# OHSU BCI Sensory/Cognitive/Communication Screen, Revised

Part I: Pre-screen

To be completed with a loved one or paid caregiver who knows the participant well. 1. Participant ID #: \_\_\_\_\_ 2. Date: \_\_\_\_\_\_ 3. Researcher initials: \_\_\_\_\_ 4. Pre-screen respondent name: 5. Length of relationship with participant: years 6. Respondent relationship to participant: Spouse/partner  $\Box$ 1  $\square$ 2 Child □3 Parent  $\Box 4$ Sibling **□**5 Other family member □6 Friend □7 Paid caregiver 7. Can participant tolerate 1-2 hour sessions involving computer tasks? (If NO, participant is ineligible.)  $\Box$ 1 Yes □2 No 8. Best day of week/time of day to visit? \_\_\_\_\_ **Pre-screen: Communication** 9. How does participant communicate? Include any and all communication methods used. 10. Does participant have reliable signals for "yes" and "no"?  $\Box$ 1 Yes  $\square$ 2 No 11. How does participant signal "yes"? (List/describe all signals): \_\_\_\_\_\_ 12. How does participant signal "no"? (List/describe all signals): 13. Do you have any concerns about participant's ability to understand spoken or written words?  $\Box$ 1 Yes\* If yes, describe:  $\square$ 2 No

Pre-sc	reen: Motor							
14. In	14. In what position would participant be most comfortable or have the best motor response for a one hour visit?							
	ves participant need frequent repositioning?  Yes* If yes, describe needs:  No							
<b>16.</b> Ca	n participant remain in one position for 10 minutes?							
□1	Yes							
□2	No							
17. Ca	n participant move his/her head?							
	Yes							
□2	No							
<b>18.</b> Ca	n participant keep his/her head still?							
□1	Yes							
□2	No							
19. Ho	w is participant's head supported (headrest, pillows, etc.)?							
<b>20.</b> Ple	ease describe any concerns you may have about positioning or movement.							

Pre-so	creen: Vision										
21. D	ate of last eye ex	am:/	 YY		□ Unkn	own	□No	recent exam			
22. Cl	inic name and co	ontact info:_							🗖 Unkn	own/r	not provided
23. D	oes participant w	vear glasses?									
□1 □2	Yes* No	•			current gl e glasses			years			
24. D	oes participant c	urrently take	any e	ye me	dication	s?					
□1 □2	Yes* No	If yes, plea	se list	:: <u> </u>							
25. Do	oes participant h	ave a history	ofan	y of th	ne followi	ng?					
Cata	racts		□1	Yes*	□2	No	□3	Unknown	If yes, date of dx:		
Mac	ular degeneratio	n	□1	Yes*	□2	No	□3	Unknown	If yes, date of dx:	мм /	YYYY
	ıcoma			Yes*	□2	No		Unknown	If yes, date of dx:	ММ	YYYY
									ii yes, date oi ux.	MM _	YYYY
Dry	eyes/keratoconju	ctivitis sicca	□1	Yes*	□2	No	□3	Unknown	If yes, date of dx:	/_	YYYY
Diab	etes/diabetic ret	inopathy	□1	Yes*	□2	No	□3	Unknown	If yes, date of dx:		
Vicus	al field cut		□1	Yes*	□2	No	□2	Unknown	If yes, date of dx:	MM /	YYYY
VISU	ai ileiu cut		шт	163					ii yes, date oi ux.	MM -	YYYY
Light	t sensitivity		□1	Yes*	□2	No	□3	Unknown	If yes, date of dx:	/_	YYYY
Colo	r blindness		□1	Yes*	□2	No	□3	Unknown	If yes, date of dx:		
Cran	ial nerve injury		□1	Yes*	□2	No	Пэ	Unknown	If yes, date of dx:	MM /	YYYY
Claii	nar nerve irijury		шт	163		INO	Шэ	OTIKITOWIT	ii yes, date oi ux.	/_ MM	YYYY
Lazy	eye		□1	Yes*	□2	No	□3	Unknown	If yes, date of dx:	/_	YYYY
										IVIIVI	YYYY
26. D	o vision problem	s interfere wi	th an	y func	tionalac	tivities	e.g. w	atching TV, lo	oking at a comput	er mo	nitor)?
	Yes*	If yes, expl	ain:								
	No										
□3	Unknown										

Dro co	reen: Hearing									
Pre-sc	reen: Hearing									
27. Do	oes participant hav	e hearir	ng loss?							
□1 □2 □3	Yes No Unknown									
28. Do	oes participant wea	ar hearir	ng aids?							
□1 □2	Yes* No	If yes:	Which How of			L Left	□2	Right	□3 Both	
29. Do	oes participant see	m to ha	ve any d	ifficulty	/ hearir	g norm	nal convei	rsation in	n a quiet room?	
□1 □2 □3	Yes No Unknown									
Pre-so	reen: Cognition									
30. Do	you have concerr	ns about	particip	ant's _		?	•			
Atte	ntion	□1	Yes*	□2	No	□3	Unknown	If ye	s, why?	
Mem	nory	□1	Yes*	□2	No	□3	Unknown	If ye	s, why?	
Perso	onality changes	□1	Yes*	□2	No	□3	Unknown	If ye	s, why?	
Othe	r cognitive change:	s □1	Yes*	□2	No	□3	Unknown	If ye	s, why?	
Scree	ning Visit Instruction	ons								

Participant ID #:\_\_\_\_\_

Page 4

OHSU BCI Sensory/Cognitive/Communication Screen, Revised

"We need to know if [participant] is taking medications that may affect his/her brain signals. Taking these medications will not exclude him/her from the study, but we do need to know about them. Please have a current medication list available for us to look at during our first visit."

"You have received/will receive a copy of the informed consent form for this study. Please read through it with the participant before our first visit. We will review it together at that time. You, or another person who knows the participant well, must sign the form as his/her authorized research representative."

Participant ID #:	
-------------------	--

## Part II: Hearing, Auditory Comprehension, & Informed Consent

To be completed before participant gives consent for study involvement. First, ask participant to demonstrate his/her

signals fo	or "yes" and "no" a	and describe below.								
31. Date	L. Date:// 32. Researcher initials:									
33. Signa	alfor "yes:									
34. Signa	alfor "no":									
35. Signa	al for taking a brea	ak:								
Hearing										
□1 □2 All tones	Fail are to be present	o all three frequenciend at 25 dB. Vary pause of tones. Please give	se times betwe		you hea	r a tone."				
	<u> </u>	 L000 Hz		2000 Hz	, 		000 Hz			
Right ea			☐ Response	☐ No respon:	se	☐ Response	☐ No response			
Left ear	· ·	☐ No response	Response	☐ No respon		☐ Response	☐ No response			
Commun	nication: Auditory	Comprehension								
	_ ,	Situational Orientation								
1.	. Am I touching	my ear right now?	(do not touch	ear)	N	☐ Correct	☐ Incorrect			
2.	2. Am I touching my nose right now? (touch nose)					☐ Correct	□ Incorrect			
3.	. Am I touching	my nose right now?	(touch nose	)	Υ	☐ Correct	☐ Incorrect			
4.	. Am I touching	my ear right now?	(do not touch	ear)	N	☐ Correct	☐ Incorrect			
5.	. Am I touching	my nose right now?	? (do not touc	h nose)	N	☐ Correct	□ Incorrect			
6.	. Am I touching	my ear right now? (	touch ear)		Υ	☐ Correct	☐ Incorrect			

OLICII DCI Caraarii	C:1: /C:-:::	Canada Dandard
OHSO BCI Sensory/	Cognitive/Communication	Screen, Revised

38.	WAB-R: Auditory	Verbal Com	nrehension.	Yes	/No O	uestions:	/10
<i>J</i> O.	WAD-IN. Additory	, veibaicoiii	prenension,		INO Q	u Coliono.	/ 10

"I am going ask you some questions. Please respond yes or no."

1. Is your name Brown? (NO should be correct)	N	☐ Correct	□ Incorrect
2. Is your name [real name]?	Υ	☐ Correct	□ Incorrect
3. Is this a hotel?	N	☐ Correct	☐ Incorrect
4. Is this your room?	Υ	☐ Correct	☐ Incorrect
5. Are you on a roller coaster?	N	☐ Correct	☐ Incorrect
6. Will paper burn in a fire?	Υ	☐ Correct	☐ Incorrect
7. Does March come before June?	Υ	☐ Correct	☐ Incorrect
8. Do you eat a banana before you peel it?	N	☐ Correct	☐ Incorrect
9. Is a horse larger than a dog?	Υ	☐ Correct	☐ Incorrect
10. Do you cut the grass with an ax?	N	☐ Correct	☐ Incorrect

39.	<b>BDAE: Com</b>	plex Ideational Material:	/4

"I am going to read you a short story and then I will ask you some questions about it. Are you ready?" (normal rate)

"Mr. Jones had to go to Seattle. He decided to take the train. His wife drove him to the station, but on the way they had a flat tire. However, they arrived at the station just in time for him to catch the train."

1.	Did Mr. Jones miss his train?	N	☐ Correct ☐ Incorrect
2.	Was Mr. Jones going to Seattle?	Υ	☐ Correct ☐ Incorrect
3.	Did he get to the station on time?	Υ	☐ Correct ☐ Incorrect
4.	Was he on his way home from Seattle?	N	☐ Correct ☐ Incorrect

Participant ID	#:
----------------	----

Informed Consent (procedures adapted from Vansteensel et al., 2016)
---

## **40.** Total score for **36-38**: \_\_\_\_/20

If score is  $\geq$ 19, continue to item 40. If score is  $\leq$ 18, participant may be decisionally impaired. Repeat any items on which the participant had one or more incorrect responses. Repeat all questions within any repeated item, and repeat each item only once. If the participant improves to  $\geq$ 19 on the second administration, proceed to item 40. If not, participant is ineligible for the current study.

41. Consent Form: Yes/No Questions:	/10
-------------------------------------	-----

Read through consent form with participant before asking these questions. If a participant answers a question incorrectly, re-read the relevant section of the consent form and ask again.

1. Will the study take 3 to 6 months to complete?	Υ	☐ Correct	☐ Incorrect
2. Will you come to our office at OHSU?	N	☐ Correct	☐ Incorrect
3. Does the study involve testing a new medication?	N	☐ Correct	☐ Incorrect
4. Does the study involve testing a new typing interface?	Υ	☐ Correct	☐ Incorrect
5. Will you wear a headband to hold electrodes on your head?	Υ	☐ Correct	□ Incorrect
6. Will each data collection session last 5 hours?	N	☐ Correct	☐ Incorrect
7. Is there a risk of mild discomfort or eye strain?	Υ	☐ Correct	☐ Incorrect
8. Will we make your personal data available to the public?	N	☐ Correct	☐ Incorrect
9. Will you receive a \$1 gift card for each study visit?	N	☐ Correct	□ Incorrect
10. Do you have the right to quit the study at any time?	Υ	☐ Correct	☐ Incorrect

articipant	ID #·	
ai ticibaiit	ιυπ.	

Part III: Vision

42. Date:/					
<b>44. Co</b> □1 □2 □3	□2 Contacts				
	None				
Vision	: Participant Report				
45. Do	you have trouble seeing up close?				
<b>□</b> 1					
□2	No				
46. Do	you have trouble seeing objects far away?				
□1	Yes				
□2	No				
47. Do	you ever have double vision?				
□1	Yes* If *: 43a. At near only? □1 Yes □2 No				
<b>□</b> 2	No 43b. With fatigue? □1 Yes □2 No				
□3	Not sure* 43c. All the time? □1 Yes □2 No				
	<b>43d. Does it improve with one eye closed?</b> □1 Yes □2 No □2 Not sure				
48. Do	you experience headaches or other discomfort with near-vision tasks, like using a computer?				
□1	Yes				
□2	No				
□3	Not sure				
49. Ar	e you bothered by light?				
□1					
□2	No				
50. Ar	e you bothered by glare?				
□1	Yes				
□2	No				

Participant ID	#.
aiticipalitib	π.

**Vision: Fixation** 

"I am going to ask you to start by looking at my nose, and then move your eyes to this target (show target) and hold your gaze there. After a few seconds I will have you look back at my nose, then at the target in another location. Look at my nose; look at the target....."

- Hold target approximately 8-10 inches from participant's face
- Using top of head, chin and either ear as reference points, start with target in center of participant's face, then move target in pattern of square.
- Participant to hold fixation on the target for at least 2 seconds. After 2 seconds, request they return their gaze to your nose and move target (eventually placing in top/bottom left/right fields).
- Note any signs of nystagmus, excessive blinking, or inability to hold fixation.

51. Participant able to hold steady gaze on target for >2 seconds:	/4 trials

52. Observations of:			
Nystagmus	□1 Yes	□2 No	
Excessive blinking	□1 Yes	□2 No	
Ptosis	□1 Yes	□2 No	
Movement restrictions	□1 Yes*	□2 No	If yes, describe:
Other	□1 Yes*	□2 No	If yes, describe:

"Watch the target as it goes around and don't take your eyes off it."

- Hold target at eye level, 16 inches from participant's face.
- Move target slowly clockwise for two rotations and counter clockwise for two rotations.
- Observe ability to keep attention on target for all rotations and accuracy of ability to follow target with smooth, accurate movements.

#### 53. Ability:

□1	Cannot complete half rotation clock or counter clockwise
□2	Completes half rotation in either direction

- □3 Completes one rotation in either direction but not 2 rotations
- □4 Completes 2 rotations in one direction but less than two in other
- □5 Completes 2 rotations in each direction

## 54. Accuracy:

- □1 No attempt to follow target
- □2 Refixates 5-10x
- □3 Refixates 3-4x
- □4 Refixates 2x or less
- □5 No refixations

#### Vision: Saccades

"Next I will show you two targets. When I say "red" please look at the red target, and when I say "green" look at the green target. Please hold your gaze until I ask you to switch."

- Position two target objects at eye level, 16 inches from participant's face; with each target approximately 4 inches away from midline (with total separation of 8 inches between objects).
- Provide instructions
- Complete 5 rounds, for a total of 10 fixations.
- Observe ability and accuracy of eye movements.

#### 55. Ability:

- □1 Completes less than 2 round trips
- □2 Completes 2 round trips
- □3 Completes 3 round trips
- □4 Completes 4 round trips
- □5 Completes 5 round trips

#### 56. Accuracy:

- □1 Large over or undershooting is noted 1 or more times.
- $\square$ 2 Moderate over or undershooting is noted 1 or more times.
- $\Box$ 3 Constant slight over or under shooting >50% of the time.
- $\Box$ 4 Intermittent slight over or undershooting < 50% of the time.
- $\Box$ 5 No over or undershooting noted.

## Vision: Field of Vision

"I'm going to cover one of your eyes. Look at my nose. Give me your 'yes' response when you see this target in your peripheral vision."

- Slowly move target into one of four quadrants of visual field at a time.
- Repeat with other eye covered.

## 57. Indicate + or – for detection of target in each quadrant:







Left eye

**Vision: Distance Acuity** 

**58. Distance acuity: 20/\_\_\_\_\_** 

### Orientation:

- Participant to wear corrective lenses, if applicable.
- Position demo cards at eye level 8-10 inches apart in adequate lighting, approximately 20 inches from participant.
- Provide the following instructions: "Here are two cars. One has a broken wheel (point) and the other one has wheels that are okay (point)."
- Shuffle the two cards and have participant indicate the "broken" wheel, either using eye gaze or by giving a 'yes' signal when the examiner points to an option. Repeat 2-3 times to confirm understanding of instructions.

#### Test:

- Stand 10 feet from participant, ensuring adequate lighting on cards.
- Starting with 20/20 cards, repeat request to indicate which wheel is broken. Shuffle cards and repeat process four times.
- If 4/4 accuracy is not obtained, present additional cards in order of decreasing acuity (20/30, 20/60, etc.) until 4/4 accuracy is achieved.
- The best acuity rating at which participant achieves 4/4 accuracy should be recorded as the result.

**Vision: Near Acuity** 

**59. Near acuity:** 20/\_\_\_\_\_

#### Orientation:

- Participant to wear corrective lenses, if applicable.
- Position demo cards at eye level, 10 inches from participant, ensuring adequate lighting.
- As previously, provide following instructions: "Here are two cars. One has a broken wheel (point) and the other one has wheels that are okay (point)."
- Rotate wheel on card and have participant indicate the "broken" wheel, either using eye gaze or by
  giving a 'yes' signal when the examiner points to an option. Repeat 2-3 times to confirm understanding
  of instructions.

#### Test:

- Position demo cards at eye level, 45 inches from participant, ensuring adequate lighting.
- Repeat request to have participant indicate which card has broken wheel.
- Rotate wheel of card four times. If 4/4 accuracy (indicating 20/30 acuity) is not obtained, present card at 20 inches (indicating 20/68 acuity). If 4/4 accuracy not achieved, move cards approximately 5 inches closer until 4/4 accuracy is achieved. Use variable distance chart to determine acuity.

Template 2

Template 3

Template 4

Template 5

OHSU	J BCI Sensory/Cogni	tive/Communication So	Participar	nt ID #:	Page 12		
Visio	n: Visual Perceptio	n					
	lipbook and answeid in flipbook.	key for this section. Co	omplete all 5 templ	ates for each ite	m. Administration ii	nstructions can be	
59. V	isual discrimination	<b>n</b> :/5					
	Template 1	Answer:	☐ Correct	☐ Incorrect			
	Template 2	Answer:	☐ Correct	☐ Incorrect			
	Template 3	Answer:	☐ Correct	☐ Incorrect			
	Template 4	Answer:	☐ Correct	☐ Incorrect			
	Template 5	Answer:	☐ Correct	☐ Incorrect			
60. F	igure ground:	<b>/</b> 5					
	Template 1	Answer:	☐ Correct	☐ Incorrect	]		
	Template 2	Answer:	☐ Correct	☐ Incorrect			
	Template 3	Answer:	☐ Correct	□ Incorrect			
	Template 4	Answer:	☐ Correct	☐ Incorrect			
	Template 5	Answer:	☐ Correct	☐ Incorrect			
61. V	isual memory:	_/5			-		
	Template 1	Answer:	☐ Correct	☐ Incorrect			

Answer: \_\_\_\_\_

Answer: \_\_\_\_\_

Answer: \_\_\_\_\_

Answer: \_\_\_\_\_

☐ Correct

☐ Correct

 $\square$  Correct

 $\square$  Correct

☐ Incorrect

☐ Incorrect

☐ Incorrect

☐ Incorrect

# Part IV: Pain, Medications, Motor Function, Cognition, & Literacy

	•		key for most subtests in Part 4. Administra s only to ensure participant understands i		•		
62. Da	ate:		63. Researcher initials:				
Pain							
64. Do	o you h	ave problem	ns with pain?				
□1	Yes*		If yes, continue with questions below (us	ing visual analogue	es), selected from the <u>PROMIS Pain</u>		
□2	No		Interference Bank. If no, skip to question	65.			
		64a. In the	past seven days, how difficult was	□5	Always		
		it for you to	o take in or understand new		past seven days, how often did		
		informatio	n because of pain?	pain make	you feel discouraged?		
		□1	Not at all	□1	Never		
		□2	A little bit	<b>□</b> 2	Rarely		
		□3	Somewhat	□3	Sometimes		
		<b>□</b> 4	Quite a bit	<b>□</b> 4	Often		
		□5	Very much	□5	Always		
		64b. In the	past seven days, how much did	64e. In the	past seven days, how much did		
		pain interfe	ere with your ability to	pain interfe	ere with your ability to remember		
		concentrat	e?	things?			
		□1	Not at all	□1	Not at all		
		□2	A little bit	□2	A little bit		
		□3	Somewhat	□3	Somewhat		
		□4	Quite a bit	□4	Quite a bit		
		□5	Very much	□5	Very much		
		64c. In the	past seven days, how often was				
		your pain s	o severe you could think of				
		nothing els	e?				
		□1	Never				
		□2	Rarely				
		□3	Sometimes				
		□4	Often				

Medications	
65. List participant's current medications (ALL):	

Motor function Control of the Contro											
66. Briefly describe participa	Briefly describe participant's motor function (voluntary motor abilities, involuntary movements, etc):										
67. Note concerns and consi	derations regarding	positionin	g for system trials:								
Cognition: Trails											
<b>68. Trails A: Level 1:</b> □ Pass	☐ Pass w/cues	□ Fail									
<b>Level 2</b> : □ Pass	☐ Pass w/cues	☐ Fail	☐ Did not attempt								
Level 3: □ Pass	□ Pass w/cues	□ Fail	□ Did not attempt								

Provide as many cues as necessary for participant to successfully complete sample item for levels 1 and 2. Stop the level 2 sample item after 6 digits. If participant requires cues to complete actual test items, record those cues below. If participant fails a level, even with cues, do not attempt the next level.

Cues might include:

- 1. Show and say current number, then ask "What comes next?"
- 2. Show and say current number, then show and say next number and ask participant to look at it.

Write box numbers for participant's responses in order, then check against answer key.

Level	Responses					Cues provided (if applicable)			
1									
2									
2									
3									
3					_				

Participant ID #:\_\_\_\_\_

OHSU BCI Sensory/Cognitive/Communication Screen, Revised Participant ID #: Page 15										
69. Trail		rel 1: □ Pass rel 2: □ Pass		-	□ Fail □ Fail  〔					
Provide as many cues as necessary for participant to successfully complete sample items. Stop the level 2 sample item after 6 digits/letters. If participant requires cues to complete actual test items, record those cues below. If participant fails a level, even with cues, do not attempt the next level.										
<ol> <li>Cues might include:</li> <li>Show and say current number, then ask "What comes next?"</li> <li>Show and say current number, then show and say next number and ask participant to look at it.</li> </ol>										
Write box numbers for participant's responses in order, then check against answer key.										
Level			Resp	onses	_		(	Cues provide	ed (if applicab	ole)
1										
			ı	T		1				
2							-			
Literacy										
<b>70.</b> Con	cept of p	orint: Letter:	correc	t/ adm	ninistered					
		Word:	correc	t/adm	inistered					
		Senten	<b>ce:</b> coi	rect/a	administer	ed				
Write bo	ox numb	ers for partici					cev.			
			Letter			Word			Sentence	
Templa	ate 1	A:	Correct	□ Inc.	A:	☐ Correct	☐ Inc.	A:	☐ Correct	☐ Inc.
Templa	ate 2	A:	Correct	☐ Inc.	A:	☐ Correct	☐ Inc.	A:	☐ Correct	☐ Inc.
Templa	ate 3	A:	Correct	☐ Inc.	A:	☐ Correct	☐ Inc.	A:	☐ Correct	☐ Inc.
Templa	ate 4	A:	Correct	☐ Inc.	A:	☐ Correct	☐ Inc.	A:	☐ Correct	☐ Inc.
Templa	ate 5	A:	Correct	☐ Inc.	A:	☐ Correct	☐ Inc.	A:	☐ Correct	☐ Inc.
		_								

OHSU BCI Sensory/Cognitive/Communication Screen, Revised Participant ID										
71. Letter identification: correct/ administered										
Write box numl	bers for part	cicipant's res	ponses	, ther	n check aga	inst answer key.				
Template 1 Answer: □ Correct □ Incorrect										
Template 2 Answer: □ Correct □ Incorrect										
Template 3 Answer: □ Correct □ Incorrect										
Template 4 Answer: □ Correct □ Incorrect										
Template 5	Answer:	Cc	orrect		ncorrect					
						•				
72. Copy-spelli	ng:cor	rect/a	dminist	ered						
Write box numl	bers for part	cicipant's res	ponses	in or	der, then c	heck against answ	er key			
Template 1					□ Correct	t 🛘 Incorrect				
Template 2					□ Correct	t 🛘 Incorrect				
Template 3					□ Correct	t 🛘 Incorrect				
Template 4					☐ Correct	t 🛘 Incorrect				
Template 5					□ Correct	t 🛘 Incorrect				
							-			
73. Error aware	eness:	correct/	_admii	nister	ed					
Write box num	bers for par	ticipant's res	sponse	s, the	n check aga	ainst answer key.				
Template 1	Answer:	Co	orrect		ncorrect					
Template 2	Answer:	Cc	orrect		ncorrect					
Template 3	Answer:	Cc	orrect		ncorrect					
Template 4	Answer:	Cc	orrect		ncorrect					
Template 5	Answer:	ПС	rrect	Пі	ncorrect					

Participant ID #:	
-------------------	--

#### **Reference List**

The <u>OHSU BCI Sensory/Cognitive/Communication Screen, Revised</u> includes items adapted from the following instruments:

- <u>Boston Diagnostic Aphasia Examination</u>: Goodglass H, Kaplan E, Barresi B. BDAE-3: Boston Diagnostic Aphasia Examination—Third Edition. Philadelphia, PA: Lippincott Williams & Wilkins; 2001.
- <u>Broken Wheel Tests</u>: Richman JE, Petito GT, Cron MT. Broken wheel acuity test: a new and valid test for preschool and exceptional children. Journal of the American Optometric Association. 1984 Aug;55(8):561-5.
- Coma Recovery Scale-Revised: Giacino JT, Kalmar K, Whyte J. The JFK Coma Recovery Scale-Revised: measurement characteristics and diagnostic utility. Archives of physical medicine and rehabilitation. 2004 Dec 1;85(12):2020-9.
- <u>Motor-Free Visual Perception test</u>: Colarusso RP, Hammill DD. Motor-Free Visual Perception Test. Academic Therapy Pub; 1972.
- NSUCO Oculomotor Test: Ficklin IT, Maples WC, Atchley J. Northeastern State University College of Optometry's Oculomotor Norms. J Behav Optom. 1992;3:143–150.
- PROMIS-Pain Interference Bank v1.0: Amtmann D, Cook KF, Jensen MP, Chen WH, Choi S, Revicki D, Cella D, Rothrock N, Keefe F, Callahan L, Lai JS. Development of a PROMIS item bank to measure pain interference. Pain. 2010 Jul 1;150(1):173-82.
- Rapid confrontation screening for peripheral visual field defects and extinction: Anderson AJ, Shuey NH, Wall M.
   Rapid confrontation screening for peripheral visual field defects and extinction. Clinical and experimental optometry. 2009 Jan;92(1):45-8.
- <u>Trail Making Test</u>: Bowie CR, Harvey PD. Administration and interpretation of the Trail Making Test. Nature protocols. 2006 Dec;1(5):2277.
- Western Aphasia Battery-Revised: Kertesz A. Western Aphasia Battery-Revised (WAB-R). PsychCorp. Harcort Assessment Incorporation. 2006.

Procedures for obtaining informed consent are adapted from:

• Vansteensel MJ, Pels EG, Bleichner MG, Branco MP, Denison T, Freudenburg ZV, Gosselaar P, Leinders S, Ottens TH, Van Den Boom MA, Van Rijen PC. Fully implanted brain—computer interface in a locked-in patient with ALS. New England Journal of Medicine. 2016 Nov 24;375(21):2060-6.

#### **About This Instrument**

The OHSU BCI Sensory/Cognitive/Communication Screen, Revised was revised in June 2017 by Brandon Eddy, MA, CCC-SLP; Melanie Fried-Oken, PhD, CCC-SLP; Michelle Kinsella, OTR/L; Aimee Mooney, MS, CCC-SLP; and Betts Peters, MA, CCC-SLP; of the Oregon Health & Science University Institute on Development & Disability in Portland, Oregon, USA.

This work was supported by National Institutes of Health grant #2R01DC009834-06A1 and National Institute on Disability, Independent Living, and Rehabilitation Research grant #90RE5017.