- If you are viewing this course as a recorded course after the live webinar, you can use the scroll bar at the bottom of the player window to pause and navigate the course.
- This handout is for reference only. It may not include content identical to the PowerPoint. Any links included in the handout are current at the time of the live webinar, but are subject to change and may not be current at a later date.

ONLINE CONTINUING EDUCATION FOR THE LIFE OF YOUR CAREER

Vanderbilt SLP Journal Club: Prognosis for Aphasia Across the Continuum of Care

Michael de Riesthal, Ph.D., CCC-SLP

Moderated by:
Amy Hansen, MA, CCC-SLP, Managing Editor, SpeechPathology.com

Need assistance or technical support?

- Call 800-242-5183
- Email customerservice@SpeechPathology.com
- Use the Q&A pod

How to earn CEUs

- Must be logged in for full time requirement
- Log in to your account and go to Pending Courses
- Must pass 10-question multiple-choice exam with a score of **80%** or higher
  - Within **7 days** for live webinar; within **30 days** of registration for recorded/text/podcast formats
- Two opportunities to pass the exam

Interested in Volunteering to be a Peer Reviewer?

- APPLY TODAY!
- 3+ years SLP Professional Experience Required
- Contact Amy Natho at anatho@SpeechPathology.com

CONTINUED

Vanderbilt SLP Journal Club: Prognosis for Aphasia Across the Continuum of Care

Michael de Riesthal, Ph.D., CCC-SLP
Pi Beta Phi Rehabilitation Institute
Vanderbilt University Medical Center

CONTINUED

Learning Objectives

After this course, participants will be able to:

- Describe the critical components of language recovery in the acute, sub-acute and chronic phases of recovery.
- Describe the factors that influence decisions for discharge disposition.
- Describe the variables that may aid the provision of a prognosis for language recovery.

8

CONTINUED

Before we get started…

How many of you work in:

- acute care?
- skilled nursing facility?
- inpatient rehabilitation?
- outpatient rehabilitation?
- a non-medical setting?

9

CONTINUED

Objectives

- Purpose of Prognosis
- Patterns of reorganization of language

Kiran S. (2012). What is the nature of poststroke language recovery and reorganization? ISRN Neurol. 2012:786872 10.5402/2012/786872

- Influence of aphasia on discharge disposition

González-Fernández, M., Christian, A. B., Davis, C., & Hillis, A. E. (2013). Role of aphasia in discharge location after stroke. Archives of physical medicine and rehabilitation, 94(5), 851-855.

- Prognostic variable method

Plowman, E., Hentz, B., & Ellis, C. (2012). Post-stroke aphasia prognosis: A review of patient-related and stroke-related factors. *Journal of evaluation in clinical practice*, *18*(3), 689-694.

10

Purpose of Prognosis

To predict the eventual outcome reached by a patient at a specific time, and/or the amount of change a patient will make over a specified period of time.

11

Purpose of Prognosis

- Tailor treatment for each individual
- Set realistic goals
- Allocate resources appropriately

12

CONTINUED

Objectives

- Purpose of Prognosis
- Patterns of reorganization of language

Kiran S. (2012). What is the nature of poststroke language recovery and reorganization? ISRN Neurol. 2012:786872 10.5402/2012/786872

- Influence of aphasia on discharge disposition

González-Fernández, M., Christian, A. B., Davis, C., & Hillis, A. E. (2013). Role of aphasia in discharge location after stroke. Archives of physical medicine and rehabilitation, 94(5), 851-855.

- Prognostic variable method

Plowman, E., Hentz, B., & Ellis, C. (2012). Post-stroke aphasia prognosis: A review of patient-related and stroke-related factors. *Journal of evaluation in clinical practice*, *18*(3), 689-694.

13

International Scholarly Research Network
ISRN Neurology
Volume 2012, Article ID 786872, 13 pages
doi:10.5402/2012/786872

Review Article

What Is the Nature of Poststroke Language Recovery and Reorganization?

Swathi Kiran[1,2]

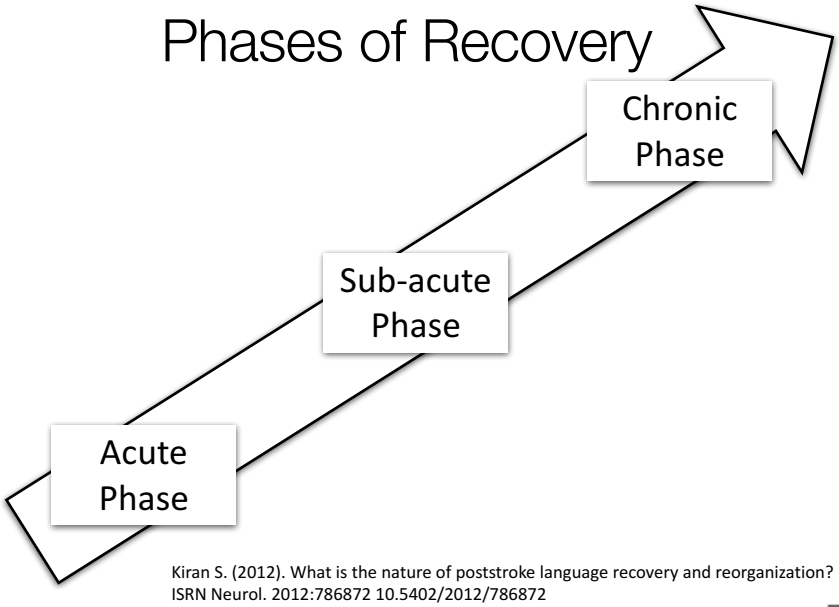
[1] *Department of Speech, Language, and Hearing Sciences, Sargent College of Health & Rehabilitation Sciences, Boston University, 635 Commonwealth Avenue, Boston, MA 02215, USA*
[2] *Massachusetts General Hospital, Boston, MA, USA*

Three main topics related to poststroke language recovery and reorganization:

1. The nature of anatomical and physiological substrates in the infarcted hemisphere
2. Current neuroimaging evidence for language recovery post-stroke
3. Change in connectivity as a function of recovery post-stroke

14

Phases of Recovery

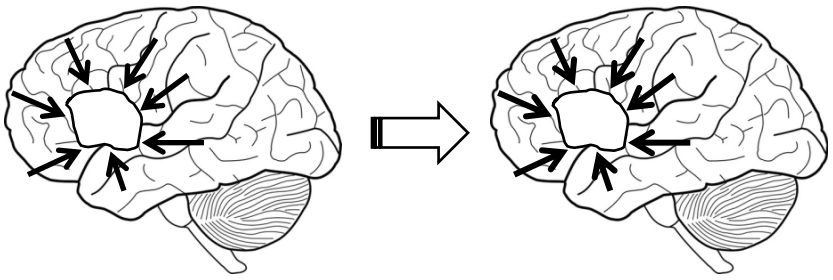


Kiran S. (2012). What is the nature of poststroke language recovery and reorganization? ISRN Neurol. 2012:786872 10.5402/2012/786872

15

Acute Phase of Recovery

- Reperfusion of tissue

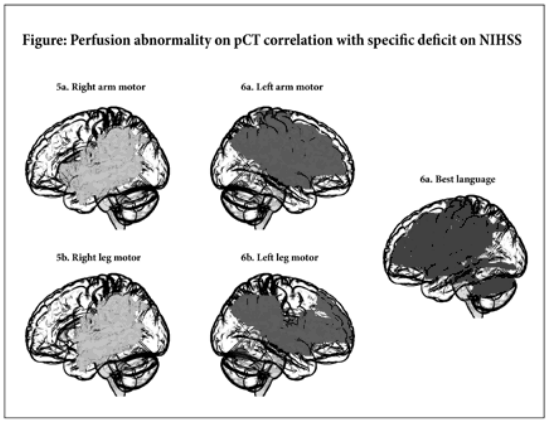


Kiran (2012)

16

CONTINUED

Prediction Based on Perfusion Abnormality



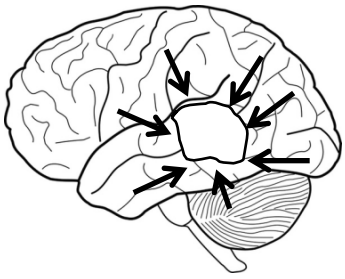
Rorden, Fridriksson, Thors, Hillis, Krebs, Fridriksson, Graham, Hubbard, Hanayik, & Sen, 2015

17

CONTINUED

Perfusion Abnormality and Language

- Hypoperfusion of specific brain regions, via magnetic resonance perfusion weighted imaging (PWI), is associated with disruption of selective lexical functions

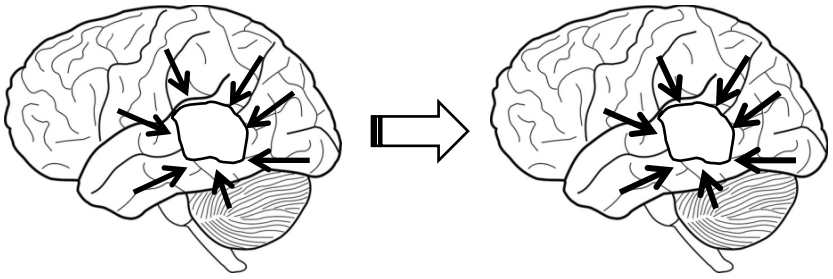


Hillis, Kane, Tuffiash, Ulatowski, Barker, Beauchamp, & Wityk (2001)

18

Reperfusion and Language Performance

- Reperfusion of the same regions, in the absence of infarct in that region, would restore the associated lexical function.

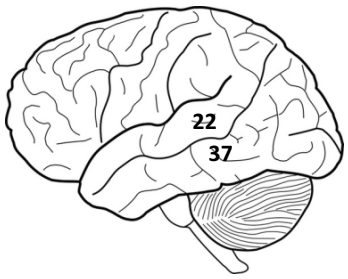


Hillis, Kane, Tuffiash, Ulatowski, Barker, Beauchamp, & Wityk (2001)

19

Reperfusion and Language Performance

- 5 patients with poor perfusion, but not infarction, of Brodmann's area 22 (BA 22), and 1 patient with poor perfusion Brodmann's area 37 (BA 37) as well as BA 22



Hillis, Kane, Tuffiash, Ulatowski, Barker, Beauchamp, & Wityk (2001)

20

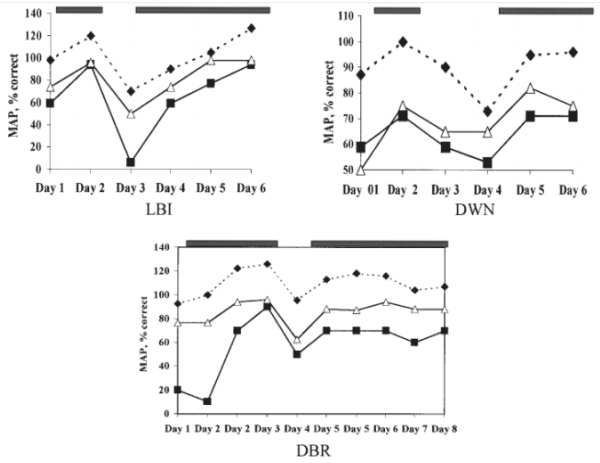
Reperfusion and Language Performance

- Each patient was treated with induced blood pressure elevation to increase perfusion of the ischemic and dysfunctional tissue
- Daily testing of naming and comprehension

Hillis, Kane, Tuffiash, Ulatowski, Barker, Beauchamp, & Wityk (2001)

21

Reperfusion and Language Performance



Hillis, Kane, Tuffiash, Ulatowski, Barker, Beauchamp, & Wityk (2001)

22

CONTINUED

Reperfusion and Language Performance

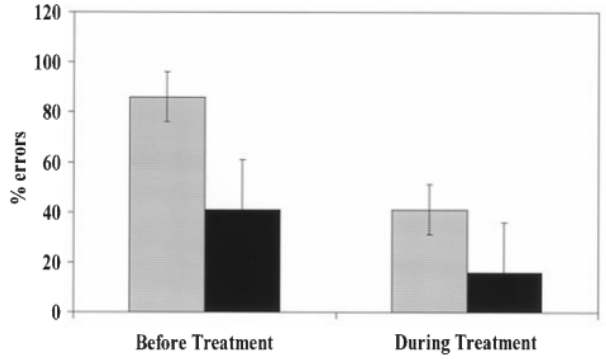


FIG. 5. Mean performance of patients who showed improved lexical-semantics, before and during treatment. Shaded columns represent percentage errors in oral naming; solid columns represent percentage errors in word/picture verification (comprehension).

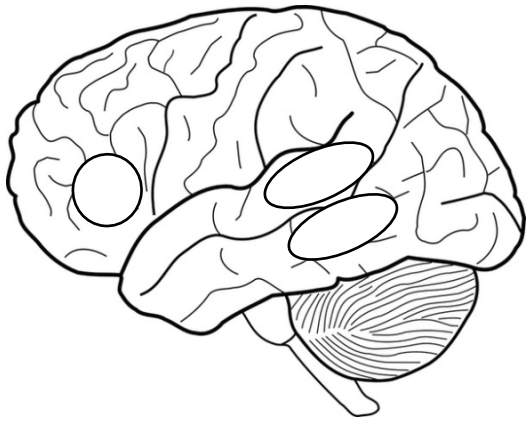
Hillis, Kane, Tuffiash, Ulatowski, Barker, Beauchamp, & Wityk (2001)

23

CONTINUED

Reperfusion of …

- Wernickes area
- MTG, fusiform, Broca's, & Wernickes
- LIFG



Hillis, Barker, Beauchamp et al. (2001)
Davis et al. (2008)

24

Take Away

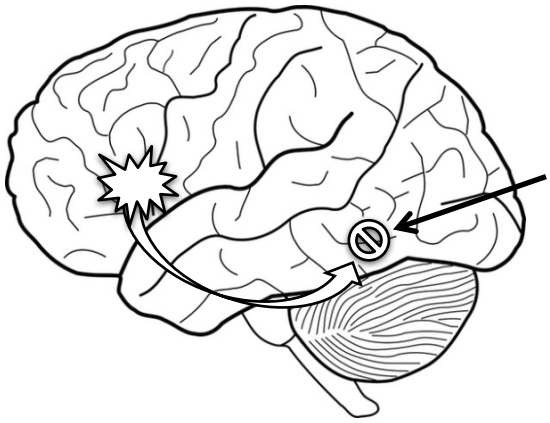
- "…reperfusion of the hypo-perfused area during the acute stages is a critical component of recovery of language and also underscores of the importance of these regions in various aspects of language processing in the brain." (p.5)

Kiran (2012)

25

Sub-acute Phase of Recovery

- Resolution of diaschisis

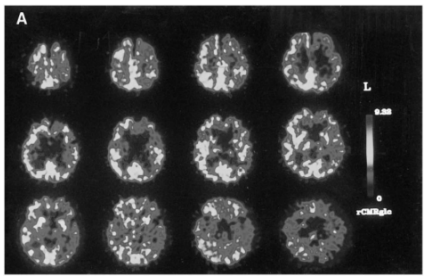


26

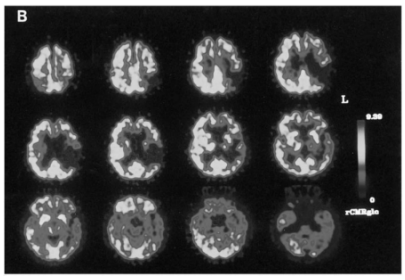
Resolution of Diaschisis

- Cappa et al. (1997)

-8 patients with aphasia due to unilateral left hemisphere stroke
-Language testing and PET study performed at 2 weeks and 6 months post-stroke



Acute phase (2 weeks):
Widespread hypometabolism

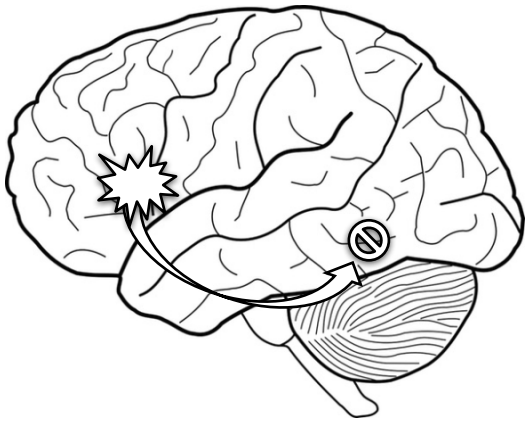


Sub-acute phase (6 months):
Bilateral metabolic recovery
Improved language function

27

Resolution of Diaschisis

- Price et al. (2001)



-4 patients with aphasia (PWA) and lesion in posterior inferior frontal cortex

-Viewed words vs. consonant strings while in a scanner

-In non-neurologically damaged individuals activation occurs in posterior inferior frontal, middle temporal, and posterior inferior temporal cortices

-In PWA, abnormal activation in the damaged inferior frontal cortex AND undamaged inferior temporal cortex

28

CONTINUED

Take Away

- In the subacute phase, "…recovery of language is dependent on the persistence of hypoperfusion and hypometabolism in regions proximal and distant from the site of lesion. It is likely that the resolution of diaschisis is dependent on the extent of neural plasticity possible in the peri-infarct tissue and the nature and scope of behavioral rehabilitation." (p.6)

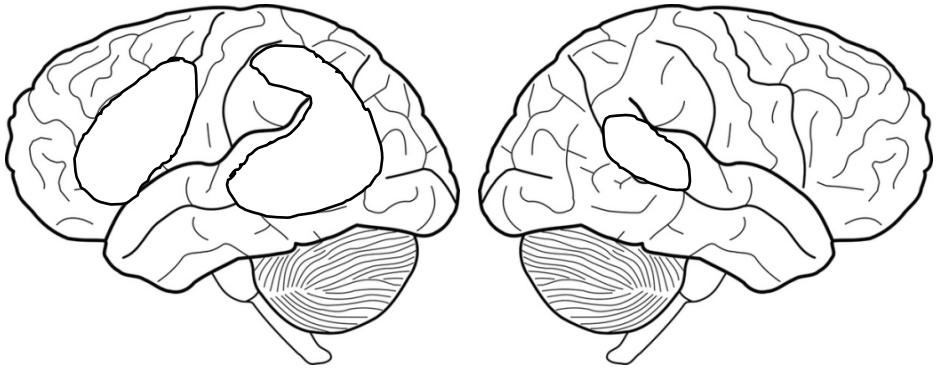
Kiran (2012)

29

CONTINUED

Chronic Phase of Recovery

- Role of the ipsilesional hemisphere

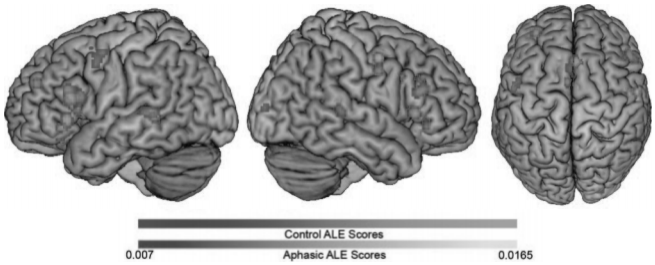


30

Ipsilesional Hemisphere

- Turkeltaub et al. (2011)

-Meta-analysis of functional neuroimaging studies using language tasks to examine the neuroplastic changes that occur in recovery from aphasia



-Control participants activated left hemisphere language areas
-PWA activated left hemisphere language areas, new left hemisphere areas, and right hemisphere areas homotopic to left language areas

31

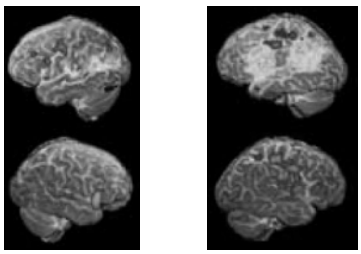
Ipsilesional Hemisphere Activation following treatment

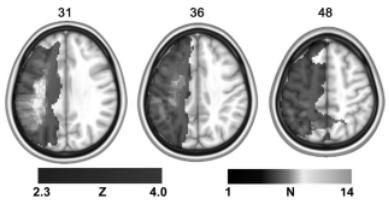
Increased bilaterally

- Fridriksson et al. 2006
- Fridriksson et al. 2007

Increased ipsilaterally

- Fridriksson et al. 2010





32

CONTINUED

Take Away

- "…the evolution of studies examining rehabilitation in poststroke aphasia increasingly points towards the principal engagement of perilesional regions in supporting training induced language recovery and is consistent with Turkeltaub et al.'s [59] suggestions about the role of the left IFG and perilesional regions in natural language recovery." (p.7)

Kiran (2012)

33

CONTINUED

Objectives

- Purpose of Prognosis
- Patterns of reorganization of language

Kiran S. (2012). What is the nature of poststroke language recovery and reorganization? ISRN Neurol. 2012:786872 10.5402/2012/786872

- Influence of aphasia on discharge disposition

González-Fernández, M., Christian, A. B., Davis, C., & Hillis, A. E. (2013). Role of aphasia in discharge location after stroke. Archives of physical medicine and rehabilitation, 94(5), 851-855.

- Prognostic variable method

Plowman, E., Hentz, B., & Ellis, C. (2012). Post-stroke aphasia prognosis: A review of patient-related and stroke-related factors. *Journal of evaluation in clinical practice*, *18*(3), 689-694.

34

CONTINUED

Questions for the group

- In your experience, does the presence of aphasia influence whether a patient is discharged to inpatient rehab?
- If so, is the decision based on severity of aphasia? That is, individuals with more severe aphasia go to inpatient rehab.

35

Published in final edited form as:
Arch Phys Med Rehabil. 2013 May ; 94(5): 851–855. doi:10.1016/j.apmr.2012.11.042.

Role of Aphasia in Discharge Location After Stroke

Marlís González-Fernández, MD, PhD[1], **Asare B. Christian, MD**[1], **Cameron Davis, MS**[2], and **Argye E. Hillis, MD, MA**[1,2,3]

[1]Department of Physical Medicine and Rehabilitation, Johns Hopkins University, School of Medicine, Baltimore, Maryland, USA

[2]Department of Neurology, Johns Hopkins University, School of Medicine, Baltimore, Maryland, USA

[3]Department of Cognitive Science, Johns Hopkins University, School of Medicine, Baltimore, Maryland, USA

- Examine the relationship between language deficits and discharge to an institutional setting
- Hypothesized that comprehension would be associated with discharge after adjusting for OT and PT needs

36

Influence of Aphasia on Discharge Disposition

- 152 subjects who had a clear discharge location (88 - home, 50 – acute rehabilitation unit, 14 - nursing home or other institutional setting)
- Subjects with a diagnosis of stroke or TIA were included in the study

González-Fernández, Christian, Davis, & Hillis, 2013

37

Influence of Aphasia on Discharge Disposition

Assessment tasks:

- Oral naming of pictures
- Written naming of pictures
- Oral naming with tactile input
- Oral reading
- Oral spelling
- Repetition of pseudowords
- Written spelling to dictation
- Spoken word-picture verification
- Written word-picture verification

38

CONTINUED

Influence of Aphasia on Discharge Disposition

Auditory Comprehension:

- Institutional setting: 63.6%
- Home setting: 42.9%

Reading Comprehension and Tactile Naming:

- Institutional setting: 70.7% and 62.9%
- Home setting: 54.0% and 43.6%

González-Fernández, Christian, Davis, & Hillis, 2013

39

CONTINUED

Objectives

- Purpose of Prognosis
- Patterns of reorganization of language

Kiran S. (2012). What is the nature of poststroke language recovery and reorganization? ISRN Neurol. 2012:786872 10.5402/2012/786872

- Influence of aphasia on discharge disposition

González-Fernández, M., Christian, A. B., Davis, C., & Hillis, A. E. (2013). Role of aphasia in discharge location after stroke. Archives of physical medicine and rehabilitation, 94(5), 851-855.

- Prognostic variable method

Plowman, E., Hentz, B., & Ellis, C. (2012). Post-stroke aphasia prognosis: A review of patient-related and stroke-related factors. *Journal of evaluation in clinical practice*, *18*(3), 689-694.

40

Prognostic Variable Method

- Use data from biographical, medical, and behavioral variables to infer a patient's potential for a positive outcome or significant amount of change in performance
- Other methods
  - Behavioral profiles
  - Statistical prediction

41

Prognostic Variables in Aphasia

- Biographical variables
  - age
  - education
  - premorbid intelligence
  - occupational status
- Medical variables
  - etiology
  - extent of lesion
  - physical condition
  - time post-onset
- Behavioral variables
  - severity of aphasia
  - type of aphasia
  - performance on verbal/ nonverbal measures

42

Journal of Evaluation in Clinical Practice
International Journal of Public Health Policy and Health Services Research

Journal of Evaluation in Clinical Practice ISSN 1365-2753

Post-stroke aphasia prognosis: a review of patient-related and stroke-related factors

Emily Plowman PhD[1] Brecken Hentz MS[2] and Charles Ellis Jr PhD[3]

[1]Assistant Professor, Department of Communication Sciences and Disorders, College of Behavioral and Community Sciences, University of South Florida, Tampa, FL, USA
[2]Staff Therapist, Department of Speech Pathology and Audiology, Duke University Medical Center, Durham, NC, USA
[3]Associate Professor, Department of Health Sciences & Research, College of Health Professions, Medical University of South Carolina, Charleston, SC, USA

43

CONTINUED

Prognostic Variables

Plowman, Hentz, & Ellis (2012)

- Biographical Variables
  - Gender – no evidence
  - Handedness – no evidence
  - Age – mixed evidence
  - Education/socio-economic status – no evidence
  - Intelligence – mixed evidence
- Medical/Behavioral Variables
  - Initial stroke and aphasia severity*
  - Site/size of lesion*

*** Positive evidence**

44

CONTINUED

Age

Important indicator
- Eisenson (1949)
- Wepman (1951)
- Vignolo (1964)
- Sands, et al. (1969)
- Marshall, et al. (1982)
- Marshall & Phillips (1983)
- Holland, et al. (1989)
- Laska et al. (2001)

Not important indicator
- Culton (1971)
- Sarno & Levita (1971)
- Keenan & Brassel (1974)
- Kertesz & McCabe (1977)
- Lendrem & Lincoln (1985)
- Wertz & Dronkers (1990)
- Basso (1992)
- Pedersen et al. (2004)
- Inatomi et al. (2008)

45

CONTINUED

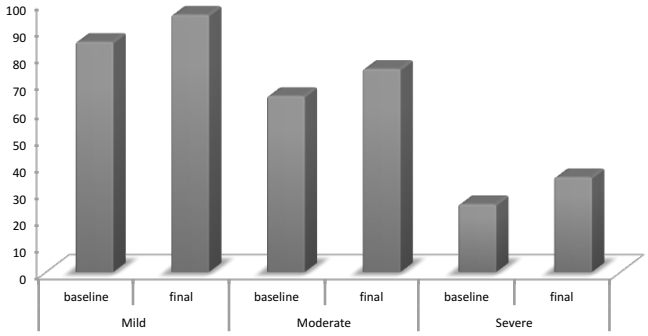
Age

- Wertz & Dronkers (1990)
  - VA Cooperative Study data – highly controlled sample of individuals with aphasia (sensory loss, coexisting medical deficits, etc)
  - When all else is equal, age is not a significant predictor of outcome or amount of change

46

Initial Severity of Aphasia

- General belief that individuals with less severe aphasia have potential for a better ultimate outcome.



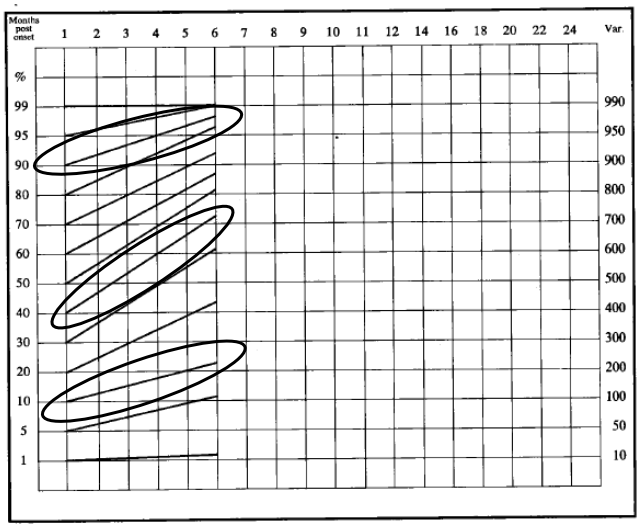
47

Initial Severity of Aphasia

- Kertesz & McCabe (1977) caution against inferring that higher outcome levels are synonymous with a larger amount of change.
  - Broca's and Wernicke's aphasic patients often demonstrate the most change
  - Anomic aphasic patients have the better ultimate outcome.

48

Porch Index of Communicative Ability
HOAP SLOPES



49

Language Measures

de Riesthal and Wertz (2004)

- Outcome at 48 weeks postonset
  - Token Test—PICA
  - PICA—PICA, RFP
  - Word Fluency—PICA, RFP
  - Conversation—PICA

  *positively correlated

- Change from 4-48 weeks postonset
  - Token Test—PICA
  - PICA—PICA
  - RFP—RFP
  - Word Fluency—PICA
  - Conversation—PICA

  *negatively correlated

50

Site and Size of Lesion

- General consensus that the site and size of lesion that causes aphasia can influence recovery from aphasia

51

Site and Size of Lesion

Mohr et al. (1978)

- Lesions to Broca's area alone do not result in persisting Broca's aphasia, only transient mutism is seen at onset, which resolves into a mild speech disorder, dyspraxia. (Baby Broca's)
- Persisting Broca's aphasia results only from extensive lesions in the territory of the upper division of the left MCA. This includes: Broca's area, adjacent prefrontal cortex, anterior parietal regions, the insula, and underlying white matter. (Big Broca's)

52

Site and Size of Lesion

Mazzoni et al. (1990)

- Recovery patterns in 45 patients with aphasia
- Smaller lesions – Improvement in auditory comprehension (AC), verbal expression, and written expression.
- Medium size lesions – Improvement in AC and verbal expression
- Large lesions – Improvement in AC

53

Site and Size of Lesion

Alexander et al. (1990)

- Lesions in frontal operculum that extend into deep white matter – more severe, persistent non-fluent aphasia

Kertesz et al. (1993)

- Lesions involving supramarginal gyrus, angular gyri, and superior temporal area, but sparing superior and middle temporal gyri – better recovery of auditory comprehension

54

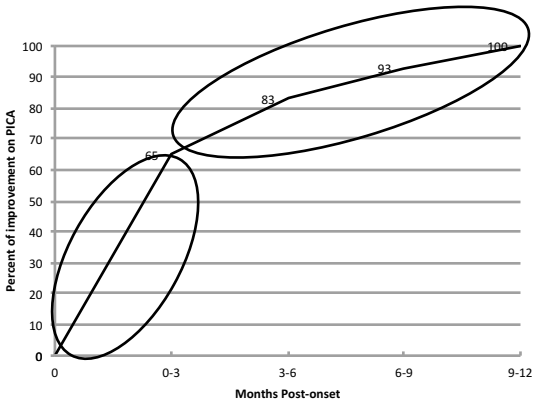
Time Post-onset

- When does spontaneous recovery occur?
  - 2 months (Culton, 1969)
  - 3 months (Lendrem & Lincoln, 1985)
  - 6 months (Basso et al., 1979; Deal & Deal, 1978; Kertesz & McCabe, 1974; Vignolo, 1964)

55

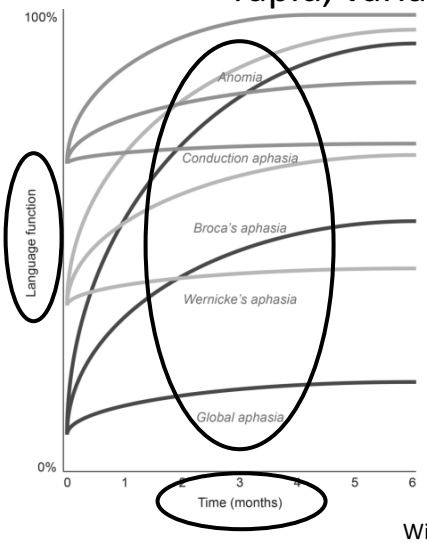
Time Post-onset

- Wertz et al. (1981) report % of total improvement with treatment in 3 month periods
- 0-3 months - 65%
- 3-6 months - 18%
- 6-9 months - 10%
- 9-12 months - 7%



56

Recovery from aphasia after stroke is rapid, variable and dynamic



We're still not very good at prognosis

but…

We know medical management impacts recovery

Biographical, medical, and behavioral variables are associated with recovery

We can distinguish between
1. Ultimate outcome
2. Amount of change

Wilson 2014

57

Review

- Purpose of Prognosis
- Patterns of reorganization of language

Kiran S. (2012). What is the nature of poststroke language recovery and reorganization? ISRN Neurol. 2012:786872 10.5402/2012/786872

- Influence of aphasia on discharge disposition

González-Fernández, M., Christian, A. B., Davis, C., & Hillis, A. E. (2013). Role of aphasia in discharge location after stroke. Archives of physical medicine and rehabilitation, 94(5), 851-855.

- Prognostic variable method

Plowman, E., Hentz, B., & Ellis, C. (2012). Post-stroke aphasia prognosis: A review of patient-related and stroke-related factors. *Journal of evaluation in clinical practice*, *18*(3), 689-694.

58

References

Cappa, S. F., Perani, D. Grassi, F. et al., "A PET follow-up study of recovery after stroke in acute aphasics," *Brain and Language*, vol. 56, no. 1, pp. 55–67, 1997.

Davis, C., Kleinman, J.T., Newhart, M., Gingis, L., Pawlak, M. & Hillis, A.E. "Speech and language functions that require a functioning Broca's area," Brain and Language, vol. 105, no. 1, pp. 50–58, 2008.

de Riesthal, M., & Wertz, R. (2004). Prognosis for aphasia: relationship between selected biographical and behavioural variables and outcome and improvement. Aphasiology, 18(10), 899-915.

Fridriksson, J., Morrow-Odom, L., Moser, D., Fridriksson, A., & Baylis, G. "Neural recruitment associated with anomia treatment in aphasia," NeuroImage, vol. 32, no. 3, pp. 1403– 1412, 2006.

J. Fridriksson, D.Moser, L. Bonilha et al., "Neural correlates of phonological and semantic-based anomia treatment in aphasia,"Neuropsychologia, vol. 45, no. 8, pp. 1812–1822, 2007.

J. Fridriksson, "Preservation and modulation of specific lefthemisphere regions is vital for treated recovery from anomia in stroke," The Journal of Neuroscience, vol. 30, no. 35, pp. 11558–11564, 2010.

González-Fernández, M., Christian, A. B., Davis, C., & Hillis, A. E. (2013). Role of aphasia in discharge location after stroke. *Archives of physical medicine and rehabilitation*, *94*(5), 851-855.

Hillis, A. E., Wityk, R. J., Tuffiash, E., Beauchamp, N. J., Jacobs, M. A., Barker, P. B., & Selnes, O. A. (2001). Hypoperfusion of Wernicke's area predicts severity of semantic deficit in acute stroke. Annals of neurology, 50(5), 561-566.

Hillis, A.E., Barker, P.B., Beauchamp, N.J., Winters, B.D., Mirski, M., & Wityk, R.J. "Restoring blood pressure reperfused Wernicke's area and improved language," Neurology, vol. 56, no. 5, pp. 670–672, 2001.

59

References

Kertesz, A., & McCabe, P. (1977). Recovery patterns and prognosis in aphasia. Brain: a journal of neurology, 100, 1-18.

Kiran S. (2012). What is the nature of poststroke language recovery and reorganization? ISRN Neurol. 2012:786872 10.5402/2012/786872

Plowman, E., Hentz, B., & Ellis, C. (2012). Post-stroke aphasia prognosis: A review of patient-related and stroke-related factors. Journal of evaluation in clinical practice, 18(3), 689-694.

Price, C.J., Warburton, E.A., Moore, C.J., Frackowiak, R.S.J., & Friston, K.J. "Dynamic diaschisis: anatomically remote and context-sensitive human brain lesions," *Journal of Cognitive Neuroscience*, vol. 13, no. 4, pp. 419–429, 2001.

Rorden, C., Fridriksson, J., Thors, H., Hillis, A., Krebs, K., Fridriksson, J. F., ... & Sen, S. (2015). Abstract W P42: Automated Perfusion Computer Axial Tomography Predicts Acute Stroke Deficits.

Turkeltaub, P.E., Messing, S., Norise, C., & Hamilton, R.H. "Are networks for residual language function and recovery consistent across aphasic patients?" Neurology, vol. 76, no. 20, pp. 1726–1734, 2011.

Wertz, R. T., & Dronkers, N. F. (1990). Effects of age on aphasia. In Proceedings of the research symposium on communication sciences and disorders and aging. A SHA Reports (Vol. 19, pp. 88-98).

Wertz, R. T., Collins, M. J., Weiss, D., Kurtzke, J. F., Friden, T., Brookshire, R. H., ... & West, J. A. (1981). Veterans Administration cooperative study on aphasia: A comparison of individual and group treatment. Journal of Speech and Hearing Research, 24(4), 580-594.

60