andon, andin, anden, andan, andone	
/b ar k əl/	barkle, barkal, barcle, barcal, barchel, barcul	
/m Er b ər/	merber, murbur, mirbir	
/m æ n v ər/	manver, manvar, manvir, manvor	manvr PIN
/n e s/	nase, nace, nas, nac, naise, neice, nasce, naic	niece LEX
/w e p/	wape, wap, waip, waype, weip, whape, waep, weighp	waap PIN
/t r æ d/	trad, tradd, traad	trade LEX traid LEX
/s k w e t/	squate, skwate, skwait, skweit, scquat,	squat LEX sqate, squadt PIN

Acceptable responses listed from most common/plausible responses on the left to more unusual/atypical responses on the right.
PIN = phonologically implausible nonword
LEX = lexicalization

ERROR CODES FOR READING REAL WORDS
Phonological Errors

- **Phonologically Plausible Errors (PPEs):** Errors are classified as PPE if the transcribed response can plausibly result in the target pronunciation according to rules of English pronunciation (i.e., "chef" pronounced with a hard "ch" rather than "sh"). Errors are considered to reflect use of grapheme-phoneme conversion as a reading strategy.

- **Phonologically Implausible Nonwords (PINs):** A response that is not phonologically plausible according to the rules of English pronunciation.

Visual Errors

- **Visually/Phonologically Similar Word (VSW):** A response that has at least 50% of letters (in correct order and position) in common with the target, but that is not morphologically or semantically related to the target. (Often such responses are phonologically similar to the target.)
  - The 50% criterion requires that 50% of letters in the response are correct relative to the target *and* that 50% of target letters are present.
  - If response shares an overall similarity in form to the target (e.g., word length and/ or shape of letters) it may still be classified as VSW even if it does not meet the 50% criterion (e.g., "Margaret" for "magnet").

- **Visually Similar or Semantic (VSW/Sem):** Responses that could be classified as either visually similar *or* semantically related. (e.g., "cloak" for "coat"). NOTE: This category is identical to the Sem/VSW category. Use this code when an individual demonstrates a preponderance of visual errors.

Semantic Errors

- **Semantic error (Sem):** A response that is related to the target in meaning but does not have visual or morphological similarity.
- **Semantic or Visually Similar (Sem/VSW):** Responses that could be classified as either semantically related *or* visually similar (e.g., "cloak" for "coat"). NOTE: This category is identical to the VSW/Sem category. Use this code when an individual demonstrates a preponderance of semantic errors.
- **Visual-to-Semantic error (V-to-Sem):** Responses that are semantically related to a word that is visually similar to the target when transcribed. (e.g., stimulus="cap", response="dog", inferred misperception="cat")

Morphological Error

- **Morphologically related response (Morph):** Responses that are morphologically related to the stimulus (e.g., derivational or inflectional errors, like "running" for "run"). Note: the designation of morphological error overrides that of visually similar word (VSW).

Other Response Codes
- **Unrelated Real Word (URW):** A response that is a real word that demonstrates no semantic, visual, or phonological similarity to the target word. Following the first instance of such a response, repeated productions are coded as perseveration (Pers).
  - **Unrelated Real Word/Visually Similar Word (URW/VSWa):** A transcribed real word response that has fewer than 50% of graphemes correct but has the first letter or two correct in the appropriate sequence.
- **No response/"Don't know" (NR/DK):** Patient refuses or is unable to attempt to read a stimulus.
- **Perseverations (Pers):** When a response is given repeatedly to a number of targets and has no apparent relationship to the target, semantically, visually, or phonologically. These responses may include repetition of a previous stimulus or of a previous correct or incorrect response or may be the patient's own stereotyped perseveration. Note: the first instance of a response should be given the proper code (e.g., PIN, URW, etc.) with subsequent productions coded as MISC and subtyped as PERS.
- **Unintelligible responses (Unintell)**
- **Miscellaneous error (Misc.):** Errors that do not fit neatly into any of the above categories.

ERROR CODES FOR READING NONWORDS
- **Lexicalization (LEX):** An error response in which a real word is read in response to a nonword target.
- **Phonologically implausible response (PIN):** A response to a nonword target that is not phonologically plausible according to the rules of English pronunciation.
- **No response/"Don't know" (NR/DK):** Patient refuses or is unable to attempt to read a stimulus item.

Error Codes for **Spelling** Words and Nonwords
(modified from Johns Hopkins University Dysgraphia Battery)

ERROR CODES FOR SPELLING REAL WORDS
Phonological Errors
- **Phonologically plausible errors (PPEs):** Spelling can plausibly result in the target pronunciation according to rules of English pronunciation. Errors are considered to reflect use of phoneme-grapheme conversion as a spelling strategy. Addition or deletion of a word-final "e" may occur, and the response still be coded as PPE.

- **Phonologically implausible errors (PINs):** Spelling is not plausible.
  - **PIN-sub** (substitution): substitution of one letter for another
  - **PIN-del** (deletion): deletion of one letter within the sequence
  - **PIN-trans** (transposition): switching adjacent or non-adjacent letters
  - **PIN-add** (addition): adding a letter to the sequence
  - **PIN-mult** (multiple): responses that include at least two different error types; at least 50% correct letters (position not important)
  - **PW-#** (partial word): fewer that 50% of letters correct (in correct position); indicate # of correct letters in correct place beginning at the left. Note: there may be intervening incorrect letters between correctly placed letters (Ex: "onteer" for "outside" would be coded as PW-2, with "o" and "t" counted as correct). There also may be extraneous letters preceding or following letters counted as a partial word (e.g., "glefot" for "glacier" (PW-2) or "vvuld" for "could." (PW-3)).

Visual Errors
- **Visually/Phonologically Similar Word (VSW):** A response that has at least 50% of letters (in correct order and position) in common with the target, but that is not morphologically or semantically related to the target. (Often such responses are phonologically similar to the target.)
  - Note 1: The 50% criterion requires that 50% of letters in the response are correct relative to the target *and* that 50% of target letters are present.
  - Note 2: if the response shares an overall similarity in form (e.g., word length and/ or shape of letters) it may still be classified as VSW, even if it does not meet the 50% criterion (e.g., "Margaret" for "magnet").
- **Visually similar or Semantic (VSW/Sem):** Responses that could be classified as either visually similar *or* semantically related. (e.g., "cloak" for "coat"). NOTE: This category is identical to the Sem/VSW category. Use this code when an individual demonstrates a preponderance of visual errors.

Semantic Errors
- **Semantic Error (Sem):** A response that is related to the target by meaning, but not visual or morphological similarity, e.g., apple for orange.
- **Semantic or Visually similar word (Sem/VSW):** Responses that could be classified as either semantically related *or* visually similar. (e.g., "cloak" for

"coat"). NOTE: This category is identical to the VSW/Sem category. Use this code when an individual demonstrates a preponderance of semantic errors.

- **Visual-to-semantic errors (V-to-Sem):** Responses that are semantically related to a word that is visually similar to the target when transcribed. (e.g., stimulus = "cap", response = "dog", inferred error = "cat")

Morphological Errors

- **Morphologically-related response (Morph):** Responses that are morphologically related to the stimulus (e.g., derivational or inflectional errors, like "running" for "run"). Note: the designation of morphological error overrides that of VSW.

Unrelated Errors

- **Unrelated Real Word (URW):** A response that is a real word and has no semantic, visual, or phonological similarity to the target word. If the response becomes perseverative, then code it as such after the first response.
- **Unrelated Real Word/Visually Similar Word (URW/VSWa):** A response with less than 50% of graphemes correct but has the first letter or two correct and in the appropriate sequence.

Other Errors

- **No response/"Don't know" (NR/DK):** Patient refuses or is unable to attempt to spell a stimulus.
- **Perseverations (Pers):** when a response is given repeatedly to several items and has no apparent relationship to the target (semantically, visually, or phonologically). This includes repetition of a previous stimulus or a previous correct or incorrect response or may be the person's own stereotyped perseveration. Note that the first instance of a response should be given the proper code (e.g., PIN, URW, etc.) with subsequent productions coded as **Pers**.
- **Illegible responses (Illeg)**
- **Miscellaneous errors (Misc.):** Errors that do not fit neatly into any of the above categories.

ERROR CODES FOR SPELLING NONWORDS

- **Lexicalization (LEX):** An error response in which a real word is written in response to a nonword target, e.g., *member* for *merber*.
- **Phonologically implausible response (PIN):** A response to a nonword target that is not phonologically plausible according to the rules of English pronunciation. Note: The grapheme "e" is not considered a phonologically implausible error when placed at the end of a nonword that does not require it (Ex: "flige" for "flig"); "e" is not considered an error when deleted from the end of a nonword (Ex: "smod" for "smode").
- **No response/"Don't know" (NR/DK):** Patient refuses or is unable to attempt to spell an item.

broom	hard
eagle	gang
mile	doubt
lose	grumble
drive	honest
circuit	spring
branch	learn
rough	yacht
routine	group
hunch	fact

slate	sword
chant	island
point	bowl
grave	twenty
charge	give
sure	vague
field	bump
debt	pint
trade	gross
friend	plastic

dust	sister
machine	head
laugh	kept
storm	count
glacier	bribe
blood	tone
chef	answer
magnet	cough
grill	land
tomb	subtle

shampoo	castle
summer	blame
pine	thief
ghost	north
prove	breath
reach	wish
shove	worm
talk	compact
broad	round
fresh	choir

ABRS List 2 (21-40)

flig	hoach
snite	glope
boak	cheed
smode	dusp
prane	grest
dringe	mofer
andon	barcle
merber	manver
nace	wape
trad	squate