Program

Academy of Aphasia 47th Annual Meeting

Omni Parker House Hotel

Boston, Massachusetts, USA

October 18-20, 2009

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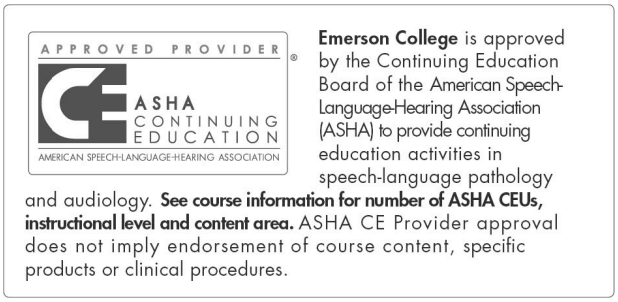

The 2009 Academy of Aphasia annual conference is offered for 2.2 CEUs (Advanced level, Professional area).

Schedule

Sunday October 18

8:30am-9:45am

Breakfast

9:45am

Welcoming Remarks

10:00am-12:00pm

Platform Session 1: Speech Production

12:00pm-1:30pm

Lunch (on your own)

1:30pm-4:00pm

Symposium 1: Neuroimaging in Aphasia Treatment Research: Lessons, Challenges and Future Directions

4:00pm-6:00pm

Poster Session 1

6:30pm

Reception

Monday October 19

8:00am-8:30am

Breakfast

8:30am-10:00am

Platform Session 2: Semantics

10:00am-12:00pm

Poster Session 2

12:00-2:00pm

Academy Luncheon

2:00pm-4:00pm

Platform Session 3: Sentences and Sequences

4:00-6:00pm

Poster Session 3

6:00pm

Academy Business Meeting

Tuesday October 20

8:00am-8:30am

Breakfast

8:30am-11:00am

Symposium 2: Lexical Retrieval and Aging: Implications for Aphasia

11:00am-1:00pm

Poster Session 4

12:00-1:00pm

Box Lunch

1:00pm-4:00pm

Platform Session 4: Neural Bases of Language

4:00pm

Closing Remarks and Student Award

Detailed Scientific Program

Sunday October 18

10:00am-12:00pm

Platform Session 1: Speech Production

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1. Voxel-based Lesion Analysis of Phonological, Lexical, and Syntactic Production Deficits in Post-stroke Aphasia

Faroqi-Shah Y. [1], Kling T. [2], Solomon J. [3], Archibald J. [4], Park G. [4], Braun A. [4]
[1] Dept. of Hearing and Speech Sciences, University of Maryland, [2] John Hopkins University Hospital, [3] Medical Numerics, [4] National Institutes of Health

2. A Computational Case-Series Approach to Frequency Effects in Aphasic Word Production

Nozari N. , Kittredge A. , Dell G.
Beckman Institute, University of Illinois at Urbana-Champaign

3. Distinguishing Phonological Errors from Phonetic Errors in Acquired Speech Impairment

Buchwald A. [1], Rapp B. [2], Miozzo M. [3]
[1] New York University, [2] Johns Hopkins University, [3] Cambridge University and Johns Hopkins University

4. Syllable Frequency Effect in Progressive Apraxia of Speech: A Case Study

Laganaro M. [1], Bagou O. [1], Croisier M. [2]
[1] University of Neuchâtel, Switzerland, [2] Hôpital Neuchâtelois, Switzerland

1:30pm-4:00pm

Symposium 1: Neuroimaging in Aphasia Treatment Research: Lessons, Challenges and Future Directions

5. Neuroimaging in Aphasia Treatment Research: Lessons, Challenges and Future Directions

Rapp B. [1], *Thompson C.* [2]
[1] *Johns Hopkins University,* [2] *Northwestern University*

6. Neuroimaging in Aphasia Treatment Research: The State of the Science

Thompson C.
Dept. of Communication Sciences and Disorders, Northwestern University

7. Functional Neuroimaging of Recovery in Aphasia: Characterizing the Lesion

Hillis A.
Dept. of Neurology Johns Hopkins School of Medicine

8. Characterizing the Language Deficit: Implications for Scan Task Selection

Rapp B.
Johns Hopkins University

9. Experimental Treatment Design: What's Important for Neuroimaging Research

Swathi K.
Boston University

10. Analyzing Functional Neuroimaging Data of the Lesioned Brain

Saur D.
Department of Neurology, University Medical Center Freiburg

4:00pm-6:00pm: Poster Session 1

Neural Bases of Language

11. Task Modulated Neural Activation Patterns in Chronic Stroke Participants with Aphasia

Sebastian R. [1], Swathi K. [2]
[1] 1Department of Communication Sciences and Disorders, University of Texas at Austin, 1 University Station A1100, Austin, TX 78712, [2] Speech Language and Hearing Sciences, Boston University Sargent College, 635 Commonwealth Ave, Boston, MA 02215

12. Wernicke's Aphasia Caused by Crossed Cerebellar Diaschisis Following Cerebellar Hemorrhage

Zhang Y. [1], Wang Y. [1], Zhao X. [1], Chunxue W. [1], Chen H. [2], Yongjun W. [1]
[1] Department of Neurology of Beijing Tiantan Hospital, Capital Medical University, China, [2] Department of Neuroimaging of Beijing Neurosurgery Institute, affiliated with Capital Medical University, China

13. Optic Aphasia or Wernicke's Aphasia with Diplopia: A Customized Approach for Assessment

Jayachandran K. , Kumar V. , Babu K. , Rafi R.
JSS Institute of Speech and Hearing, Mysore University, Mysore

14. Repetitive Transcranial Magnetic Stimulation (rTMS) and Sham Modulation of Language Function in Aphasia

Barwood C. [1], Murdoch B. [2], Whelan B. [3], Lloyd D. [4], O'Sullivan J. [5], Coulthard A. [6]
[1] Docotoral Researcher, Centre for Neurogenic Communication Disorders Research, School of Health and Rehabilitation Sciences, University of Queensland, [2] Head of School amd Professor, Centre for Neurogenic Communication Disorders Research, School of Health and Rehabilitation Sciences, University of Queensland, [3] Post Doctoral Research Fellow, Centre for Neurogenic Communication Disorders Research, School of Health and Rehabilitation Sciences, University of Queensland, [4] Post Doctoral Reseracher, Centre for Neurogenic Communication Disorders Research, School of Health and Rehabilitation Sciences and School of Human Movement Studies, University of Queensland, [5] Associate Professor of Neurology, Department of Neurology, Royal Brisbane and Women's Hospital, Queensland, [6] Professor of Neuroradiology, Royal Brisbane and Women's Hospital, Head of University of Queensland Discipline of Medical Imaging

15. Clinical Profiles of Communication Impairments after a Right-Hemisphere Stroke

Ferré P. [1], Clermont M. [2], Lajoie C. [2], Côté H. [3], Ska B. [3], Joanette Y. [3]
[1] Centre de recherche, Institut universitaire de gériatrie de Montréal and Hôpital de réadaptation Villa Medica, Montréal (SPEAKER), [2] Université de Montréal, [3] Centre de recherche, Institut universitaire de gériatrie de Montréal

16. Broca 0 – Wernicke 2: Contrasted Effects of Transcranial Magnetic Stimulation on Language in Chronic Aphasia

Macoir J. [1], Flamand V. [2], Beaulieu L. [2], Jacob-Roy G. [2], Routhier S. [2], Schneider C. [3]
[1] Université Laval et Centre de recherche Université Laval Robert-Giffard, [2] Université Laval, [3] Laboratoire de Neurophysiologie Humaine, Centre de recherche du CHUL

17. A Systematic Analysis of Executive Functioning in Adults with Aphasia

Purdy M. , Labbe C.
Southern Connecticut State University

18. Neuroanatomical Organization of Functional Language Processing: an fMRI Study

Kumar V. [1], Jayachandran K. [1], Rafi R. [1], Babu K. [1], Emmanuel R. [2]
[1] JSS Institute of Speech and Hearing, Mysore University, Mysore, [2] Bharat Scan Centre, Chennai, India

19. Longitudinal Recovery of Repetition and Comprehension in Aphasic Stroke Patients

Kuemmerer D. [1], Kellmeyer P. [1], Mader I. [2], Weiller C. [1], Saur D. [1]
[1] University Medical Center Freiburg, Department of Neurology, [2] University Medical Center Freiburg, Department of Neuroradiology

20. Factor Analysis of the Data from the Mandarin Chinese BDAE

Lu C. [1], Wang C. [1], Lee S. [2], Chung Y. [2], Donkers N. [3]
[1] National Hsinchu University of Education, Taiwan, [2] The General Hospital of Veterans, Taipei, Taiwan, [3] VA Northern California Health Care System, Martinez, CA

21. Magnetoencephalography of Language: New Approaches to Understanding the Cortical Organization of Chinese Processing

Xinghu Z. [1], Zhonghua Y. [1], Zaizhu H. [2], Ning Z. [1], Hongyang C. [3], Yumei Z. [1]
[1] Department of Neurology of Beijing Tiantan Hospital, affiliated with Capital Medical University, China, [2] State Key Laboratory for Cognitive Neuroscience and Learning, Beijing Normal University, Beijing, China, [3] Department of Neuroimaging of Beijing Neurosurgery Institute, affiliated with Capital Medical University, China

Language in Context

22. A Multi-Level and Multi-Modal Framework for Analyzing Cantonese Aphasic Discourse Production: A Preliminary Proposal

Kong A. [1], *Law S.* [2], *Lee A.* [3]
[1] *University of Central Florida,* [2] *University of Hong Kong,* [3] *University College Cork*

23. Wisdom in Words: The Relationship between Language Production and the Perception of Wisdom

Gordon J.
Communication Sciences & Disorders, University of Iowa

24. Repetition as Pragmatic Function in Left and Right Hemisphere Damage

Wolf R. [1], *Sidtis D.* [2], *Sidtis J.* [1]
[1] *Nathan S. Kline Institute for Psychiatric Research,* [2] *New York University*

25. Impaired Theory of Mind and Irony Comprehension in Parkinson's Disease

Monetta L. [1], *Grindrod C.* [2], *Pell M.* [3]
[1] *Laval University, Centre de Recherche Robert Giffard, Québec, QC, CANADA.,* [2] *University of Illinois at Urbana-Champaign, Department of Speech & Hearing Science, Champaign, IL, USA,* [3] *McGill University, School of Communication Sciences & Disorders, Montréal, QC, CANADA.*

26. Techniques for Eliciting and Comparing Narratives Obtained Within Aphasia Community Groups

Georgiou A. [1], *Carozza L.* [2]
[1] *Nova Southeastern University,* [2] *St Johns University*

27. Communication Across Dementia Progression

Astell A. , Birch S.
University of St. Andrews

28. How the Brain Grasps Pragmatic Meaning Through a Metaphorical Lens: fMRI and ERP Evidence in Favour of the Extra-linguistic Hypothesis

Bambini V.
Scuola Normale Superiore, Laboratory of Linguistics

29. Dialogue Inference Performance of Bilingual Brain-Damaged Subjects

Lu C. [1], *Huang H.* [1], *Dronkers N.* [2]
[1] *National Hsinchu University of Education, Taiwan,* [2] *VA Northern California Health Care System, Martinez, CA*

Idioms and Formulaic Language

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30. Language Decline in Alzheimer's Disease: The Influence of Age of Onset

Bridges K. [1], *Sidits D.* [1], *Zeldin V.* [2]
[1] *New York University and Nathan Kline Institute,* [2] *New York University*

31. Script Generation in Mild and Moderate Alzheimer's Disease

Kojo P. [1], *Pekkala S.* [1], *Erkinjuntti T.* [2]
[1] *Department of Speech Sciences, University of Helsinki, Finland,* [2] *Department of Neurology, University of Helsinki, Helsinki, Finland*

33. Measuring Conversation Change in People with Agrammatic Aphasia

Beeke S. [1], *Cooper F.* [1], *Best W.* [1], *Edwards S.* [2], *Maxim J.* [1]
[1] *Division of Psychology and Language Sciences, University College London,* [2] *School of Psychology and Clinical Language Sciences, University of Reading*

34. The Effects of Neurological Damage on Formulaic Language

Sidtis D.
New York University

35. Formulaic Language in Alzheimer and Parkinson Speech

Rogers T. [1], *Sidtis D.* [1], *Sidtis J.* [2]
[1] *New York University Department of Communicative Sciences and Disorders, Nathan Kline Institute for Psychiatric Research,* [2] *Nathan Kline Institute for Psychiatric Research*

Morphology

36. Does Word Morphology Affect Vocabulary Knowledge and Word Retrieval in Old Age?

Yafe R. [1], Kavé G. [2]
[1] Department of Communication Disorders, Tel Aviv University, [2] Department of Education and Psychology, The Open University

37. Testing Cue-Cost and Cue-Validity Concepts on Inflectional Morphology-Error Pattern in a Kannada-Speaking Individual with Agrammatism

Karthikeyan S. [1], Datta H. [2], Karpur P. [3], Obler L. [2]
[1] First author, The Graduate Center, City University of New York, New York, [2] The Graduate Center, City University of New York, New York, [3] MV Shetty College, Mangalore, India

38. Compounds in Different Aphasia Categories: A Study on Confrontation Naming.

De Pellegrin S. [1], Battel I. [2], Garzon M. [2], Meneghello F. [2], Semenza C. [1]
[1] Department of Neuroscienze, Università di Padova, IRCCS Ospedale S. Camillo, Lido di Venezia, Italy, [2] IRCCS Ospedale S. Camillo, Lido di Venezia, Italy

39. The Mental Parsing of Italian Nominal Compounds: Evidence from Deep Dyslexia.

Marelli M. [1], Aggujaro S. [2], Molteni F. [2], Luzzatti C. [1]
[1] Department of Psychology, University of Milano-Bicocca, [2] Centro di riabilitazione Villa Beretta, Costa Masnaga (LC)

40. Morphological Therapy Protocol: New Therapy for Language Impairment after Stroke

Nault K. [1], Baayen H. [1], Libben G. [2]
[1] University of Alberta, [2] University of Alberta, University of Calgary

41. Novel Compound Processing in Broca's Aphasia

Bose A. [1], Borgwaldt S. [2]
[1] University of Windsor, Windsor, Canada, [2] University of Braunschweig, Braunschweig, Germany

Monday October 19

8:30am-10:00am

Platform Session 2: Semantics

42. The Influence of Phonological Competition on Lexical-Semantic Processing: Evidence from Aphasia

Olsen C. [1], Sweeney C. [1], Blumstein S. [1], Apfelbaum K. [2]
[1] Department of Cognitive and Linguistic Sciences, Brown University, [2] Department of Psychology, University of Iowa

43. Contrasting Effects of Near and Distant Semantic Neighbors on Picture Naming in Aphasia

Mirman D.
Moss Rehabilitation Research Institute

44. Direct Evidence for Two Distinct Anatomical Circuits for Lexical-Conceptual Categories

Papagno C. [1], Gallucci M. [1], Caramazza A. [2], Casarotti A. [1], Bello L. [3]
[1] Department of Psychology, University of Milano-Bicocca, [2] CIMeC – Center for Mind/Brains Sciences, University of Trento, [3] Department of Neurological Science, University of Milano

10:00am-12:00pm

Poster Session 2

Memory

45. Treating Phonological Short-Term Memory Impairments with Computer-Assisted Treatment: Results from Seven Cases.

Di Pietro M. [1], Schneider L. [2], Schnider A. [3]
[1] Neurorehabilitation Service, University Hospital Geneva and University of Geneva, Switzerland, [2] Neuropsychology and Neurorehabilitation Service, Centre Hospitalier Universitaire Vaudois and University of Lausanne, Switzerland, [3] Neurorehabilitation Service, University Hospital Geneva, Switzerland

46. Using Item Response Theory to Examine the Effects of Short-Term Memory Demands on Minimal Pair Discrimination

Hula W. [1], Kalinyak-Fliszar M. [2], Martin N. [2]
[1] VA Pittsburgh Healthcare System, [2] Temple University

47. Metamemory, Phonological Memory and Word Relearning in People with Aphasia: A Preliminary Investigation

Ramachandra V. , Jones J. , Flanagan K. , Bollinger N. , Reilly M.
Marywood University

48. Effects of Memory Load and Typicality of Semantic Category on Semantic Processing in Aphasia

Kamen R. , Martin N. , Kohen F. , Kalinyak-Fliszar M.
Temple University

49. Analysis of Sentence Repetition in Aphasia (part 1): System for Coding Responses

Gruberg N. , Martin N. , Afman R.
Temple University

50. Analysis of Sentence Repetition in Aphasia (part 2): Semantic Influence on Position and Type of Errors

Martin N. , Gruberg N.
Temple University

51. The Independence of STM Deficits and the Shifting Component of Executive Function

Allen C. , Martin R.
Rice University

Written Production

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52. Patterns of Breakdown in Spelling in Primary Progressive Aphasia

Sepelyak K. , Molitoris J. , Crinion J. , Epstein-Peterson Z. , Bann M. , Hillis A.
Johns Hopkins University School of Medicine

53. Accessing allographic representation of letters but not their graphemic identity

Volpato C. [1], Meneghello F. [1], Piron L. [1], Semenza C. [2]
[1] IRCCS San Camillo, Venice, Italy, [2] 1) IRCCS San Camillo, Venice, Italy; 2) University of Padua, Italy

54. Processing of Compound Nouns in Deep Dysgraphia: Limitations to Orthographic Autonomy

Bormann T. [1], Seyboth M. [2], Grund C. [2], Blanken G. [2]
[1] Department of Neurology & Freiburg Brain Imaging, University Medical Center Freiburg, [2] Erfurt University, Psycholinguistics

55. Visuospatial Agraphia: A Case Report

Krishnan G. , Tiwari S.
Manipal University

56. Retention of Music Notation "Spelling" in a Semantic Dementia Patient

Koenig P. [1], Koenig A. [2], Weinstein J. [1], Gunawardena D. [1], Grossman M. [1]
[1] Neurology Dept., University of Pennsylvania, [2] Gillette, NJ

57. Cross-Language Treatment Generalisation in Welsh-English Bilingual Dysgraphia

Roberts J. , Tainturier M.
School of Psychology, Bangor University, Wales

Phonology, Phonetics and Acoustics-1

58. Perceptual Discrimination of Shona Lexical Tones and Hums by Left and Right Hemisphere Damaged Patients

McLoddy K. [1], De Bleser R. [1], Mayer J. [2]
[1] University of Potsdam, [2] University of Stuttgart

59. The Treatment Effects of Phonological Complexity on Apraxia of Speech: An Implicit Alternative

Davis C. [1], Farias D. [1], Baynes K. [2], Wittmann R. [3]
[1] University of California, Davis, Medical Center, [2] Department of Neurology, University of California, Davis, [3] California State University, Sacramento

60. Acoustic Analysis of Prosody for Normal and Aphasic Discourse of Cantonese Speakers

Lee A. [1], Kong A. [2], Law S. [3]
[1] University College Cork, [2] University of Central Florida, [3] University of Hong Kong

61. The development of a Standardized Assessment of Phonology in Aphasia.

Kendall D. [1], Del Toro C. [2], Nadeau S. [3], Rosenbek J. [2], Johnson J. [2], Velozo C. [2]
[1] University of Washington, [2] University of Florida, [3] University of Florida and VA Medical Center

62. White Matter Fiber Tracts for Phonological Processing

Kellmeyer P. [1], Saur D. [2], Peschke C. [3], Kappes J. [4], Ziegler W. [4], Baumgärtner A. [5]
[1] Department of Neurology, University Medical Center Freiburg, Germany, [2] Department of Neurology, University Medical Center Freiburg, [3] Department of Systems Neuroscience, University Medical Center Hamburg-Eppendorf, Germany, [4] Clinical Neurophysiology Group, Hospital Munich-Bogenhausen, Germany, [5] Department of Health Sciences, University of Applied Sciences Fresenius, Hamburg, Germany

63. Tomato to Baritood: The Source of Non-Words in Jargon Aphasia

Sampson M. , Faroqi-Shah Y.
University of Maryland-College Park

64. Phonemic Errors in Conduction Aphasia: Vowels versus Consonants.

Mori I. [1], Pignatti R. [1], Scaltritti M. [1], Ceriani F. [1], Luzzatti C. [2], Semenza C. [3]
[1] Istituto Auxologico Italiano, Verbania, Italy, [2] Department of Psychology, University of Milano Bicocca, Italy, [3] Department of Neuroscience, University of Padova; IRCCS San Camillo, Lido di Venezia, Italy

65. Lesion Sites in Acquired Neurogenic Stuttering: Implications for Neural Models of Fluent Speech

Balasubramanian V. [1], Max L. [2]
[1] Seton Hall University, New Jersey, [2] University of Washington, Seattle, Washington

66. The Phonetic Echoes of Deficits to Lexical Access

Goldrick M.
Department of Linguistics, Northwestern University

Noun and Verb Processing

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67. Naming Proper Nouns from Sound and Vision: Analysing the Role of the Temporal Lobe with fMRI

Bethmann A. , Scheich H. , Brechmann A.
Leibniz Institute for Neurobiology, Magdeburg, Germany

68. Verb Retrieval and the Influence (or not) of Verb Argument

Van Ewijk L. [1], Edwards S. [2]
[1] University of Utrecht, Netherlands., [2] University of Reading, UK

69. Do Noun and Verb Processing Really Recruit Spatially-Segregated Neural Circuits?

Crepaldi D. [1], Berlingeri M. [1], Cattinelli I. [2], Borghese A. [2], Paulesu E. [1], Luzzatti C. [1]
[1] Department of Psychology, University of Milano-Bicocca, [2] Department of Computer Science, University of Milan

70. Verb Retrieval and Inflection in Aphasia: Insights from Different Verb Classes in Greek

Koukoulioti V. , Stavrakaki S.
Aristotle University of Thessaloniki

71. Improved Action Naming in a Severe, Nonfluent Aphasia Patient following Transcranial Magnetic Stimulation plus Constraint-Induced Language Therapy

Naeser M. , Martin P. , Treglia E. , Ho M. , Baker E. , Kaplan E.
Harold Goodglass Boston University Aphasia Research Center, Department of Neurology, Boston University School of Medicine and the Veterans Affairs Boston Healthcare System

72. fMRI Study with Error Analysis of Overt Action Naming by People with Chronic Aphasia

Postman-Caucheteux W. [1], Meltzer J. [2]
[1] Temple University, [2] NIDCD/NIH

73. Electrophysiological Correlates of Nouns and Verbs: Effects of Task and Stimulus Characteristics

Druks J. [1], Monjauze C. [2], Tuomainen J. [3]
[1] UCL Research Department of Linguistics, University College London, UK, [2] Institute of Child Health, University College London, UK, [3] UCL Reseach Department of Speech Hearing and Phonetics, University College London, UK

74. Differential Effect of Constraint-Induced Aphasia Therapy on Noun Related/Non-Noun Related Verb Production.

Park Y. [1], Goral M. [2], Kristen M. [1], Daniel D. [3]
[1] Speech-Language-Hearing Sciences, The Graduate Center, The City University of New York, [2] Speech-Language-Hearing Sciences, Lehman College, The City University of New York, [3] Communication Sciences and Disorders, Emerson College

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Reading

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75. Semantic Paralexias: Incidence and Underlying Linguistic Deficits in 343 Consecutive Italian-speaking Aphasics

Miceli G. [1], Ciaghi M. [2], Pancheri E. [2]
[1] Center for Neurocognitive Rehabilitation, Center for Mind/Brain Studies, University of Trento (speaker), [2] Center for Neurocognitive Rehabilitation, Center for Mind/Brain Studies, University of Trento

76. Word Stress Assignment in Surface Dyslexia: A Case Study in Slovenian

Makovac E. [1], Semenza C. [2]
[1] University of Trieste, Department of Psychology, [2] University of Padova, Department of Neuroscience

77. Neural Response to Word and Pseudoword Reading after a Left Fusiform Gyrus Resection: An fMRI Investigation

Tsapkini K. , Rapp B.
Johns Hopkins University, Dept of Cognitive Science

78. Reading Compounds in Neglect Dyslexia

Semenza C. [1], Arcara G. [2], Facchini S. [2], Meneghello F. [3], Ferraro M. [4], Passarini L. [5]
[1] Department of Neuroscience, University of Padova, Italy, [2] Department of General Psychology, University of Padova, Italy, [3] I.R.C.C.S. Ospedale S.Camillo, Lido di Venezia, Italy, [4] Azienda Ospedaliera di Padova, Italy, [5] R.C.C.S. Ospedale S.Camillo, Lido di Venezia, Italy

79. Are Reading Strategies in Aphasia Reflected by Eye Movements?

Schattka K. [1], Ablinger I. [1], Radach R. [2], Huber W. [1]
[1] Section Neurolinguistics, Departement of Neurology, RWTH Aachen University, [2] Departement of Psychology, Florida State University, Tallahasee, USA

12:00-2:00pm

Academy Luncheon

Speaker: Marc Hauser

Professor of Psychology, Organismic & Evolutionary Biology and Biological Anthropology, Harvard University

"Evolving the Central Components of the Language Faculty"

2:00pm-4:00pm

Platform Session 3: Sentences and Sequences

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80. Different Mechanisms for Role Assignment for Functional and Lexical Categories

Miozzo M. [1], Sanchez C. [2], Rapp B. [2]
[1] University of Cambridge, Johns Hopkins University, [2] Johns Hopkins University

81. The Role of Phonological Working Memory in Sentence Comprehension: The Interaction Between Type of Processing and Output and Input Buffer Deficits

Gvion A. [1], Friedmann N. [2]
[1] Ono Academic College, Reuth Medical Center, Israel, [2] Tel-Aviv University, Israel

82. Position Representation in Spelling and Verbal Working Memory

Fischer-Baum S. [1], McCloskey M. [1], Jones A. [2], Folk J. [2], Rapp B. [1]
[1] Johns Hopkins University, [2] Kent State University

83. Selection for Position: The Role of Left Inferior Frontal Gyrus (LIFG) in Sequencing Nouns

Thothathiri M. [1], Schwartz M. [2], Thompson-Schill S. [3]
[1] Moss Rehabilitation Research Institute & University of Pennsylvania, [2] Moss Rehabilitation Research Institute, [3] University of Pennsylvania

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4:00-6:00pm

Poster Session 3

Syntactic Representations and Processes-1

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84. Errors Patterns in Sentence Comprehension Among Malay Adults with Aphasia: A Case Series Study

A Razak R. , A Aziz M. , Hassan M.
Department of Audiology and Speech Sciences, Faculty of Allied Health Sciences, Universiti Kebangsaan Malaysia, Kuala Lumpur

85. The Production and Comprehension of Grammatical Time Reference in Agrammatic Aphasia: A Cross Linguistic Study

Bastiaanse R. [1], Bamyaci E. [2], Hsu C. [2], Lee J. [3], Yarbay Duman T. [1], Thompson C. [3]
[1] University of Groningen, The Netherlands, [2] European Master's in Clinical Linguistics (EMCL), [3] Northwestern University, USA

86. Treating Specific Verbs May Impede Generalization in Non-fluent Aphasia

Kempler D. [1], Goral M. [2]
[1] Emerson College, [2] Lehman College, CUNY

87. Neural Correlates of Functional Category Learning and Recovery: An fMRI Study of Verb Inflection Production

Kielar A. [1], Fix S. [1], Bonakdarpour B. [1], Parrish T. [2], Thompson C. [3]
[1] Northwestern University, Aphasia and Neurolinguistics Research Laboratory, [2] Northwestern University, Department of Radiology, [3] Northwestern University, Aphasia and Neurolinguistics Research Laboratory, Department of Neurology

88. Constrained Sentence Production in Semantic Dementia

Graham N. [1], Rochon E. [1], Tang-Wai D. [2], Black S. [3]
[1] Department of Speech-Language Pathology, University of Toronto, [2] Department of Medicine, University of Toronto, [3] L.C. Campbell Cognitive Neurology Research Unit, Sunnybrook Health Sciences Centre, Toronto

89. Chance in Agrammatic Sentence Comprehension – What Does It Really Mean? Evidence from Eye Movements of German Agrammatic Aphasics

Hanne S. [1], Sekerina I. [2], Vasishth S. [1], Burchert F. [1], De Bleser R. [1]
[1] Linguistics Department, University of Potsdam, Potsdam, Germany, [2] Psychology Department, College of Staten Island, City University of New York, New York, USA

90. Rehabilitation of a Pruned Syntactic Tree of an Italian Aphasic Patient

Pivi M. [1], Garzon M. [2], Cardinaletti A. [1], Meneghello F. [3], Chinellato P. [1], Semenza C. [4]
[1] Ca' Foscari University, Venice, [2] IRCCS San Camillo Hospital - Neurorehabilitation Department, Venice, [3] IRCSS San Camillo Hospital - Neurorehabilitation Department, Venice, [4] Neuroscience Department, University of Padua

91. Comprehension of Passive Sentences in a Bilingual Aphasic Speaker: Strategies Across the Language

Venkatesh M. , Edwards S. , Saddy D.
University of Reading,UK

92. Word and Sentence Production after Destruction of Broca and Wernicke Regions

Shankweiler D. [1], Conway Palumbo L. [1], Fulbright R. [1], Mencl W. [1], Van Dyke J. [1], Kollia B. [1], Thornton R. [1], Crain S. [2], Harris, K.S. [1]
[1] Haskins Laboratories, [2] Macquarie University

93. Predicting Outcomes for Linguistically-specific Sentence Treatment Protocols

Dickey M. , Yoo H.
University of Pittsburgh

94. The assignment of gender in Greek: Evidence from aphasic and unimpaired adults.

Nerantzini M. [1], Papadopoulou D. [2], Varlokosta S. [1]
[1] University of Athens, [2] Aristotle University of Thessaloniki

95. Grammatical Gender Information: Where is it Stored and When is it Accessed?

Biran M. [1], *Friedmann N.* [2]
[1] *Tel Aviv University, Haifa University, Loewenstein Rehabilitation Center,* [2] *Tel Aviv University*

96. Performance of Agrammatic and Non-aphasic Persons in Face-to-Face- versus Computer-Mediated Communication

Springer L.
School of Logopedics, University Hospital Aachen, Germany

97. On Applying the Relational and Accessibility Hierarchy to Oral Sentence Production of Aphasic Clients

Stark J. , Pons C. , Fonyad G.
Department of Linguistics, Austrian Academy of Sciences

98. Verb-Form Regularity Facilitates Copula Verb Production in Spanish Agrammatism

O'Connor Wells B. [1], *Obler L.* [1], *Goral M.* [2]
[1] *CUNY Graduate Center- 365 Fifth Avenue, New York, NY 10016, USA,* [2] *Lehman College- 250 Bedford Park Blvd., Bronx, NY 10468, USA*

99. Double Dissociation between Tense and Agreement in an Arabic-Speaking Fluent Agrammatic Patient

Al-Kaabi M. [1], *Idrissi A.* [2], *Béland R.* [3]
[1] *New York University / United Arab Emirates University,* [2] *United Arab Emirates University,* [3] *Université de Montréal*

Phonology, Phonetics and Acoustics-2

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100. Influence of Word Stress in Patients with Apraxia of Speech

Aichert I. , Ziegler W.
Clinical Neuropsychology Research Group, Munich

101. Phrase-Level Reduction in Apraxia of Speech

Staiger A. , Ziegler W.
EKN – Clinical Neuropsychology Research Group, Munich

102. Bilingual Advantage in Lateralized Attention: Evidence from a Dichotic Listening Task

Soveri A. [1], Laine M. [1], Hämäläinen H. [2], Hugdahl K. [3]
[1] Department of Psychology, Åbo Akademi University, Finland, [2] Centre for Cognitive Neuroscience, Department of Psychology, University of Turku, Finland, [3] Department of Biological and Medical Psychology, University of Bergen, Norway

103. The Neural Bases of Phonological Competition: Evidence from Aphasia

Sweeney C. [1], Blumstein S. [1], Apfelbaum K. [2]
[1] Department of Cognitive and Linguistic Sciences, Brown University, [2] Department of Psychology, University of Iowa

104. Lexical and Post-Lexical Deficits in Bilingual Anomia

Munarriz A. , Ezeizabarrena M.
University of the Basque Country

105. On the Role of Rapid Temporal Processing in Pure Word Deafness

Martin R. [1], Slevc L. [1], Hamilton A. [1], Joanisse M. [2]
[1] Rice University, [2] University of Western Ontario

106. Acoustic and Linguistic Influences on Auditory Extinction

Wolmetz M. , Rapp B.
Johns Hopkins University, Department of Cognitive Science

107. Neuro-Cognitive Processing of Pitch and Speech Rate Cues to Emotion: Evidence from Brain-Damaged Patients

Dara C. , Pell M.
School of Communication Sciences & Disorders, McGill University

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Lexical Access

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108. Neural Correlates of Improved Picture Naming in Aphasia

Abel S. [1], Dressel K. [1], Saur D. [2], Weiller C. [2], Huber W. [1]
[1] Neurolinguistics at the Department of Neurology, Medical Faculty, RWTH Aachen, [2] Department of Neurology, University Medical Center Freiburg

109. Contrasting Word Retrieval Treatments for Semantic Anomia

Raymer A. , Graham K. , Azevedo Z. , McHose B.
Old Dominion University

110. Double Dissociation of Word and Number Processing in Auditory and Written Modalities: A Case Study

Han Z. [1], Shao A. [1], Zhang Y. [2], Bi Y. [1]
[1] State Key Laboratory of Cognitive Neuroscience and Learning, Beijing Normal University, [2] Department of Neurology, Tiantan Hospital, China

111. Re-Assessment of Semantic Control Deficits in Stroke Patients using Blocked-Cyclic Naming and Comprehension Tasks

Bi Y. [1], Feng T. [1], Wei T. [1], Lin N. [1], Tatiana S. [2], Martin R. [2]
[1] State Key Laboratory of Cognitive Neuroscience and Learning, Beijing Normal University, [2] Rice University

112. Phonological Impairment as a Decay-Based Impairment: New Evidence from a Single Case Study

Martinez Perez T. [1], Majerus S. [2], Van der Kaa M. [3], Boniver C. [2], Poncelet M. [2]
[1] Belgian National Fund for Scientific Research (FNRS), Department of Cognitive Sciences, University of Liège, Belgium, [2] Department of Cognitive Sciences, University of Liège, Belgium, [3] Neuropsychological Rehabilitation Unit, University Hospital of Liège, Belgium

113. Longitudinal Naming Performance in a Bilingual Patient with Primary Progressive Aphasia

Friedman R. [1], Carney A. [1], Snider S. [1], Eckmann C. [2], Ullrich L. [1], Lott S. [1]
[1] Georgetown University, [2] Språk- og informasjonstjenester

114. ERP Correlates of New Word Learning in Two Aphasic Patients

Camen C. [1], Morand S. [2], Laganaro M. [3]
[1] University Hospital & University of Geneva, Switzerland, [2] Department of Psychology, University of Glasgow, UK, [3] University of Neuchâtel, Switzerland

115. Lexical Competition Effects in Nonfluent Aphasia: Converging Evidence from Three Different Tasks.

Wilshire C. [1], Bareham C. [1], Scott R. [2]
[1] Victoria University of Wellington, New Zealand, [2] Monash University, Victoria, Australia

116. The Functional Locus of Word-finding Difficulties in Alzheimer's Disease: Insights from the Picture-word Interference Task.

Keall L. [1], Wilshire C. [2], Savage G. [3], Lowndes G. [1]
[1] Monash University, Victoria, Australia, [2] Victoria University of Wellington, New Zealand, [3] Macquarie University, New South Wales, Australia

117. Impaired Number Word Production: A Bilingual Chinese-English Case Study

Bencini G.[1] , Eng N.[1], Semenza C.[2]
[1]Hunter College, City University of New York, [2] University of Padova, Department of Neuroscience

118. Aged-Related Changes in Neurofunctional Networks for Verbal Fluency as a Function of Production Time

Marsolais Y. [1], Perlbarg V. [2], Benali H. [2], Joanette Y. [1]
[1] Centre de recherche, Institut universitaire de gériatrie de Montréal, Québec, Canada/ Département de psychologie, Université de Montréal, Québec, Canada, [2] UMR-S 678, INSERM/UPMC, Faculté de médecine Pitié-Salpêtrière, Paris, France /5LINeM INSERM/UPMC/Université de Montréal

Tuesday October 20

8:30am-11:00am

Symposium 2: Lexical Retrieval and Aging: Implications for Aphasia

119. Lexical Retrieval and Aging: Implications for Aphasia

Obler L. [1], Goral M. [2], Rogalski Y. [3], Kavé G. [4], Neumann Y. [5], Crosson B. [3]
[1] The Graduate School and University Center, The City University of New York, [2] Lehman College and The Graduate School and University Center, The City University of New York, [3] University of Florida, [4] The Open University, Israel, [5] Queens College, City University of New York

120. Effects of Surface Detail and Environmental Context on Lexical Access in Visual Confrontation Naming in Aging

Rogalski Y. [1], Biun D. [1], Altmann L. [2], Rothi L. [3], Reilly J. [4]
[1] Department of Communicative Disorders, University of Florida, [2] Department of Communication Sciences and Disorders, University of Florida, [3] Brain Rehabilitation Research Center, VA Medical Center; Department of Neurology, University of Florida, [4] Departments of Communicative Disorders and Psychology, University of Florida

121. Frequency and Concreteness Effects in Spontaneous Noun Production

Kavé G.
Department of Education and Psychology, The Open University, Israel

122. Early Phonological Problems for Lexical Retrieval in the Elderly

Neumann Y. [1], Obler L. [2], Gomes H. [3], Shafer V. [2]
[1] Queens College, City University of New York (CUNY), [2] The Graduate Center, CUNY, [3] City College, CUNY

123. HAROLD and Lexical Retrieval: What is the Role of the Right Frontal Lobe?

Crosson B. [1], Wierenga C. [2], Meinzer M. [3], McGregor K. [1], Benjamin M. [3], Cohen M. [3]
[1] VA Brain Rehabilitation Research Center and University of Florida, [2] University of California, San Diego, [3] University of Florida

11am-1pm

Poster Session 4

Laterality

124. A Dissociation of Laterality for Language Production and Comprehension in a Subcortical Aphasic Patient, Assessed with MEG and fMRI.

Meltzer J. , Braun A.
NIDCD, NIH

125. Automatic Activation of Affective Words in the Cerebral Hemispheres

Abbassi E. , Joanette Y.
l'Institut universitaire de gériatrie de Montréal & Faculté de médecine, Université de Montréal

126. The Lateralization of Math and Language: Agraphia and Acalculia in a Left-handed Patient with a Right Hemisphere Lesion.

Chiarelli V. [1], Menichelli A. [2], Zadini A. [2], Semenza C. [3]
[1] Department of Neuroscience, University of Padova, Italy; S.C. Medicina Riabilitativa, Ospedali Riuniti di Trieste, Italy, [2] S.C. Medicina Riabilitativa, Ospedali Riuniti di Trieste, Italy, [3] Department of Neuroscience, University of Padova, Italy

127. Hemispheric Roles in Perception and Production of Famous Proper Nouns

Yang S. [1], Sidtis D. [1], Sidtis J. [2]
[1] Department of Communicative Sciences and Disorders, New York University & Nathan S. Kline Institute for Psychiatric Research, [2] Nathan S. Kline Institute for Psychiatric Research & Department of Psychiatry, New York University Medical School

128. A Dual Task Investigation of Hemispheric Semantic Processing Following RH Release from Inhibition in Participants with LH Lesions.

Smith E. [1], Copland D. [2], Angwin A. [1], Chenery H. [3]
[1]The University of Queensland School of Health and Rehabilitation Sciences, [2]The University of Queensland Centre for Clinical Research, & The University of Queensland, School of Health and Rehabilitation Sciences, [3]The University of Queensland, Faculty of Health Sciences

Treatment Methods and Impacts

129. A Language Teacher in the Labyrinth of Aphasia: A Kurdish-Persian Case

Ghafar Samar R. , Akbari M.
English Language Teaching Dept; Faculty of Humanities; Tarbiat Modares University

130. Factors Underlying Successful Use of a Computer-assisted Alternative Communication Program by People with Severe Aphasia

Nicholas M. [1], Page Sinotte M. [2], Helm-Estabrooks N. [3]
[1] MGH Institute of Health Professions, [2] University of Connecticut, [3] Western Carolina University

131. Treatment Induced Language Recovery in Chronic Aphasia: The Role of Non-domain Specific Brain Areas

Meinzer M. [1], Menke R. [2], Mohammadi S. [3], Floel A. [3], Deppe M. [3], Breitenstein C. [3]
[1] University of Florida, [2] Oxford University, [3] University of Münster

132. Functional Reorganization after Constraint-Induced Language Therapy in a Case of Wernicke's Aphasia

Kurland J. , Baldwin K. , Tauer C.
University of Massachusetts Amherst

133. Photography as a Means of Expression: Performance as Related to Aphasia Severity and Nonverbal Cognitive Status

Helm-Estabrooks N. [1], Roe D. [2], Whiteside J. [3], Queen J. [2], Drew R. [1]
[1] Western Carolina University, [2] Rollins College, [3] Central Florida University

134. Comprehension, Maintenance, and Generalization after Treatment for Anomia in Semantic Dementia

Jokel R. , Anderson N.
Baycrest-KLARU, University of Toronto

135. Issues in the Management of Subjects with Aphasia in India: A Survey

Tiwari S. , Krishnan G.
Manipal University

136. Functional Impact of CILT in Early Aphasia Rehabilitation: A Case Study

Kirmess M. [1], Maher L. [2]
[1] Departement of Special Needs Education, University of Oslo, [2] Department of Communication Sciences and Disorders, University of Houston

137. Adaptive Interaction: Communicating with People with Very Advanced Dementia Using Imitation

Ellis M. , Astell A.
University of St. Andrews

138. Effects of Intensive Aphasia Therapy on the N400: Evidence from Chronic Aphasics

Newman A. [1], O'Rourke H. [2], Wozniak L. [3], Kosotpoulos E. [3], D'Arcy R. [4], Marchand Y. [4]
[1] Departments of Psychology, Psychiatry, & Surgery, Institute of Neuroscience, Dalhousie University, [2] Department of Psychology, Dalhousie University, [3] School of Human Communication Disorders, Dalhousie University, [4] National Research Council Insititute for Biodiagnostics (Atlantic)

139. Investigating Speech as a Source of Biomarkers for Changes in Cognition, Executive Function and Mood

Pénard N. , Counihan S. , D'Arcy S. , Rapcan V. , Reilly R. , Robertson I.
Trinity College Dublin

Syntactic Representations and Processes-2

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140. Syntactic and Memory-Based Effects in Aphasic Agreement

Slevc L. , Banneyer K. , Martin R.
Rice University

141. Neural Correlates of Storage and Computational Costs in Sentence Comprehension

Woodbury R. [1], Caplan D. [2]
[1] Neuropsychology Lab, Neurology, MGH; Speech and Hearing Sciences, MIT, [2] Neuropsychology Lab, Neurology, MGH

142. Treating Written Verb and Written Sentence Production in an Individual with Aphasia: A Clinical Study

Salis C. , Edwards S.
University of Reading

143. Neuroplasticity and Recovery from Aphasia: Treatment-Induced Recovery of Verbs and Sentence Production

Riley E. , Den Ouden D. , Lukic S. , Thompson C.
Northwestern University

144. Neural Basis of On-Line Processing of Words and Sentences in Aphasia Revealed by Voxel-Based Lesion-Symptom Mapping

Schneider L. [1], Spierer L. [1], Grosjean F. [2], Clarke S. [1]
[1] Neuropsychology and Neurorehabilitation Service, Centre Hospitalier Universitaire Vaudois, Lausanne, Switzerland, [2] Language and Speech Processing Laboratory, University of Neuchâtel, Switzerland

145. Structurally Primed Passive Sentence Production in Agrammatic Aphasia: An Eyetracking Study

Cho S. , Thompson C.
Northwestern University

146. The Effects of Distance on Reading Sentence Processing in Persons with Aphasia and Normal Individuals.

Sung J. , McNeil M. , Dickey M.
University of Pittsburgh

147. The Role of the Left Inferior Frontal Gyrus in Sentence Composition: Connecting fMRI and Lesion-Based Evidence

Piñango M. , Finn E. , Lacadie C. , Constable T.
Yale University

Conceptual and Semantic Processing

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148. Abstract and Concrete Noun Processing in Healthy Older Adults using fMRI

Sandberg C. , Kiran S.
Boston University Sargent College

149. Syntactic Structural Recursion or 'Theory of Mind' Type Embeddings in Aphasia

Bánréti Z. [1], Zsitvai M. [2]
[1] Research Institute for Linguistics of the Hungarian Academy of Sciences, Budapest, Hungary, [2] Technical University, Budapest, Hungary

150. Probing Semantic Memory with a Computerized Sorting Task

Kar J. [1], Den Hollander J. [2], Clark D. [3]
[1] University of Alabama at Birmingham, [2] University of Alabama at BIrmingham Department of Medicine, [3] Birmingham VA Medical Center & University of Alabama at Birmingham Department of Neurology

151. Lexical vs. Compositional Semantics: Syntax and Quantifier Scope in Aging and Semantic Dementia

Clark D. [1], Kar J. [2]
[1] Birmingham VA Medical Center and University of Alabama at Birmingham, [2] University of Alabama at Birmingham

152. Nicotinic Modulation of Strategy-Based Semantic Priming in PD

Holmes A. [1], Copland D. [1], Silburn P. [2], Chenery H. [3]
[1] University of Queensland Centre for Clinical Research, & University of Queensland, School of Health and Rehabilitation Sciences, [2] University of Queensland Centre for Clinical Research, St Andrew's War Memorial Hospital, & The Welsey Hospital, [3] University of Queensland, School of Health and Rehabilitation Sciences

153. Processing the same action-related stimuli in verbal and nonverbal tasks: evidence for dissociable modality-dependent representations in aphasics

Papeo L. , Mengotti P. , Negri G. , Rumiati R.
International School for Advanced Studies - SISSA, Trieste

154. Mapping Language and Action in the Brain: Evidence from Aphasia and Apraxia.

Mengotti P. [1], Negri G. [1], Corradi-Dell'Acqua C. [1], Trincia E. [2], Zadini A. [3], Rumiati R. [1]
[1] SISSA, Trieste, Italy, [2] U.C.O. di Radiologia, Università degli Studi di Trieste, Italy, [3] S.C. Medicina Riabilitativa, Ospedali Riuniti di Trieste, Italy

155. Do Abstract and Concrete Concepts Have Different Representational Frameworks? Further Evidence from Another Case of Refractory Semantic Access Disorder.

Hamilton A., Schnur T., Martin, R.
Rice University

156. Shared Feature and Associative Semantic Errors in Aphasic Word Production

Nickels L. [1], Best W. [2], Williamson L. [2], Etzien M. [3], Burmester J. [3]
[1] Macquarie Centre for Cognitive Science (MACCS), Macquarie University, Sydney, [2] University College London, [3] Potsdam University, Germany & Macquarie University, Sydney

157. Neural Correlates of Semantic Feature Analysis in Chronic Aphasia: Brain Plasticity Mechanisms Induced by Therapy Influenced by Pre-existing Networks.

Marcotte K. [1], Damien B. [2], De Préaumont M. [2], Généreux S. [2], Hubert M. [2], Ansaldo A. [1]
[1] CRIUGM, [2] IUGM

158. Profound Jargon Aphasia with Preserved Semantic and Gestural Processing: A Case Study.

Kohen F. , Martin N.
Temple University

2:00pm-4:00pm

Platform Session 4: Neural Bases of Language

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159. Lesion Localization of Chronic Aphasia Syndromes

Dronkers N. [1], Baldo J. [2], Ogar J. [3], Wilkins D. [3], Ludy C. [3], Arevalo A. [3], Knight R. [4]
[1] VA Northern California Health Care System/UC Davis/UC San Diego, [2] VA Northern California Health Care System, [3] VA Northern California Health Care System/UC Davis, [4] UC Berkeley

160. Areas of Ischemia Associated with Semantic vs. Phonological Errors in Auditory Comprehension

Pitz E. [1], Rogalsky C. [2], Pawlak M. [3], Hickok G. [4], Hillis A. [1]
[1] Johns Hopkins U School of Medicine, [2] University of Southern California, [3] University of Pennsylvania, [4] University of California Irvine

161. Anatomical Correlates of Spelling Errors in Primary Progressive Aphasia

Crinion J. [1], Sepelyak K. [2], Molitaris J. [2], Epstein-Peterson Z. [2], Leigh R. [2], Davis C. [2], Hillis A. [2]
[1] UCL, London, [2] Johns Hopkins, USA

162. Anterior Temporal Involvement in Semantic Word Retrieval: VLSM Evidence from Aphasia

Schwartz M. [1], Kimberg D. [2], Walker G. [1], Faseyitan O. [2], Brecher A. [1], Dell G. [3], Coslett H. [2,1]
[1] Moss Rehabilitation Research Institute, [2] Department of Neurology, University of Pennsylvania, [3] University of Illinois, Urbana-Champaign

Platform Session 1: Speech Production

1. Voxel-based Lesion Analysis of Phonological, Lexical, and Syntactic Production Deficits in Post-stroke Aphasia

Faroqi-Shah Y. [1], Kling T. [2], Solomon J. [3], Archibald J. [4], Park G. [4], Braun A. [4]
[1] Dept. of Hearing and Speech Sciences, University of Maryland, [2] John Hopkins University Hospital, [3] Medical Numerics, [4] National Institutes of Health

Individuals with aphasia vary in the extent to which lexical, phonological, and syntactic impairments underlie their language production difficulties. Most aphasic individuals have a combination of these impairments that cannot be always predicted from their aphasia classification. The present study investigated the lesion correlates of lexical, phonological and syntactic production deficits and examined the findings in the context of current understanding of functional roles attributed to these perisylvian regions (Hagoort, 2005).

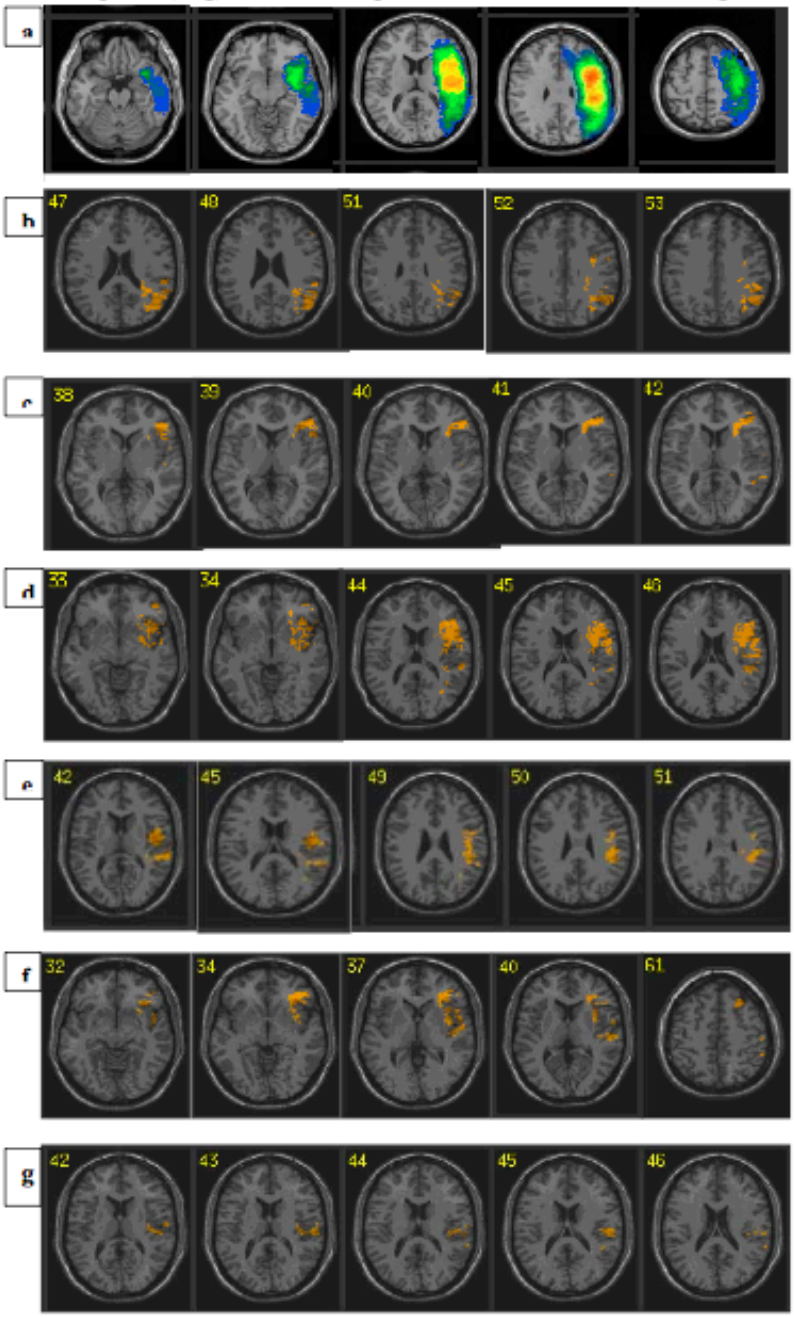
Methods
Thirty-one pre-morbidly right-handed aphasic individuals with a single left hemisphere ischemic lesion participated in extensive psycholinguistically-motivated language testing. Picture naming, nonword repetition, and sentence elicitation (simple and complex sentences) scores were used as measures of lexical, phonological, and syntactic production respectively. T1 weighted magnetic resonance images (MRI) were obtained using a GE 1.5 Tesla MRI scanner. Spatial normalization, anatomical labeling of brain regions, and statistical operations were conducted using ABLe 2.3 (Solomon, et al., 2007). T-maps illustrating significant voxel-wise relationships between language deficits and the presence or absence of a lesion were generated . Boolean operations were used to create lesion maps unique to (lexical, phonological, syntactic only), and common across various production measures [lexical and phonological and syntactic]; [lexical and phonological not syntactic]; [lexical and syntactic not phonological]; [phonological and syntactic not lexical).

Results and Discussion
Figure 1 shows the extent of lesions across all participants and representative lesion maps for each comparison. Purely lexical deficits were associated with temporo-parietal lesions (middle temporal gyrus, and posterior planum temporale (PT) extending into the inferior parietal lobule (IPL), and postcentral gyri). Lesions in a restricted portion of the inferior frontal gyrus (IFG, BA 45, 44/6) and rolandic operculum produced phonological deficits. Syntactic deficits were associated with large lesions of the IFG (BA44/45/47), anterior superior temporal gyrus (STG), putamnen and anterior insula. Lesions contributing to concurrent syntactic and phonological deficits included IFG, MFG, anterior STG, and anterior insula. Lesions of the superior temporal sulcus, IPL, posterior IFG, and posterior insula resulted in syntactic with lexical deficits. No significant lesions were identified for lexical and phonological deficits combined. Lesions common to all three production deficits included the posterior PT, contiguous insula, and IPL.
Overall, syntactic and phonological deficits were associated with left anterior perisylvian lesions, while lexical deficits were associated with posterior perisylvian lesions. Interestingly, the insula and PT showed a distribution of lesions consistent with this anterior (syntax, phonology)-posterior (lexical) perisylvian trend. The lesion maps are consistent with recent neuroimaging studies of language production, and support the notion that unification operations (syntax and phonology) are mediated by the IFG while retrieval of stored information (lexical-semantic and syntactic rules) is a function of temporo-parietal structures (Hagoort, 2005). However, our lesion data indicate that functional networks for unification-retrieval are distributed more extensively to include the planum temporale, insula and subcortical structures,

References

Solomon, J., Raymont, V., Braun, A., Butman, J., & Grafman, J. (2007). User-friendly software for the analysis of brain lesions (ABLe). Computer Methods and Programs in Biomedicine.
Hagoort, P. (2005). On Broca, brain and binding. Trends in Cognitive Sciences.

Figure 1. a) Shows the combined lesion of all participants, the colors reflect the number of participants with a lesion in that region: blue=at least 3, green=6, yellow=14, orange=17, red>20), Lesion map of **b)** only lexical deficits, **c)** only phonological deficits, **d)** only syntactic deficits, **e)** lexical+syntactic deficits combined, **f)** syntactic+phonological deficits combined, **g)** all three deficits combined. The slices were selected in figures **b)** - **g)** to show the significant lesions and are not contiguous.



Presented by: **Faroqi-Shah, Yasmeen**

2. A Computational Case-Series Approach to Frequency Effects in Aphasic Word Production

Nozari N., Kittredge A., Dell G.
Beckman Institute, University of Illinois at Urbana-Champaign

Introduction
When repeating a word, do we access its lexical representation, or solely its sublexical units? We approached this question by investigating the structural overlap between picture naming and auditory word repetition using Foygel and Dell's (2000) two-step model of lexical access. In this model, naming has two steps: first, meaning is mapped onto a word-form, and second, the word-form is mapped onto its phonemes. For repetition, though, the first step is not necessary. Once the word-form is accessed (through listening), repetition uses the second step of naming (the lexical-route model). Alternatively, the sounds of the word may be directly mapped onto the output phonemes (the nonlexical- route model). A third possibility is to have both routes in place. Such a dual-route system might use both routes on each repetition trial (the summation dual-route model), or only one route on a given trial (the independent dual-route model; figure 1).

These four repetition models differ in their degrees of overlap with the second step of naming. If we can empirically quantify the overlap between naming and repetition, we can pick the correct model. To do this, we investigated the increase in the probability of aphasic subjects' nonword errors in these two tasks as the target's frequency decreases. Frequency has a stronger effect on the second step and nonwords are canonical second-step errors. Therefore, if the frequency effect on nonwords is similarly strong in naming and repetition, the two tasks may share the second step. We tested this hypothesis by comparing aphasic naming and repetition to simulated data from our naming and repetition models.

Methods
59 aphasic patients (from Dell et al., 2007) with minimal input processing deficit were tested on naming and repetition using the Philadelphia Naming Test and the Philadelphia Repetition Test, respectively. Simulations were run using the naming and the four repetition models, with lexical frequency represented in the models' connection weights.

Results
Patients' nonword errors were analyzed using multinomial-hierarchical-logistic-multiple regression, as well as a binomial-crossed-random-effects model. Both naming and repetition showed sizable frequency effects, comparable to one another. The results of the simulations were analyzed using a similar technique. The lexical-route and the summation dual-route models reflected the patients' data pattern best, by showing frequency effects on the probability of producing nonword errors that were at least as large in repetition as they were in naming.

Conclusions
Strong structural overlap between naming and repetition, confirmed by the comparable frequency effects in the two tasks, means that repetition is heavily lexically influenced. Both the lexical-route and the dual-route models simulate the data well and the choice of the model may depend on certain factors, such as accessibility of word meaning.

References
Dell, G. S., Martin, N., & Schwartz, M. F. (2007). A case-series test of the interactive two-step model of lexical access: Predicting word repetition from picture naming. Journal of Memory and Language, 56, 490–520.
Foygel, D., & Dell, G. S. (2000). Models of impaired lexical access in speech production. Journal of Memory and Language, 43, 182–216.

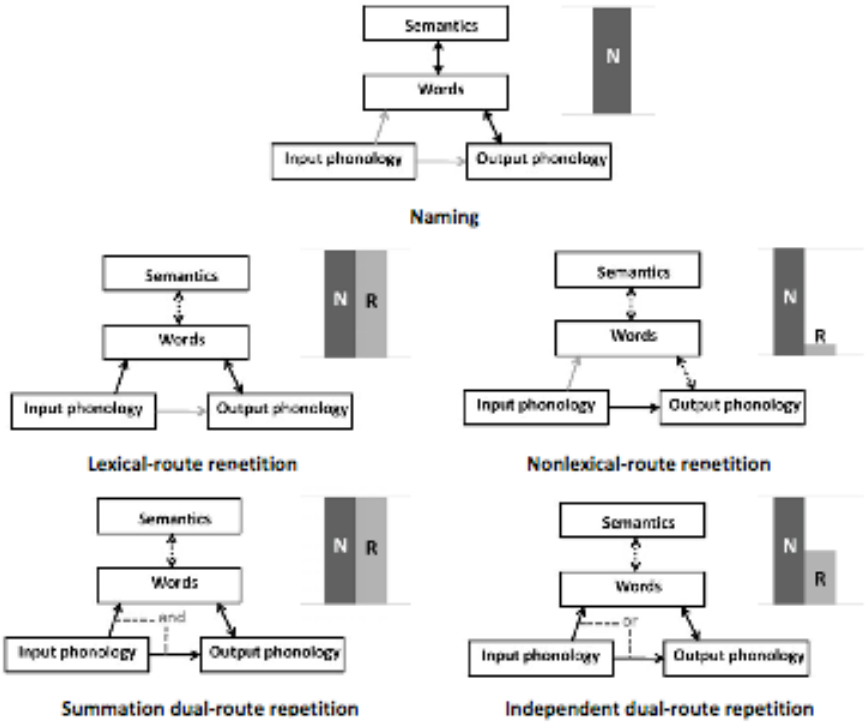


Figure 1- The architecture of the naming and the four repetition models used in the simulations. N= naming; R= repetition; black arrows= active routes; dotted arrows= connections via feedback; gray arrows= inactive routes. The bars next to each model show the predicted pattern of the frequency effect in that model (how much the probability of making a nonword error increases as a function of decreasing target frequency). For repetition models, the predicted effects are graphed next to the predictions of the naming model. Lexical and summation dual-route models predict large frequency effects. The nonlexical-route model predicts a small effect and the independent dual-route model predicts an intermediate effect.

Presented by: **Nozari, Nazbanou**

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3. Distinguishing Phonological Errors from Phonetic Errors in Acquired Speech Impairment

Buchwald A. [1]*, Rapp B.* [2]*, Miozzo M.* [3]
[1] *New York University,* [2] *Johns Hopkins University,* [3] *Cambridge University and Johns Hopkins University*

Distinguishing between errors that arise at phonological or phonetic levels of processing is an important aspect of understanding acquired phonological production impairments. Here we attempt to identify if the errors produced by an individual (DLE) with acquired spoken production impairment originate in phonological processing or in subsequent phonetic and motor-based processes.
Following a left hemisphere infarct affecting the fronto-parietal regions, DLE produces form-based errors in naming and repetition tasks. Interestingly, DLE frequently deletes the initial fricative from fricative-stop (speech → [pitS]) and fricative-nasal (snack → [næk]) consonant clusters. In American English, the [p] in speech is produced without aspiration, thus having a shorter voice onset time (VOT) than the aspirated [p] in peach (and similar to the [b] in beach). Additionally, [n] is significantly longer in knack than in snack. We used these properties of English phonetic

implementation to identify the level of DLE's deficit.
The rationale for the study was as follows. In phonological impairment, we expect the fricative to be deleted prior to generating a phonetic plan, so we predict that the [p] produced in the deletion error (speech → [pitS]) and in the word peach should be similar. In contrast, a 'later' phonetic impairment should yield errors that are consistent with the underlying target cluster, so the unaspirated allophonic variant of [p] should appear in the deletion error speech → [pitS].
To test these predictions DLE was asked to repeat auditorily presented words with fricative-stop (speech) and fricative-nasal (snack) clusters, as well as control words with singleton stops and nasals (peach and beach; knack). In phonologically-based errors, the deleted form for fricative-stops should be more similar in VOT to the voiceless singleton control (peach) than the voiced control (beach), and nasal duration in fricative-nasal targets should be similar to singleton nasals. In contrast, motor-based errors should have appropriate articulatory timings for clusters (i.e., stop VOT closer to voiced controls; nasal duration shorter than singleton nasals).
The results were consistent with a phonological impairment. A VOT analysis revealed that VOT was significantly longer in fricative-stop tokens with deletion errors (speech → [pitS]; 40.9ms) than in responses with voiced control words (beach; 26.3ms; $t(261)=6.30$, $p<.001$). However, deleted tokens trended towards having shorter VOT than the voiceless controls (peach; 45.1ms; $t(309)=1.93$, $p=.051$), indicating a small effect of the underlying target cluster. A second analysis of nasal duration revealed comparable duration for nasals in deletion errors ([n] in snack → [næk]; 50.6ms) and as singletons (knack; 46.9ms; $t(114)=.794$, ns). Taken together, these results indicate that the phonetic characteristics of the deletion errors are consistent with deletion prior to generating a detailed phonetic plan.
These findings are consistent with DLE's/s/-deletion taking place during phonological encoding, We will present other aspects of DLE's production that are also consistent with this conclusion. We will discuss how the data can be accounted for in an interactive speech production framework we will present more general conclusions about factors determining the nature of phonological production errors.

Presented by: **Buchwald, Adam**

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4. Syllable Frequency Effect in Progressive Apraxia of Speech: A Case Study

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Introduction
Although apraxia of speech (AoS) has usually been described in degenerative language disorders in association with non-fluent progressive aphasia, at least 20 clinical cases of pure progressive apraxia of speech (PAoS) have been reported in the literature (Didic et al., 1998; Duffy, 2006; Joseph et al. 2006). Impairment in AoS is usually ascribed to the programming of speech gestures (phonetic encoding in the models of speech production). Converging evidence in the literature point to a frequency organization of syllable-sized gestural scores (Cholin, et al., 2006; Laganaro and Alario, 2006) and to an effect of syllable frequency in the programming difficulties accompanying AoS after stroke (Aichert and Ziegler, 2004; Steiger and Ziegler, 2008).
One central issue for both theoretical and diagnostic purposes is whether the same characteristics are observed in AoS after focal lesion and in progressive AoS. Here we present a single case study aimed at analyzing whether syllable frequency affects the progressive disruption of speech production in PAoS.

Method
We present an 18 months follow-up study of a 68-year-old men presenting with PAoS. The patient displayed progressive disruption of speech production, characterized by phonetic errors, intersyllabic pauses, syllable lengthening and dysprosodia, without positive signs of aphasia. Error analyses and word and syllable duration measures were carried out on spontaneous speech and word repetition at first examination and 18 months later. Across the two sessions words and syllables with the same syllabic structure and word position were analyzed.

Results
Error rate increase and speech rate decrease were observed in the comparison of the two assessment periods. More interestingly, syllable duration (1) no longer differentiated according to its position in the word and (2) correlated negatively with syllable frequency in the second assessment only (see Figure 1).

Conclusion
Progressive isolated AoS is affected by syllable frequency during the worsening of speech production. This finding suggests that PAoS progressively displays the same features of AoS after stroke and that its manifestation can be exploited for theoretical and clinical investigations of phonetic encoding.

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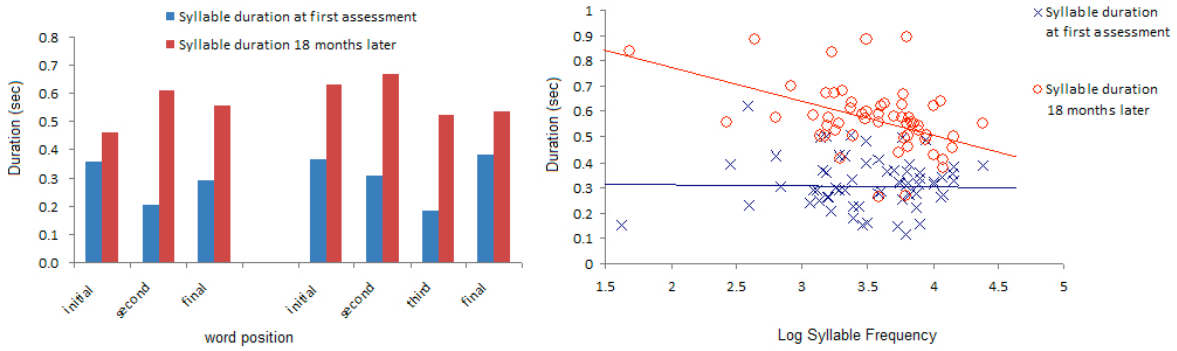

Figure 1. Duration of CV syllables

Presented by: **Laganaro, Marina**

Symposium 1: Neuroimaging in Aphasia Treatment Research: Lessons, Challenges and Future Directions

5. Neuroimaging in Aphasia Treatment Research: Lessons, Challenges and Future Directions

Rapp B. [1], *Thompson C.* [2]
[1] *Johns Hopkins University,* [2] *Northwestern University*

Language function improves in individuals with aphasia, substantiating the now well-known fact that neuroplasticity extends to the adult brain (Merzenich et al., 1996). In the face of damaged neural tissue induced by stroke the brain has the capacity to reorganize. Importantly, as shown in studies of sensory and motor recovery in animals, neural reorganization is directly shaped by experience (Nudo et al., 1996). Reorganizational processes in aphasia are similarly under the influence of the environment even in chronic phases of recovery. That is, treatment directly affects these processes.

Functional neuroimaging has advanced the ability to study the neural mechanisms that support treatment-induced recovery of language processing and there are now a number of studies in the literature addressing this issue. In a recent review, over twenty studies were identified in which fMRI, PET, or MEG has been used to examine the effects of treatment (Thompson & Den Ouden, 2008). In this symposium we discuss this research and address the lessons learned, challenges that remain, and future directions of neuroimaging work examining the effects of treatment for aphasia.

In the first talk, Cynthia Thompson will provide a brief review of the aphasia treatment and neuroimaging literature and summarize the state of the science. Her remarks will provide a scaffolding for the other presentations, which will focus on recommendations for future research. Argye Hillis will address methods for characterizing both structural and functional lesions. Brenda Rapp will discuss the importance of careful quantification of the language deficit that patients present as well as considerations for scan task development. Swathi Kiran will address aspects of treatment research design and implementation in neuroimaging studies, and Dorothee Saur will address challenges in analyzing neuroimaging data derived from lesioned brains, including application of connectivity analyses.

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Presented by: **Rapp, Brenda**

6. Neuroimaging in Aphasia Treatment Research: The State of the Science

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Dept. of Communication Sciences and Disorders, Northwestern University

Research examining the neurobiology of recovery from aphasia indicates that treatment impacts brain reorganizational processes. In general two primary patterns of recovery have been noted: (1) language function, premorbidly subserved by the damaged left hemisphere, is shifted to right hemisphere homologous regions, and (2) undamaged neural tissue in the left hemisphere is recruited, extending the functional map to include perilesional regions, perhaps because of functional redundancy. One other possibility is that completely novel brain mechanisms may come into play. Although some suggest that of these possibilities, reorganization within the left hemisphere results in the best recovery, review of studies published using fMRI, PET, or MEG indicate wide heterogeneity in activation patterns from pre- to post-treatment, and even patients who recover well given treatment show both right and left brain activation. This presentation will provide an overview of published studies, highlighting the heterogeneous activation patterns found from pre- to post-treatment across studies and potential reasons for them. There are at lease five factors related to the lack of convergence across studies. The first concerns characteristics of patient lesions and methods used to quantify them. Some studies include patients with aphasia resulting from various etiologies (e.g., stroke, tumor) and the size and extent of patient lesions (both structural and functional) are not always quantified. Because these factors may influence reorganizational processes, for example, patients with similar structural lesions may respond differently to treatment because of hypoperfused perilesional tissue, measures of both structural and functional dimensions of the lesion are important, including evaluation of the integrity of white matter tracts. Another issue concerns heterogeneity with regard to the type of language deficit patients present. Most studies provide information limited to the type of aphasia, but do not discuss aspects of language that are impaired and spared prior to treatment and the precise language functions that improve when treatment is provided. Because the objective of this type of research is to understand the specific neural changes that support recovery of specific language functions, it is important to comprehensively test language function before and after treatment. A third, related factor, is scan task selection and patient performance ability. Some studies have used tasks that at pre-treatment the patients cannot perform, thus it is difficult (if not impossible) to attribute any associated pre- to post-treatment activation with improved language processing ability per se. Another factor related to heterogeneity in neuroimaging treatment research is that the treatment itself varies across studies: treatments are not always clearly described and reliable treatment effects are not always reported. Finally, methods used for analysis of neuroimaging data differ across studies and most have not considered alterations in blood flow that coincide with some stroke-induced aphasias.
Presentations following this introductory talk will provide specific suggestions for addressing these issues, with emphasis placed on developing a set of standards used across researchers. A unified approach to fMRI treatment research will allow the results of studies to be compared to one another and move the neuroscience of aphasia rehabilitation forward.

Presented by: **Thompson, Cynthia**

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7. Functional Neuroimaging of Recovery in Aphasia: Characterizing the Lesion

Hillis A.
Dept. of Neurology Johns Hopkins School of Medicine

Interpreting areas of activation associated with recovered language in aphasic individuals requires characterizing the lesion responsible for the aphasia. The nature, site, size, and age of the lesion must be adequately determined to understand the functional imaging data. This talk will address the reasons why and methods for examining these variables in neuroimaging studies of aphasia treatment effects.
The nature of the lesion is important for several reasons. Some lesions, such as stroke, occur over a short period of

time, followed by potential reorganization of structure/function relationships. However, pre-existing cerebrovascular disease can complicate the hemodynamic response to neural activation; for example, stenosis of major vessels can limit blood flow to their vascular territories, eliminating the hemodynamic response, even if the area is not damaged. Likewise, for days to weeks after acute stroke, areas of hypoperfusion surrounding the acute infarct may be dysfunctional and contribute to the language deficits. These areas may show no hemodynamic response, even when there is some neural activation. Areas of hypoperfusion can be identified with MR perfusion imaging, CT perfusion, PET, or measures of vascular reserve. Some types of stroke (e.g. subarachnoid hemorrhage) have diffuse, poorly localized cognitive effects, even when they also cause areas of focal damage due to vasospasm or treatment. Other lesions cause damage over weeks to months, such as herpes encephalitis and rapidly growing tumors. Others cause damage over months to years, such as primary progressive aphasia, chronic intractable epilepsy, and slow-growing tumors. These progressive lesions can cause reorganization of structure/function relationships even before intervention, influencing the time course and extent of recovery. The nature of the lesion also determines what areas can be evaluated. Some areas are vulnerable to ischemia. Other areas, such as the temporal pole, are rarely affected by stroke. In contrast, herpes encephalitis, Semantic Dementia, and surgery for intractable epilepsy often affect the temporal pole. Thus, the likelihood of seeing activation in these areas during recovery will depend on the nature of the lesion.
The site of lesion can be identified in several different ways, with distinct strengths and weaknesses. The site of focal lesions can be drawn on a template or standardized "atlas", such as the Montreal Neurological Institute atlas or Talairach space, that would also be used to identify the areas of activation. However, the site of dysfunctional tissue (including the area of hypoperfusion discussed above) may be more important than the site of only structural lesion alone. Scans showing the lesion should also be "registered" to the selected atlas, because brains are all different shapes and sizes. Registration methods vary in how well they accommodate large lesions, because these distort the shape of the brain. White matter tracts affected by the lesion can influence functional imaging results. Status of white matter tracts can be evaluated with Diffusion Tensor Imaging and tractography.
Volume of the lesion or dysfunctional tissue will also influence what areas are likely to assume the role of the damaged areas. Finally, age of the lesion is important, as areas of activation during language change over time.

Presented by: **Hillis, Argye**

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8. Characterizing the Language Deficit: Implications for Scan Task Selection

Rapp B.
Johns Hopkins University

The goal of functional neuroimaging research on recovery of language function is to characterize and understand the neural changes that support recovery or improvement of specific language functions. Presumably, different language functions will recruit different neural regions in their recovery. For example, recovery of thematic role assignment abilities presumably will involve different neural changes than improvement in the ability to retrieve phonological word forms from a lexical phonological memory store. Therefore, the objective of this type of research is to understand the specific neural changes that support recovery of specific language functions. In the longitudinal approach to this issue, the neural activation patterns of individuals with specific language deficits are evaluated at multiple time points during the course of recovery, either spontaneous or as a result of treatment. Neural changes correlated with the changes in the relevant language functions are assumed to provide information regarding the neural regions and mechanisms that supported the recovery. Simply put, changes in language functions are related to changes in neural activation patterns.
In order to interpret the longitudinal changes within a given study and also to compare and contrast the results of different investigations, it is critical to precisely evaluate language abilities both before and after treatment (or spontaneous recovery). Before treatment, it is necessary to identify the language functions that have been disrupted by the lesion and those that have not; subsequent to treatment, it is necessary to identify the language functions that have improved and those that have not. Only in this way can the longitudinal neural changes that are observed be associated with the appropriate language functions. The pre and post treatment characterization of language abilities will need to be informed by various considerations including the need for comprehensive evaluation, test/re-test

practice effects, etc.
In order to relate the changes in language abilities to changes in neural activation patterns, it is critical to select language tasks to be performed during the functional neuroimaging that will recruit the relevant neural substrates both pre and post treatment. Presumably these tasks will activate the substrates involved in the language functions that have been disrupted by the lesion; in this way changes in language functions can be reflected in changes in activation patterns. The choice of scanner task is a very complex one and will be affected by a number of different factors, including task difficulty.
The quality of the research directed at understanding the neural substrates of recovery of language function will be determined, to an important extent, by the quality of the two "sides of the equation" –our understanding of the affected language functions and our ability to select scanner tasks that will reveal the relevant neural activation patterns. In this talk, the challenges faced by both of these aspects of research design will be discussed.

Presented by: **Rapp, Brenda**

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9. Experimental Treatment Design: What's Important for Neuroimaging Research

Swathi K.
Boston University

Functional neuroimaging is a relatively new methodology that holds promise for detecting physiological processes that underlie learning-related plasticity. A number of studies examining recovery patterns associated with treatment of both groups of (Belin et al., 1996; Musso et al., 1999) and individual patients (Leger et al., 2002; Davis, Harrington, & Baynes, 2006; Small et al. 1998, Thompson et al., 2000) have been published. However, wide heterogeneity has been found with regard to changes in activation from pre- to post-treatment. Although there are a number of factors to consider with regard to this heterogeneity, an important issue relates to the type of treatment provided as well as documentation of how well patients respond to it.
The goal of this paper is to address treatment-related issues relevant to the conduct of neuroimaging studies. First, options for implementing controlled experimental treatment designs will be discussed, including both single subject and group approaches. Topics covered will include measurement of independent and dependent variables, acquisition and generalization, internal and external validity, and reliability. The need for operational definition of the treatment itself will be emphasized. It is now well know that treatment directly impacts reorganizational processes of the brain; thus, it follows that the type of treatment provided also will influence recovery processes. Without careful detailing of the precise experimental treatment manipulations provided, the meaning of any changes in the neurobiology of language will be illusive.
How to integrate treatment dependent variables and fMRI tasks in order to closely inspect the neural regions involved in treatment-induced plasticity will also be discussed. Topics covered will include comparison of task performance inside and outside the scanner, criteria for defining change, and comparisons of improvement and recovery during treatment to that noted during pre-post fMRI scans. It is anticipated that this presentation will promote awareness and interest in using neuroimaging as a tool to document treatment-related changes in the brain and stimulate discussion regarding challenges and recommendations for future research in this area.

Presented by: **Swathi, Kiran**

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10. Analyzing Functional Neuroimaging Data of the Lesioned Brain

Saur D.
Department of Neurology, University Medical Center Freiburg

Performing functional imaging in acute and chronic aphasic stroke patients poses a number of challenges but also offers unique insights into the reorganizing brain. In this presentation, the need to consider the lesion extent, derived from both structural and functional (diffusion- and perfusion weighed imaging) in analysis of activation patterns derived from both pre- and post-treatment conditions will be emphasized. In order to understand changes in reorganizational processes derived from functional imaging data these dimensions of the lesion need to be considered. In addition, the results of diffusion tensor imaging, which provides information relative to the functioning of white matter tracts is important to consider in analysis of functional imaging data. Methods for doing this will be emphasized.
Methods for analyzing fMRI data derived from both single subjects as well as groups of aphasic stroke patients also will be discussed, together with methods for evaluating change in activation patterns across all phases of stroke recovery. Data showing changes across phases of recovery with no treatment provided will be presented to demonstrate processes occurring at different phases of language reorganization after stroke. Analysis of treatment-induced recovery will be discussed in consideration of these changes. Furthermore, functional and anatomical network identification procedures used to detect reorganization in terms of a re-coordination of the lesioned language network will be presented. Finally, it will be shown how the application of multivariate analysis techniques to early language fMRI data might be used to predict individual behavioral outcomes of aphasic stroke patients.

Presented by: **Saur, Dorothee**

Poster Session 1: Neural Bases of Language

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11. Task Modulated Neural Activation Patterns in Chronic Stroke Participants with Aphasia

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Introduction
Functional neuroimaging (fMRI) studies on the recovery of language functions in aphasia have showed contradictory results. Some underlined the role of left hemisphere regions in recovery mechanisms (Karbe et al., 1998; Heiss et al., 1997), whereas others have implicated areas of the right hemisphere in compensatory functions (Weiller et al., 1995; Ohyama et al., 1996). This lack of consistency in findings in the neuroimaging literature could be attributed to a number of factors, including lesion site, phase of recovery, difficulty of the task, and performance accuracy used in the investigations. In the proposed study, the relationship between tasks with varying processing demands (lexical decision, semantic judgment, and picture naming) and varying lesion site (anterior, posterior, anteroposterior) was examined in participants with aphasia.

Methods
Three monolingual, right handed, English-speaking participants with aphasia and one normal control were involved in the preliminary phase of the experiment (age range 54-61years). All participants with aphasia had a single

unilateral left hemispheric ischemic stroke in the distribution of the left middle cerebral artery. P1 had a frontal lesion, P2 a temporo-parietal lesion and P3 a fronto-temporal lesion. All participants with aphasia were high level patients at least 2 years post onset. The Aphasia Quotient ranged from 91-97.6 and the Boston Naming test scores ranged from 46-59. Data was acquired on a 3T GE scanner. A gradient-echo EPI with the following parameters were used TE=40ms, TR = 2000ms, FOV = 24x24cm, a 256x256 pixel matrix. 31 axial slices with 3 mm thickness and 0.3 mm gap in A-P direction were acquired. This was followed one high-resolution T1 SPGR images. Functional MRI data were preprocessed and analyzed in FSL (www.fmrib.ox.ac.uk/fsl/).

Results and Discussion

Performance accuracy was greater than 95% for all the three tasks. For all the participants, increased cortical activation was observed as the task processing demand increased. For P1 and P2, activation involved prevalently the perilesional or undamaged regions in the language dominant hemisphere during lexical decision task and semantic judgment task.

For P3 activation was observed in perilesional Broca's area and in the right-sided homologue during semantic judgment task and bilateral occipital activation during lexical decision task.

On the other hand, during picture naming task, all participants showed increased right temporoparietal activation in addition to the left hemisphere activation. Activation maps for participant P03 are presented in Figure 1. The results of this study suggest that the pattern of brain activation is influenced by the task and site of the lesion.

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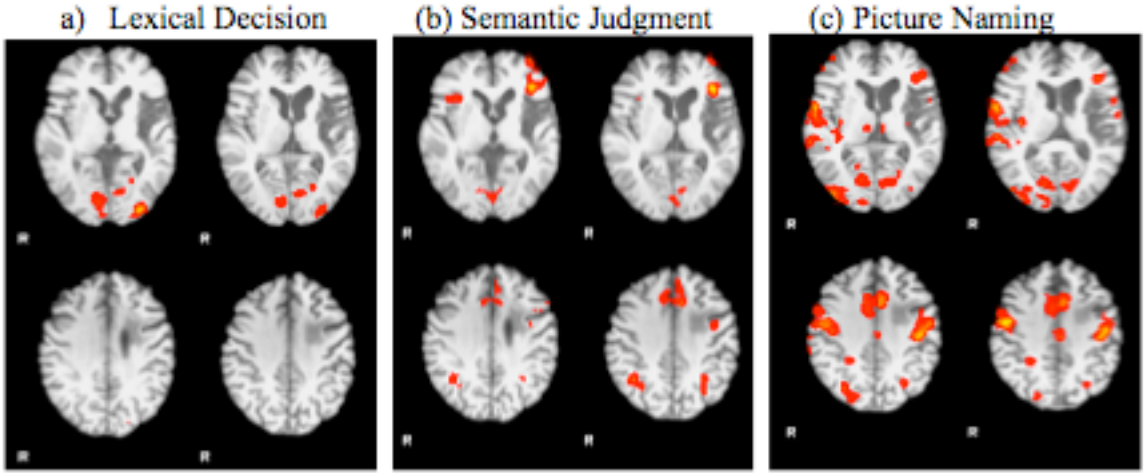

Figure 1: Activation maps for P03 for (a) lexical decision task, (b) semantic judgment task, (c) picture naming task. Statistical maps were thresholded by using clusters determined by $Z > 3.5$ and a (corrected) cluster significance threshold of $P = 0.05$.

Presented by: **Sebastian, Rajani**

12. Wernicke's Aphasia Caused by Crossed Cerebellar Diaschisis Following Cerebellar Hemorrhage

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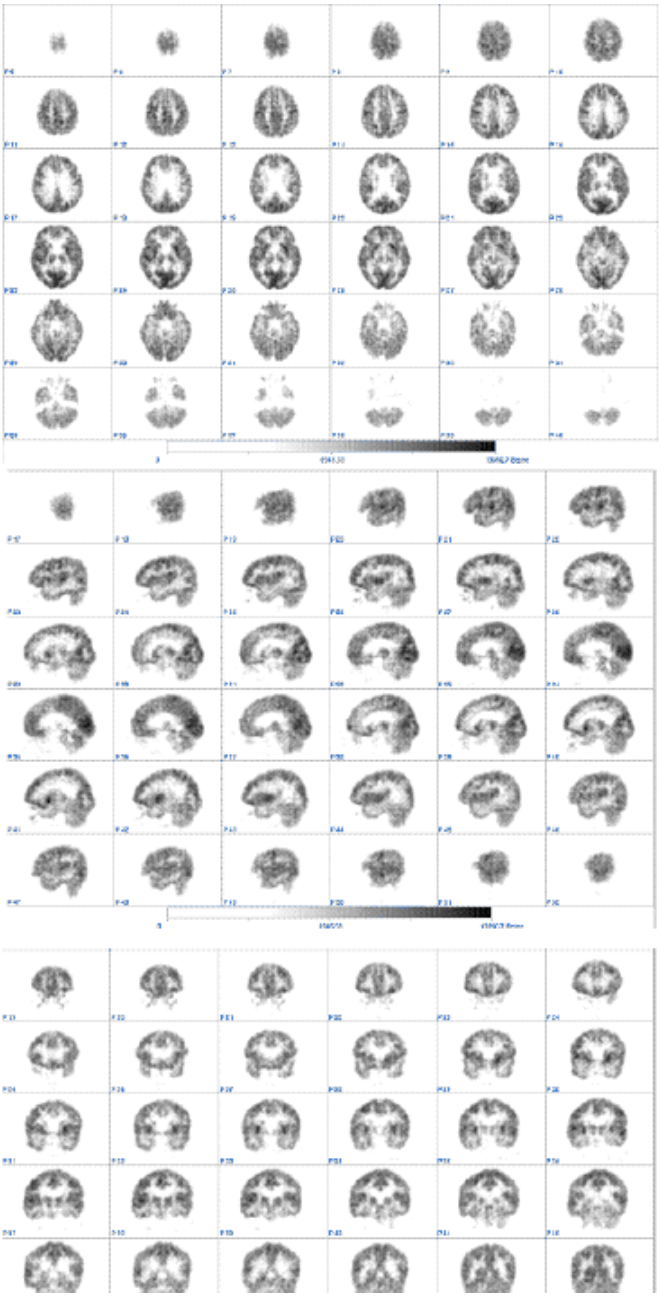
Stroke is the most frequent serious neurological disorder in the world and the third leading cause of death in many countries. Among the diverse cognitive deficits caused by stroke, aphasia is the one of the most devastating. Among aphasia types, Wernicke's aphasia (as described by Wernicke) consists of the loss of comprehension, loss of ability to read and write, and distortion of oral speech. Hearing is intact. Within the Geschwind-Lichtheim model, the disorder is due to cortical lesions: Brodmann's areas 22 and 39 (namely, Wernicke's area).

Diaschisis is a functional impairment at a site in the brain remote from the lesion causing it. Cerebellar diaschisis after cortical insult is detailed in the literature; however, cortical diaschisis after cerebellar insult remains a rarely reported occurrence. In the chronic stage of stroke, contralateral cerebellar blood flow and metabolism are depressed, which is known as crossed cerebellar diaschisis (CCD). We reported a Wernicke's aphasia caused by CCD following cerebellar hemorrhage.

The patient was a 56 years old, right-handed male. He lived in Beijing and was a businessman. He was admitted by the department of Neurology, Beijing Tiantan Hospital on 10th Aug, 2007. His wife's major complaint was deterioration of his language skills for one month, and she recalled that the patient suffered from cerebellar hemorrhage two months ago and was given some treatment at hospital. When he went home after one month, she found that the patient had difficulty with word-finding. Specifically, when the patient needed words to express his needs, he could not accurately say the correct word but could express his needs with gestures. On the other hand, he had significant impairment in auditory comprehension and he could not perform sentence completion tasks. However, he could perform well in reading comprehension at the sentence level (sentence comprehension, reading instructions and reading the test). His performance in writing names of objects and pictures matching were poor, and could not write down some words during writing and dictation tasks. He was diagnosed as Wernicke's aphasia by using the Western Aphasia Battery. His aphasia severity gradation was level four.

Why did cerebellar hemorrhage produce his aphasia? Using positron emission tomography (PET), we found decreased perfusion of the bilateral frontal and temporal lobes, consistent with regional loss of neural activity. As shown in Figure 1, the result of PET showed that bilateral frontal and temporal lobes, especially the right frontal and temporal lobes were in a state of glucose hypometabolism. We gave him language training twice a day, and we observed his language ability improved quickly. We proposed that the patient's aphasia resulted from both anterograde disconnection of the corticopontocerebellar tracts and retrograde deafferentation of dentatothalamocortical projections. This patient provides a case of CCD elicited by cerebellar hemorrhage.



Presented by: **Zhang, Yumei**

13. Optic Aphasia or Wernicke's Aphasia with Diplopia: A Customized Approach for Assessment

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Introduction
Aphasia refers to a family of clinically diverse disorders that affect the ability to communicate orally and/or written language following brain damage. Aphasiologists claim that there are as many clinical forms of aphasia as there are aphasic patients which suggest that every client is different from every other depending on various factors such as site, severity of injury and the uniqueness of the individual. The fact that they vary so dramatically from one another has made assessment challenging for Speech Language Pathologists. Therefore, it is always preferable to implement a customized approach during assessment of an atypical aphasic in order to determine the amount of function that is intact for language comprehension and to arrive at a diagnosis with greater reliability.

Aim
The present study focuses on how a customized approach can be utilized in assessing atypical aphasias to arrive at a reliable diagnosis.

Method
An eighty year old, right handed, adult male with a complaint of loss of language following a stroke was examined two weeks post onset. The individual complained of an additional problem in perceiving two images of single object simultaneously. MRI findings revealed an acute parieto-temporal lesion due to an infarct in the posterior cerebral and middle cerebral artery watershed areas.

Results
Based on his performance on the WAB the individual was classified between global and Broca's with an aphasia quotient of 20.50. However, these scores provided an ambiguous diagnosis as they did not correlate with the clinical symptoms nor the neuroanatomical site of lesion. So, a similar test, the BDAE, was customised on the basis of the client's intact abilities. His performance showed two important aspects. Scores of fluency were better compared to comprehension tasks, and poor scores in comprehension, repetition and naming with the presence of paraphasia were noted (typical symptoms of Wernicke's aphasia). His audiological status was also normal. The visual deficit of dilopia resolved in the later stages. In general, the scores of the BDAE, the neuroanatomical site of lesion, and the clinical symptoms exhibited by the case helped us diagnose him as a case of Wernicke's aphasia with diplopia rather than optic aphasia.

Conclusion
Outcome of the study emphasizes how a reliable diagnosis can be attained by using a customized approach using battery of tests for atypical aphasics. As this study emphasizes, the WAB or BDAE alone is not sufficient for uncovering all aspects of client's disorder. Therefore it is vital for clinicians to be logical in selection of a spectrum of test batteries and modalities of subtests for a particular aphasic. A multiple baseline assessment will further enhance the quality of test outcomes. Flexibility in the evaluator's approach in selection of test subtask will definitely enhance the reliability and validity of assessment.

Presented by: **Kumar, Vijay**

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14. Repetitive Transcranial Magnetic Stimulation (rTMS) and Sham Modulation of Language Function in Aphasia

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Introduction
The present research investigated the effects of low frequency Repetitive Transcranial Magnetic Stimulation (rTMS) applied to the Right perisylvian language homologue of L CVA patients on behavioural and neurophysiological measures of semantic naming.

Procedures
Based on procedures outline by Naeser et al., (2005), two patients with non-fluent aphasia were treated using low frequency (1Hz) Repetitive Transcranial Magnetic Stimulation (rTMS) for 20 minutes per day, for 10 days at 90% of resting motor threshold. Stimulation targeted Right Pars Triangularis using the Stealthstation TREON neuronavigational system to monitor coil position. Patient A, (moderate severity) received real rTMS while Patient B, (moderate severity) received blind condition Sham rTMS.

Baseline and 1 week post stimulation language outcome measures included subtests from the Boston Diagnostic Aphasia Examination (BDAE), the Boston Naming Test (BNT) and verbal naming responses from 144 black and white line drawings (Snodgrass and Vanderwart, 1980). Event Related Potentials (ERP) baseline and post stimulation data was collected to monitor changes in semantic processing via the centroparietal negativity, N400.

Analyses conducted
Behavioural language assessments were compared as pre-post stimulation measures. The Snodgrass & Vanderwart picture stimuli (verbal responses) were analysed according to latency and accuracy of naming pre and post stimulation. ERP measures were analysed according to mean amplitude, area, latency and peak amplitude across three centroparietal electrodes.

Results
See attached table.

Final conclusions
Results indicated that rTMS has the capacity to modulate behavioural language in patients with non-fluent aphasia and are consistent with findings of previous studies (Naeser et al., 2004; Naeser et al., 2005). Changes in semantic processing measured by ERP are inconclusive and require replication based on larger samples.

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		BDAE				BNT	S & V pictures			ERP Semantic anomaly condition	
		Naming tools and implements	Naming of actions	Repetition of sentences	Picture description complexity index	BNT	Accuracy	Mean RT ms	SD	Av. Latency ms	Area µV
Patient A	Baseline	8/12	10/12	8/10	1.1	44/60	118/144	1823.76	723.82	321.30	-136.83
	Post rTMS	11/12	11/12	10/10	1.5	52/60	132/144	1256.14	519.57	342.60	- 243.86
Patient B	Baseline	8/12	8/12	8/10	1.6	31/60	76/144	1636.46	661.44	456.83	-440.49
	Post rTMS	7/12	7/12	7/10	1.4	38/60	96/144	1629.70	651.18	491.50	-570.59

Table 1: Behavioural language and picture naming results

Presented by: **Barwood, Caroline**

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15. Clinical Profiles of Communication Impairments after a Right-Hemisphere Stroke

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It is now commonly admitted that right hemisphere damage (RHD) is likely to lead to communication disorders. Approximately 50% of individuals with RHD show impairment of prosodic, discourse, pragmatics and / or lexico-semantics dimensions of verbal communication. These impairments have essentially been studied separately but their possible coexistence in a same individual is still unknown. Moreover, the profiles of communication impairments, including their correlation with underlying cognitive deficits, lesion sites and types, are still unreported.

71 individuals (43 Canadians, 20 Brazilians, 8 Argentineans) with a first and unique RHD have been included. Gender, age and education were controlled. In addition, data on the CVA nature in our sample are consistent with the prevalence found in the literature. Participants underwent a communication assessment (Protocole MEC, Joanette, Côté, & Ska, 2005) in conjunction with neuropsychological tasks (e.g. inhibition, flexibility, short-term memory). Z scores for each language task were used to perform a hierarchical cluster analysis. This method has identified five distinct clinical profiles as following (Lajoie et al., 2009). Table 1 describes in more detail the tasks failed for each profile. Results regarding the neuropsychological aspects suggest at this point that communication deficits are not only the indirect impact of other cognitive disorders. Preliminary data collected about the CVA site (in an ongoing study) show a double dissociation: brain injury in the same location can lead to distinct profiles of cognitive disorders, and different injury localizations can lead to the same profile. In contrast, it is the nature of the injury (i.e.: hemorrhagic versus ischemic) which seems to have a significant influence on clinical manifestations. It would thus mean that there is some kind of interaction between the nature and the site of the lesion.

These findings open to a new perspective on understanding the clinical profiles following RHD. Interestingly, the international recruitment shows that the clusters seem to be consistent across languages, thus suggesting that the

profiles described are “universal”. The study of these profiles as well as the exploration of neuropsychological impairments and CVA locations associated will participate to a better clinical knowledge and SLP intervention.

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Joanette,Y., Ska, B., Côté, H. (2004). Protocole Montréal d’évaluation de la communication (MEC). Isberques: OrthoÉdition.

Aspects	Tâches	1	2	3	4	5
Discours	Rappel de discours					
	Questions discours					
	Conversation	5	8	7		1
Pragmatique	ALI					
	Métaphores					
Sémantique	Évocation libre					
	Évocation orthographique					
	Évocation sémantique					
	Jugement sémantique					
	Métaphores					
Prosodie	Lg compréhension					
	Lg répétition					
	Ém compréhension					
	Ém répétition					
	Ém production					

Table 1: Language aspects impaired for each profile (1,2,3,4 and 5).

Presented by: **Ferré, Perrine**

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16. Broca 0 – Wernicke 2: Contrasted Effects of Transcranial Magnetic Stimulation on Language in Chronic Aphasia

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Introduction
Post-stroke recovery is based on plastic changes in the central nervous system that can compensate for the loss of activity in affected brain regions. This brain reorganization or neuroplasticity (Kolb et al., 2003) means that the

human brain demonstrates the capacity to respond to a neurological insult such as a stroke (Raymer et al., 2008). To date, the cortical reorganization associated with language recovery in aphasia is partly unknown. Stroke in the left hemisphere (LH) overactivates the right hemisphere (RH) following the alteration of interhemispheric inhibition (IHI); in turn, exaggerated IHI from RH may hinder LH recovery. In a few studies with aphasic patients, repetitive transcranial magnetic stimulation (rTMS) was applied over Broca's right counterpart and entailed significant improvements in language production (e.g., Martin et al., 2007; Naeser et al., 2005). Our study focused on whether theta-burst stimulation (TBS, a specific rTMS paradigm) applied over Wernicke's (W) and Broca's (B) area could improve language production and comprehension in a chronic patient with severe aphasia.

Methods and materials
cTBS (continuous stimulations to down-regulate RH) and iTBS (intermittent to up-regulate LH) were applied in three consecutive treatment phases, 3 times a week per phase during 4 weeks. Three experimental tasks of word and sentence comprehension and syllable repetition helped measure TBS effect between baselines (2 weeks apart), pre- and post-TBS testing (once/week) and follow-ups (11 days after each treatment phase).

Results
Comprehension significantly improved at both Wernicke's phases (words: phases 1 & 3: $p < .01$; sentences: phase 1: $p < .01$; phase 3: $p < .05$), whilst unchanged at phase 2. Language production remained at baseline level. Follow-up measures in comprehension remained above the baseline, but without reaching the significance level.

Conclusion
These results suggest that TBS may be area-specific, at least for language function. An improvement of performance was also observed in motor function for Wernicke's phases, a result supporting TBS potential for balancing brain activity. Future studies are needed to test whether changes in hemispheric balancing facilitate the reactivation and re-recruitment of interconnected brain areas whose functioning was reduced by stroke. Once clearly identified, TBS effects could then be combined with more conventional therapy to strengthen the reactivation of networks dedicated to language rehabilitation.

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Presented by: **Macoir, Joël**

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17. A Systematic Analysis of Executive Functioning in Adults with Aphasia

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Introduction
Emerging evidence suggests that it is the language disorder in conjunction with non-linguistic cognitive deficits, specifically executive functions, that is responsible for unsuccessful communication in aphasia (Glosser and Goodglass, 1990; Murray, Holland & Beeson, 1998; McNeil, Odell, & Purdy, 2002; Purdy, Duffy, & Coelho, 1994; Ramsberger, 2000). Executive function abilities refer to a collection of interconnected control processes that allow

us to self-regulate, adapt, inhibit, plan and organize our behavior. Thus, there is a broad range of cognitive processes contained under the umbrella of executive functioning, and little is known regarding whether these processes are differentially impaired in aphasia. The primary purpose of this research project was to systematically examine executive function ability in persons with aphasia and to examine the relationship between executive functioning and severity of aphasia.

Procedure
Twenty individuals diagnosed with aphasia participated in this study. The mean age was 58.5 (s.d. 8.18), mean time post-stroke was 7.4 years (s.d. 4.23), and mean education was 14.3 years (s.d. 2.22). The mean Aphasia Quotient as determined by the Western Aphasia Battery (WAB) was 69.2 (s.d. 21.2). Executive functioning was examined using subtests from the Delis-Kaplan Executive Function System (D-KEFS): Trail Making, Design Fluency, Tower Building, and Free Sorting. These subtests were selected since they do not require a verbal response, and thus were more appropriate for individuals with aphasia. The D-KEFS is designed to assess performance on the fundamental (attention, perception, language) and higher-order (concept formation, inhibition, planning, cognitive flexibility) skills.

Results
The mean scaled scores (standard deviation) for the various tests were as follows: Design Fluency Switch score = 7.62 (2.47), Trails condition 4 = 2.25 (2.64), Number of correct sorts = 7.62 (2.16), and Tower overall achievement score = 6.75 (4.18). The Trails test was the most difficult for the group, and many participants were unable to complete the fundamental tests for that section (sequencing numbers and letters). A wide range of performance was noted on the remainder of the subtests. A comparison of the means resulted in significant differences for the group among all 4 subtests.
Correlational analyses were completed for all variables. Results showed there was no significant correlation between severity of aphasia and any of the executive functioning variables. Significant correlations were seen between the Sorting test and Design Fluency (r= -.62, p= .01), and the Sorting test and Trails (r-.55, p= .026). In order to control for aphasia, partial correlations were run. The correlation between the Sorting test and Trails remained significant (r= -.83, p= .02).

Discussion
These findings suggest that executive function skills may be differentially impaired in aphasic individuals, and be unrelated to aphasia severity. The significant correlations among Design Fluency, Sorting, and Trails suggests a similar underlying component to these tests, most likely cognitive flexibility. The Sorting and Trails subtests encompassed more conceptual knowledge while the Design Fluency was visual/spatial. The Tower test addresses planning and impulsivity. Future studies should examine the relationship between specific executive function components and functional communication in aphasia.

Presented by: **Purdy, Mary**

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18. Neuroanatomical Organization of Functional Language Processing: an fMRI Study

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The neuroanatomical organization of language has always been a puzzling but curious topic among scientists. Beginning with neurophysiologists, joined by neuropsychologist, neurocogntivist, and neurosurgeons, researchers have tried to resolve this using a variety of relatively reliable procedures. There have been various studies highlighting different neuronal areas responsible for various speech language and cognitive tasks on the basis of the site of the lesion directly or indirectly triggering language impairment. Later, researchers realized that the use of neuroimaging techniques can further strengthen such outcomes. Functional imaging further facilitates the work of contemporary scientists in unconvering the organization of various linguistic and cognitive tasks.

Aim
The aim of the study was to understand the neuroanatomical organization of language processing for passage reading, covert judgment of semantically related and unrelated tasks.

Method
Task 1, Silent reading of a standardized passage (the Rainbow Passage) of 98 words. Task 2, judgment of semantically related words presented at a rate of 10 pairs over 30 seconds. Task 3, judgment of semantically unrelated words presented at a rate of 10 pairs over 30 seconds taken from the Western Aphasia Battery.

Procedure
A normal adult female was scanned using a 3 tesla General Electric scanner. The visual stimulus for Task 1 was presented in a customized way to avoid artifacts associated with motor movement during manipulation of the stimuli. The auditory stimuli for Task 2 and Task 3 were presented through headphones within the scanner. In Task 1 the subject was instructed to read the passage covertly without moving her head. In Task 2 and Task 3 the subject was asked to judge if the words were semantically related or not. The “Functool” software was used for analysis.

Results
The data obtained from thirty one oblique axial slices suggests that the areas primarilyresponsible for silent reading were left superior and middle frontal gyrus and precentral gyrus. The neuroanatomical correlates for covert judgment of semantically related words were mainly identified as right cerebellum, and left inferior temporal lobe. The primary areas of activation for semantically unrelated task were bilateral cerebellar hemisphere, bilateral temporo occipital lobe, left hippocampus,and left parahippocampal gyri.

Conclusion
Results from Indefrey and Levelt (2000) also revealed that a number of areas were responsible for performing a single task. Activation of several neuroanatomical sites for each specific task suggests that there is involvement of a number of neuronal structures in language processing. In spite of this execution of these tasks can occur very dexterously and spontaneously because of fine tuning of neuronal networks. The clinical implications of these studies can be to understand the qualitative and quantitative relationship between neuroanatomical sites and the corresponding cognitive and linguistic functions.

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Presented by: **Kumar, Vijay**

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19. Longitudinal Recovery of Repetition and Comprehension in Aphasic Stroke Patients

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Introduction
Repetition (REP) and comprehension (COMP) are two prototypical tasks which preferentially involve dorsal and ventral processing streams: REP is subserved by a temporal-premotor network which interacts via a dorsal pathway along the arcuate and superior longitudinal fascicle (AF/SLF), while COMP involves a temporal-prefrontal network which interacts via a ventral pathway along the extreme capsule (EmC) (Saur et al., 2008).
In the present study, we investigated the longitudinal recovery of REP and COMP in aphasic stroke patients within these neuroanatomical frameworks.

Methods
We report preliminary data of three aphasic patients (P1-P3), who suffered from an embolic stroke of the left MCA-territory. Within one year post stroke, six consecutive examinations (Ex1-Ex6) were performed from the acute to the chronic phase. At each examination patients were investigated with an fMRI REP and COMP task. From an aphasia test battery, composite scores for REP and COMP were computed. In single subject repeated measures analyses (SPM8), scores for COMP and REP were correlated with activation in the respective tasks.

Results
P1 suffered from a left middle MCA infarction affecting central regions as well as the dorsal AF/SLF system (COMPEx1/Ex6 = 0.71/0.99; REPEx1/Ex6 = 0.64/0.92). Highest correlation between test scores and activation was found in preserved left frontal areas for both REP and COMP.
P2 revealed a left temporo-parietal lesion (COMPEx1/Ex6 = 0.95/1.00; REPEx1/Ex6 = 0.20/0.90). In this patient highest correlation between language performance and activation was found in perilesional posterior temporal cortex in both tasks and additional activation in right posterior temporal regions in the REP task.
P3 suffered from a left frontal stroke mainly affecting subcortical tissue including the insula and the ventral EmC fiber system (COMPEx1/Ex5 = 0.53/0.95; REPEx1/Ex5 = 0.65/0.98). Correlation between test scores and activation was mainly found in perilesional frontal tissue and homologue right frontal areas.

Discussion
In sum, these preliminary results demonstrate how longitudinal recovery of REP and COMP correlates with activation in perilesional, preserved left as well as homologue right language areas. We propose that functional reconnection of these areas along dorsal and ventral white matter pathways plays an important role for functional recovery. Further investigations of patient subgroups with lesions affecting distinct components of these processing streams are necessary to identify specific patterns of reorganization depending on lesion site and functional impairment.

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Presented by: **Kuemmerer, Dorothee**

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20. Factor Analysis of the Data from the Mandarin Chinese BDAE

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Factor analysis was performed on 39 variables of the Mandarin Chinese version of the Boston Diagnostic Aphasia Exam (BDAE). Five factors were isolated from the data on 258 aphasic subjects. The first was clearly related to the writing subtests, excluding those for Mechanics of Writing. Factor Two was a composite of both auditory and reading comprehension tasks, including Word Discrimination, Body-Part Identification, Commands, Complex Ideational Material, Symbol and Word Discrimination, Word Recognition, Word-Picture Matching, and Reading Sentences and Paragraphs. Factor Three was a speech production factor, most heavily representing Repeating Phrases. Factor Four was most typified by the rating scales, including Melodic Line, Phrase Length, Articulatory Agility, Grammatical Form, Paraphasias in Running Speech, and Word Finding. Factor Five was highly selective for the Agility tasks, including Oral (nonverbal) Agility and Verbal Agility. The common mechanisms underlying the different language tasks were inferred and will be discussed. A comparison with the results of the factor analysis based on inclusion of all the measures in the English version of BDAE (Goodglass and Kaplan, 1983) will also be

presented.

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Presented by: **Lu, C.-C.**

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21. Magnetoencephalography of Language: New Approaches to Understanding the Cortical Organization of Chinese Processing

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Background and Purpose
Chinese is a logographic language, which is different from alphabetic languages in many psycholinguistic characteristics. For instance, the tone in Chinese is one of the critical elements at the syllable level. There is no segmental correspondence between the character and syllable. The visual form of most characters can more or less provide cues to the meaning of each character. Although one-character morphemes are prevalent in Chinese corpora, some Chinese morphemes are composed of multiple characters. These distinctive characteristics of Chinese compared to alphabetic scripts might lead to different neural bases underpinning Chinese language processing. This study aimed to investigate the brain language centers for processing Chinese information in healthy Chinese speakers using Magnetoencephalography (MEG).

Methods
Ten healthy native Chinese speakers (six male, four female; age range: 28-37 years old) participated in this study. They were postgraduates and had no history of language disorders.
Our stimuli contained 180 Chinese characters: 90 real characters and 90 pseudo characters. The real characters were common in Chinese corpora (e.g., 纸, /zhi3/, paper). The pseudo characters were constructed by changing the strokes or logographemes of real characters (e.g., 疒). The two types of characters were matched for stroke number. The 180 characters were presented in pseudo-random order. Each character was visually presented for one second on the screen, following a one-second interval. The subjects were required to read silently the existing characters and to view the pseudo characters.
We used a 151 Channel MEG System to record the pattern of brain activation while the subjects performed the above task. The magnetic reaction with a latency of 100ms was treated as the early elements produced by vision. We therefore just selected the metaphase and late elements between 150ms and 700ms. We then carried out the analysis of the induced language stimulation, calculated the elements of stimulation reaction through a synthetic aperture magnetometry model, and obtained the position parameter of the reaction element doublet.
We then filtered the calculated doublet and combined the doublet figure and the MRI image. This allowed us to obtain information regarding the brain areas supporting language functions.

Results
After the presentation of the character stimuli, two late magnetic reactions were elicited, and the left wave shape had a better polarization. The late elements of the reaction waves had similar wave shapes. The results indicated that Broca's area was located at the back of left gyrus frontalis inferior or gyrus frontalis medius and Wernicke's area was located at the left gyrus temporalis medius, gyrus temporalis superior, or gyrus supramariginalis. Wernicke's area was activated earlier than Broca's area (Figure 1).

Conclusions
The language lateralization of brain function in Chinese native speakers is in the left hemisphere. The Broca's and

Wernicke's areas in Chinese speakers correspond to the classical language centers found in alphabetic languages. In general, functional brain areas observed in Chinese speakers are similar to those in speakers of alphabetical script langauges.

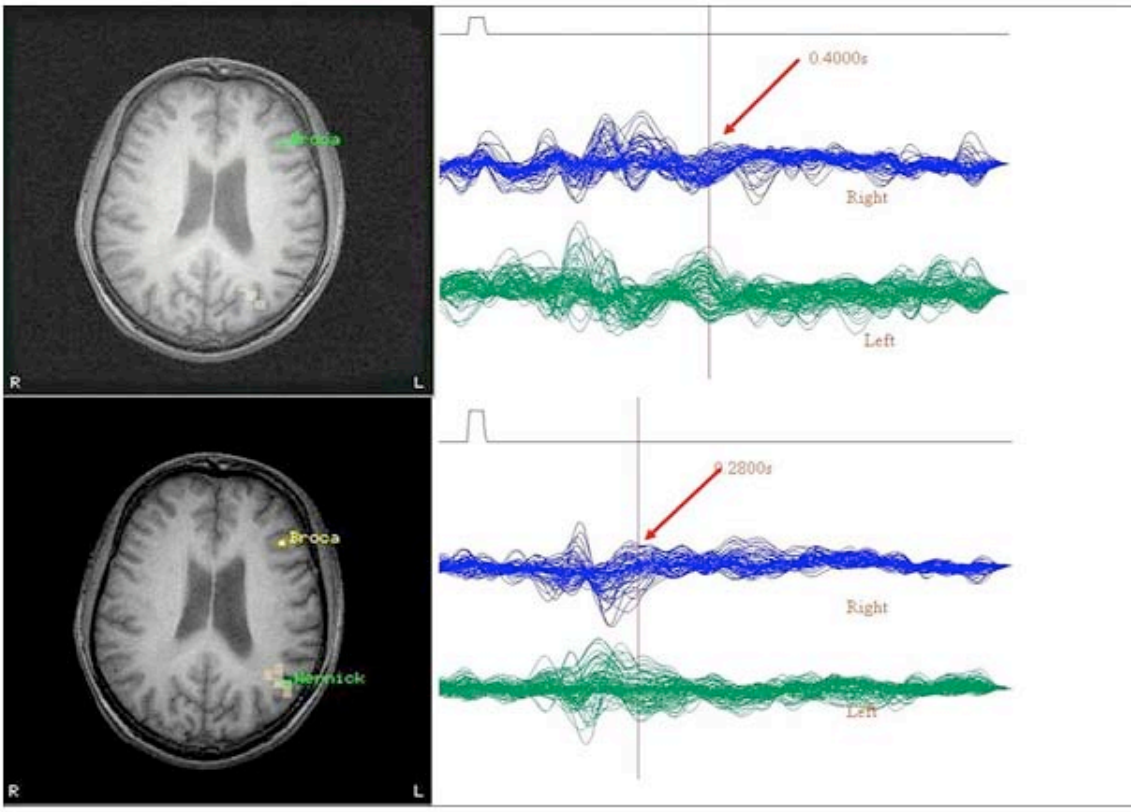

Figure 1 Language functional areas of a native Chinese speaker male

From the figure, we can see that both cerebral hemispheres induced two late magnetic reaction waves and the left wave shape had a better polarization; Broca's area appeared in 400ms after stimulation, located at the left gyrus frontalis inferior while Wernicke's area appeared in 280ms after stimulation, located at the left gyrus temporalis medius, and Wernicke's area appeared prior to Broca's area.

Presented by: **Yumei, Zhang**

Poster Session 1: Language in Context

22. A Multi-Level and Multi-Modal Framework for Analyzing Cantonese Aphasic Discourse Production: A Preliminary Proposal

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Background
Stroke survivors are often left with varying degrees of aphasia. Three major types of symptoms are commonly found in aphasia, including linguistic symptoms, speech symptoms, and symptoms of non-verbal behaviors. Despite the importance of these features for profiling the communicative abilities of language-impaired individuals, there is no comprehensive framework for assessing the production of Cantonese speakers with aphasia. Moreover, the development of such an analytic system must be based on a corpus of aphasic output that captures both verbal and non-verbal behaviors.

Method
Four speakers with aphasia (two fluent and two non-fluent) in Cantonese after a single stroke will participate in the investigation. Four age-, gender-, and education-matched normal speakers will participate as controls. Speech samples will be elicited through a protocol described by MacWhinney, Holland, Forbes, Spector, and Fromm (2008), including description of two single-pictures and two sequential-picture sets, and tasks of procedural-discourse, story-telling, and conversation.
The language samples collected will be phonetically and orthographically transcribed. The scripts will be linked to the digitized video and audio files and annotated using the Child Language Analyses computer program (MacWhinney,2003). The Codes for Human Analysis of Transcripts format in Chinese (Lee & Wong,1998) will be adopted for annotation of the linguistic properties, prosodic features, and gestural behaviors for further analysis.
The text-based analyses will include word level analysis, measurement of communication efficiency, degree of speech cohesion, coherence, syntactic complexity, and ungrammatical sentence structure. Concerning the prosodic analyses, the different levels of prosodic units in Tseng, Pin, Lee, Wang, and Chen's (2005) framework for fluent speech prosody will be annotated by identifying the boundary breaks using the modified ToBI system (Tseng & Chou,1999). The characteristic prosodic patterns will be measured in terms of the fundamental frequency, intensity, syllable and break duration, and speech rates. As for non-verbal behaviors, the employment of gestures, non-symbolic behaviors, props, writing or finger tracing, and drawing will be analyzed in terms of frequency, type, duration, rate, and accuracy of employment.

Conclusions
The results will allow us to evaluate how well the proposed multi-faceted analytic method can reflect differences between speakers with aphasia and controls, and among speakers with aphasia. They will further be modified as the aphasic data corpus is being established. It is believed that this initiative will provide the necessary foundation for research into theoretical and clinical issues related to Chinese aphasiology.

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Presented by: **Kong, Anthony Pak Hin**

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23. Wisdom in Words: The Relationship between Language Production and the Perception of Wisdom

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The nature of wisdom has been debated for centuries without reaching a consensus. We explore the ambiguity of wisdom by focusing on how it is transmitted and perceived through language. The language-wisdom connection is particularly pertinent because both may be affected by age. Wisdom is widely believed to accrue with age, but language production often declines with age. Another example comes from the common public misperception that individuals with aphasia are assumed to be intellectually impaired.

The study discussed here is a pilot for a larger project, itself part of a collaborative interdisciplinary project called "Defining Wisdom." In the larger study, we investigate the language-wisdom paradox by assessing how language declines with age, and relating these changes to listener judgments of the speakers' wisdom. The pilot study tested the hypothesis that perceived wisdom is influenced by aspects of language other than the message. Specifically, we proposed that higher grammatical complexity (in mean number of clauses) and lexical diversity (type-token ratio) would result in higher judgments of wisdom.

We constructed speech samples to simulate two different responses to each of two advice-giving scenarios, e.g. "A fifteen-year-old girl wants to run away from home. What would you tell her and why?" We then manipulated their grammatical complexity and lexical diversity, creating four versions of each response (see Table 1). The 16 written samples were presented to eight young adults, who rated the "speakers" on several dimensions shown to contribute to conceptions of wisdom (see Table 2). In addition to these wisdom ratings, participants indicated the extent to which they agreed with each response, and estimated the age and education of the speakers.

Each rating was analyzed using a 2x2 ANOVA (GCxLD). Grammatical complexity showed a marginally significant effect ($p=0.077$) in the predicted direction on only one wisdom rating (communication). Lexical diversity showed the predicted effect on two wisdom ratings: knowledge ($p=0.077$) and communication ($p=0.049$). High LD samples were judged to come from speakers with more education. Unexpectedly, the samples with high GC often received lower ratings than those with low GC. For one rating (alternative solutions), a significant interaction was found: high LD samples were rated higher than low LD samples, but high GC samples were rated lower than low GC samples. A similar reversal was shown when participants rated their agreement with the responses (more agreement with low GC-high LD responses).

In correlational analyses, four of the wisdom ratings showed high inter-correlations ($r>0.50$), indicating a large degree of overlap, as intended. The communication rating, however, showed lower correlations ($r<0.30$) with the other wisdom ratings, counter to our hypothesis. Agreement ratings were highly correlated ($r>0.50$) with all wisdom ratings except communication, suggesting that participants' wisdom perceptions were mainly influenced by the extent to which they agreed with the responses.

Two main conclusions were drawn from this pilot study. First, grammatically complex speech does not appear to portray wisdom. Second, perceived wisdom appears to depend largely whether or not the listener agrees with the speaker. Although language variables had relatively weak, and somewhat counter-intuitive, effects, we propose that testing these hypotheses with more participants, and including agreement as a covariate, will reveal subtle effects of language on wisdom perception. Findings will contribute to our understanding of the complex relationship between

language and cognition, and how these conspire to shape our perceptions of the elderly, including those with language impairments such as aphasia.

Table 1: Linguistic manipulations of responses. Grammatical complexity is indexed by mean clauses per utterance (MCU); lexical diversity is indexed by type-token ratio (TTR)

	High Grammatical Complexity		Low Grammatical Complexity	
	MCU	**TTR**	**MCU**	**TTR**
High Lexical Diversity	2.26	0.649	1.21	0.676
	2.33	0.631	1.22	0.660
	2.41	0.632	1.23	0.627
	2.46	0.633	1.24	0.634
Mean	***2.37***	***0.636***	***1.23***	***0.649***
Low Lexical Diversity	2.30	0.416	1.23	0.404
	2.32	0.408	1.21	0.412
	2.59	0.400	1.32	0.419
	2.39	0.404	1.30	0.403
Mean	***2.40***	***0.407***	***1.27***	***0.410***

Table 2: Wisdom rating scales.

Personal Characteristics	**Strongly Agree ---------- Neutral ---------- Strongly Disagree**
1. This person is knowledgeable.	7 ------- 6 ------- 5 ------- 4 ------- 3 ------- 2 ------- 1
2. This person is perceptive.	7 ------- 6 ------- 5 ------- 4 ------- 3 ------- 2 ------- 1
3. This person considers alternative solutions.	7 ------- 6 ------- 5 ------- 4 ------- 3 ------- 2 ------- 1
4. This person is sensitive to the feelings of others.	7 ------- 6 ------- 5 ------- 4 ------- 3 ------- 2 ------- 1
5. This person communicates ideas well.	7 ------- 6 ------- 5 ------- 4 ------- 3 ------- 2 ------- 1
6. I would give similar advice.	7 ------- 6 ------- 5 ------- 4 ------- 3 ------- 2 ------- 1

7. How old do you think the speaker is?

a) 21-30 **b)** 31-40 **c)** 41-50 **d)** 51-60 **e)** 61-70 **f)** 71-80 **g)** 81-90

8. How educated do you think the speaker is?

a) Some High School **b)** High School Diploma **c)** Some College **d)** College Degree **e)** Graduate Degree

Presented by: **Gordon, Jean**

24. Repetition as Pragmatic Function in Left and Right Hemisphere Damage

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Introduction
The use of "pragmatic repetition," the iteration of one's own speech or the speech of a co-participant during discourse, has been overlooked in studies of language sciences and disorders (Johnston, 1994; Tannen, 1987). In adult communication disorders, repetition is commonly described from a pathological perspective (Cristman, Bousten, & Buckingham, 2004) or used as a formal diagnostic parameter in aphasia. The use of pragmatic repetition in aphasic speech has not been systematically investigated. The purpose of this study is to examine spontaneous repetition in the verbal discourse of individuals following left hemisphere (LH) and right hemisphere (RH) brain damage. The hypothesis is that LH and RH damaged subjects use repetition in different amounts and for different functional purposes in spontaneous speech.

Method
A method was developed for measuring repetition in discourse. It was determined that using the morpheme as the basic unit of measure, incidence can be reliably quantified, and factors or subtypes such as localness of repetition, preservation of the original form, source, unit of speech, function of repetition, and formulaicity can be exactly determined. The study analyzed repetition using transcripts of discourse by stroke patients with damage to either the left hemisphere, resulting in a fluent aphasia, or right hemisphere, compared to matched normal-control speech samples.

Results
Significantly higher use of repetition by LH (27%) than NC subjects (18%) was observed ($t(8) = 2.383$, $p = 0.044$). (Figure 1). The single outlier in the LH group had the highest BDAE severity score (3.5), indicating the mildest aphasia. The LH group used significantly more repetition of formulaic expressions (57%) than the RH group (30%), ($F(2, 12) = 4.984$, $p = 0.027$). Subtypes of repetition, including preservation of initial expression, source of repetition, and unit of speech differed between groups. Significantly fewer repetitions were used by the LH group (25%) for the function of enhancing the content of talk as compared to the normal control group (40%), reflect greater use for social enhancement of talk ($t(8) = -2.514$, $p = 0.036$). In contrast, the RH group used the smallest percentage of repetition for the function of socialization (15%).

Discussion
Findings from this study clarify repetition as a normal component of spontaneous verbal discourse and provide new information on how hemispheric neurological damage impacts its use. These results support descriptions of the RH-damaged population as compromised in pragmatic and social skills. Examination of other forms of disordered speech suggests that repetition becomes pathological when used entirely in place of novel language, such that linguistic content is severely impoverished.

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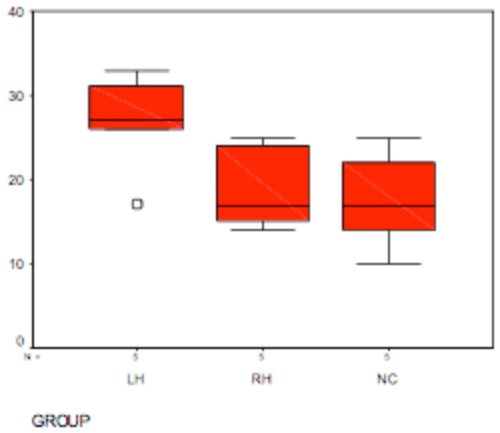

Figure 1. Boxplot – Percentage of Repeated Morphemes

Presented by: **Wolf, Rachel**

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25. Impaired Theory of Mind and Irony Comprehension in Parkinson's Disease

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Idiopathic Parkinson's disease (PD) is associated with difficulties in processing pragmatic language. Specifically, changes within the fronto-striatal pathways in PD often lead to a decline in executive resources needed for higher level language processing (Monetta et al., 2008). Recognizing verbal irony necessitates the use of pragmatic knowledge to arrive at the intended meaning. One factor that appears to be critical for understanding verbal irony is an individual's theory of mind ability (ToM; Martin & McDonald, 2003). In the present study, we evaluated non-demented PD patients' ability to differentiate verbal irony from lies, and we investigated whether any deficits uncovered were associated with the ToM ability and/or with specific cognitive features of the PD patients.

Methods
Participants
Eleven English-speaking adults with PD (without dementia) and 11 age-, education- and gender-matched healthy controls (HC) participated in the experiment.
Materials & Procedure
Participants completed a battery of standardized neuropsychological tests. In the main experiment, subjects were presented with 12 pragmatic interpretation stories (see Winner et al., 1998). Each story described a situation where one person (the witness) observed another person (the protagonist) doing something sneaky. Half of the items were lie stories and half were irony stories, presented in a fixed random order. Six questions were asked at different time points during each story: 1) fact question, 2) first-order belief question, 3) second-order true or false belief question, 4) second-order belief follow-up question, 5) second order expectation question, and 6) pragmatic interpretation question.

Results
Both groups were highly accurate in responding to fact questions, indicating that they were able to understand the stories. PD participants exhibited errors in answering first-order belief questions, indicating that they had difficulty in drawing inferences [$F(1,20) = 6.23$, $p < .05$]. PD patients were also significantly less accurate overall in answering questions based on second-order beliefs [$F(1,20) = 8.54$, $p < .01$]. There was also a significant difference between HC and PD participants for the pragmatic interpretation questions [$F(1,20) = 4.69$, $p < .05$]. The ability to

make pragmatic interpretations was correlated with the ability to attribute second order beliefs (ToM) and with certain estimates of frontal lobe functioning in the PD group.

Discussion
The current findings argue that second-order ToM attributions and executive resource functions such as working memory in PD contribute in an overlapping manner to pragmatic abilities such as irony comprehension. This could be due to the common reliance of these functions on the fronto-striatal circuitry, which is progressively compromised in the course of the disease.

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Presented by: **Monetta, Laura**

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26. Techniques for Eliciting and Comparing Narratives Obtained Within Aphasia Community Groups

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The purpose of this pilot study was to investigate the differences in language patterns between aphasic, healthy elderly and demented subjects. A small group of volunteer participants were administered a language sampling task adapted from the work of Anne Basting (2002). Preliminary results suggested that collection of narratives is a potentially useful diagnostic and therapeutic technique particularly in the community group environment. This is essential in providing quality care to those individuals who depend on services of this nature to support or maintain their language recovery.

Statement of problem
To investigate the differences in narrative style among healthy elderly, demented and aphasic clients using a conversational analysis approach

Procedures
Participants recruited from local community groups were engaged in a picture description task using the same stimuli. Participants were given minimal prompts consisting of open ended and closed questions designed to elicit independent discourse.

Results
The differences in qualitative and quantitative language of 3 subject groups can be obtained through a dynamic conversational paradigm, revealed differences consistent with expectations based on the literature. This encourages the use of the storytelling techniques and methodology in a naturalistic setting for elicitation of diagnostic language samples and suggest therapeutic modalities that may be useful in aftercare programs.

Conclusion
Due to limited sample size and pilot nature of this study, conclusions are limited at present. However, a more formalized indepth study of these patient groups is under way and shows promise for the evaluation of language changes associated with neurogenic disease in a differential fashion. Using discourse analysis models, assessment can be gained that is useful in augmenting traditional formal tests.

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Presented by: **Georgiou, Anastacia**

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27. Communication Across Dementia Progression

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This study explores the impact of dementia progression on communication by examining verbal and non-verbal communication in people with mild through to the advanced stages of Alzheimers' disease (AD). Video clips of 20 people with different stages of dementia interacting in a one-to-one session were coded for non-verbal communication such as imitation. The corresponding transcripts of the sessions were coded for verbal communication such as amount of vocabulary. Verbal indicators such as vocabulary declined as dementia severity increased. However the fundamentals of communication were present across all stages and became more pronounced as severity increased.

Introduction
The decline of different aspects of spoken language in people suffering from Alzheimer's disease (AD) has been well documented. However, it is possible that nonverbal communication, i.e. the behaviours humans possess from birth, may be functional even into the advanced stages of dementia (Astell & Ellis, 2006; Ellis & Astell, 2008). This study examines verbal and nonverbal communication in people at different stages of dementia with a view to elucidating the changes that occur in communication as the disease progresses.

Method
Twenty people with AD (mean age 83 years) were divided into four groups of five each based on MMSE score: Mild (19-24), Moderate (13-18), Severe (7-12) and advanced (MMSE<0) plus a control group of five healthy older people (MMSE 27–30).

A verbal coding scheme was devised based on Ripich, et al. (1997). A nonverbal coding scheme was developed using the ObserverTM system. A second rater coded 20% of all video clips and transcripts. Vocabulary size and imitation are reported here.

Results
The mean amount of vocabulary declined as dementia severity increased (Table 1; $H = 7.81$, $df = 3$, $p < .05$). A Jonckheere test revealed that the healthy controls ($p<.05$; median = 139) had significantly larger vocabularies than the severe dementia group (median = 108). In terms of nonverbal behaviour, imitation occurred at all stages of dementia (Table 1). Multiple comparisons revealed that the advanced dementia group (median = 4) used imitation significantly more than the control group (median = 0), however no other differences between groups were found.

Discussion
The findings suggest that as speech utility declines with dementia progression, the role of nonverbal communication increases. The findings suggest that there is potential for developing interventions to promote communication with people with advanced dementia based on nonverbal behaviour.

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Table 1. Mean (SD) vocabulary size and occurrence of imitation in the five participant groups

	Controls	Mild	Moderate	Severe	Advanced
Total vocabulary	145.6 (14.44)	117 (25.95)	99.2 (22.94)	81.2 (40.12)	
Imitation	0 (0)	0 (0)	2 (2.45)	0.6 (1.2)	4.4 (2.58)

Presented by: **Astell, Arlene**

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28. How the Brain Grasps Pragmatic Meaning Through a Metaphorical Lens: fMRI and ERP Evidence in Favour of the Extra-linguistic Hypothesis

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Introduction
The last decade has witnessed an increasing interest toward the neural mechanisms supporting metaphor comprehension. However, the literature suffers from a poor consideration of the phenomenon of metaphor in the broader picture of human cognition. Past research has focused on whether figurative meaning specifically engages regions in the right hemisphere, and whether these regions are recruited in a dual-step fashion: a wide variety of clinical, fMRI and ERP results disconfirms the traditional hypotheses [1,2,3]. But the question is: why is metaphor so interesting? Metaphor is a use of language where the gap between the linguistically encoded meaning and the pragmatic meaning is especially obvious. Speakers are able to fill such a gap by integrating contextual elements. Speaking metaphorically, metaphor offers a lens through which we can observe how the brain integrates language and context into pragmatic representations, which appears as one of the most timely topics in the neuroscience of language [4]. Here we present novel fMRI and ERP data on metaphor comprehension, along with a tentative account of pragmatic processing in the brain.

Results
The experimental design was based on the comparison between passage-pairs, e.g.: "Do you know what that fish is? A shark." (literal) / "Do you know what that lawyer is? A shark." (metaphorical). Modulations of familiarity and discourse information were included. The fMRI experiment showed that, compared to literal passages, metaphors activate a diffuse bilateral network, including frontal, temporal and parietal regions. In the ERP study, metaphor comprehension significantly elicited two components, i.e., the traditional N400 and the P600. Moreover, we observed a strong effect of familiarity and discourse, which seem to modulate especially temporal regions and the N400 component.

Conclusion
In light of similar results reported for other context-dependent uses of language [4], we ventured in the attempt of sketching a neuro-functional model of pragmatic processing. Our findings support a network model involving a linguistic system, plus an extended system responsible for context elaboration and related to extra-linguistic high-order functions (memory, attention, theory of minds, imagery). The recruitment of such a network is likely to be differently modulated – both spatially and temporally – depending on the specific contextual coordinates. In the clinical perspective, a similar model allows us to motivate pragmatic impairments across a variety of clinical populations: because pragmatics draws upon many different interacting sub-systems, similar pragmatic deficits may

result from different dysfunctions in the system.

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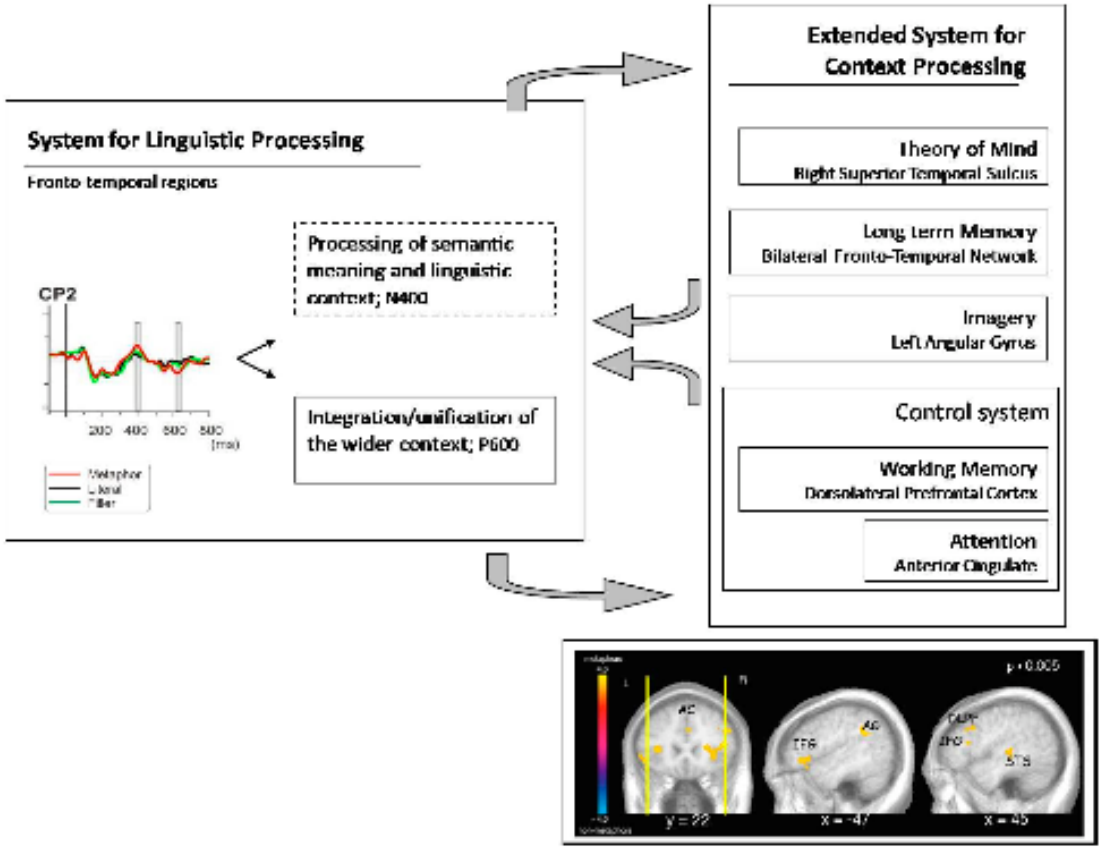

Presented by: **Bambini, Valentina**

29. Dialogue Inference Performance of Bilingual Brain-Damaged Subjects

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Recent research has suggested that the processing of language inference is performed mainly by the right hemisphere. In this study, we investigated the language inference performance of bilingual Mandarin and Taiwanese-speaking brain-injured subjects.
Two dialogue-inference tests were designed, one in Mandarin Chinese and one in Taiwanese. Four right hemisphere-injured subjects, five left hemisphere-injured subjects, 195 Mandarin-speaking control subjects and 215 Taiwanese-speaking control subjects were tested. The brain-injured subjects were Mandarin-Taiwanese bilinguals. They possessed native or near-native proficiency in the language being tested before stroke onset. All of them had sustained single CVAs, were 1 year post stroke onset, right-handed, and without any previous history of major neurological or psychiatric disease. For each subject a language background questionnaire and self-evaluation were collected. In addition to the Mandarin and Taiwanese dialogue-inference tests, the brain-injured subjects were also tested with the Mandarin version of the WAB (Western Aphasia Battery) and the Taiwanese version of the WAB. The Mandarin control subjects were tested with the Mandarin version of the dialogue-inference test and Mandarin version of WAB. The Taiwanese control subjects were tested with the Taiwanese version of the dialogue-inference test and the Taiwanese version of the WAB.
The control subjects' data were analyzed according to different education and age levels. Their error patterns were compared with the results of the brain-injured subjects. Results revealed that the dialogue inference performance of the two languages were not highly correlated. Analyses also explored the factors of age of acquisition, language dominance and lesion site (examined with MRI scans). Finally, additional analyses compared their performance on the WAB and dialogue inference tasks.

Presented by: **Lu, Ching-Ching**

Poster Session 1: Idioms and Formulaic Language

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30. Language Decline in Alzheimer's Disease: The Influence of Age of Onset

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Introduction
In addition to a loss of memory, Alzheimer's disease (AD) is known for decline in language. Individuals with AD often use higher frequency lexical items, but the literature is divided on whether there is a decline in linguistic complexity (Garrard et al., 2005; Kemper et al., 2001). The status of formulaic language, including formulaic, idiomatic and conventional expressions, is less well documented in AD speech. Interest in formulaic language has recently increased (Wray, 2002). We examined lexical frequency, linguistic complexity, and formulaic expressions in discourse obtained from persons diagnosed with AD.

Method
Discourse samples were collected from eleven individuals with AD (3 years post-diagnosis) and five age-matched normal controls (NCs) (M age = 63.30 years, SD = 13.79). The AD group was further divided into younger (M age = 53.80 years, SD = 5.54; M MMSE = 14.60, SD = 4.92) and older groups (M age = 85.50 years, SD = 3.94; M MMSE = 18.67, SD = 1.63). We obtained mean frequency ratings for lexical items (nouns, verbs, adjectives)

(Francis et al., 1982) and analyzed linguistic complexity by categorizing utterances into clausal components. Finally, words in formulaic expressions as a proportion of total words were calculated and compared between groups.

Results
Although AD subjects used higher frequency words over all, significant differences were not found for lexical frequency between either AD group or NCs. Additionally, there were no significant differences in linguistic complexity between either AD group or NCs, although differences in subordinate clause use approached significance, with the younger AD group using fewer. For formulaic expressions, significant group differences were seen $F(2,13) = 4.08$, $p < .05$. Younger AD subjects had a larger percentage of words ($M = 31.82$, $SD = 4.79$) in formulaic utterances than older AD subjects ($M = 22.65$, $SD = 6.84$) and the NCs fell between AD groups ($M = 24.56$, $SD = 4.11$) (Figure 1).

Discussion
The nonsignificant trends for younger AD persons to show more high frequency lexical items and less linguistic complexity than the other comparison groups merits further study. A significant difference between older and younger AD groups in use of formulaic expressions was observed. The evidence presented here suggests that younger individuals with AD are more severely affected than their older AD counterparts in that they utilized fewer novel utterances and rely more on over-learned formulaic expressions in discourse.

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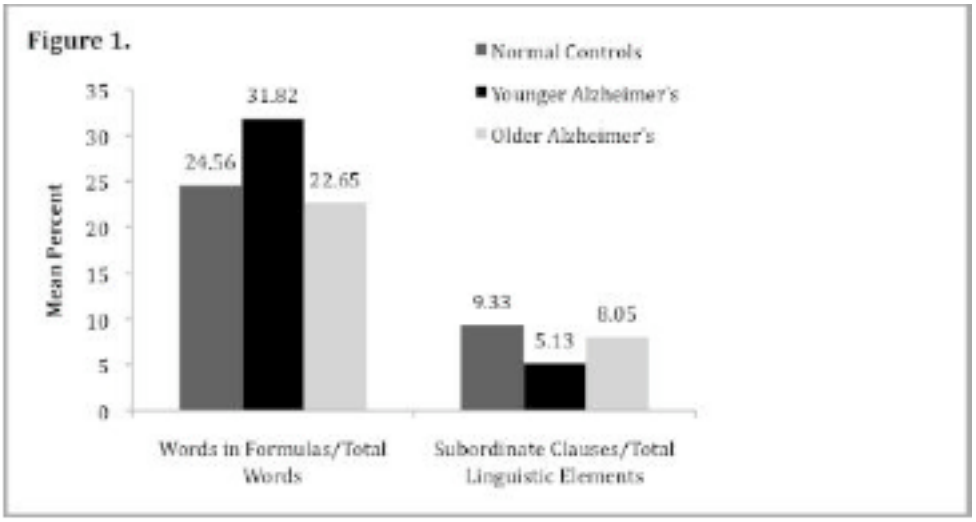

Presented by: **Bridges, Kelly**

31. Script Generation in Mild and Moderate Alzheimer's Disease

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Introduction
Individuals with Alzheimer's disease (AD), who display a prominent decline in episodic and semantic memory (Kazui et al., 2003; Pekkala, 2004), tend to produce significantly fewer events for scripts but more events that fall outside the script boundaries, thus producing less informative scripts than healthy age-matched controls (Grafman et al., 1991). The present study examines how the degree of dementia affects the generation and informative content of scripts in AD.

Methods
Ten people with mild AD (miAD), 10 with moderate AD (moAD) and 10 normal controls (NC) matched for age, gender, and education, were asked to produce as many script events as possible in response to two questions: "What do you do between waking up and having lunch?" (the morning script) and "What happens at a doctor's appointment?" (the doctor script). Sixty seconds were allotted for each response. The scripts were scored for the total number of events (e.g., "taking a shower" / "waiting in the waiting-room"), the number of event repetitions, and the informativeness of the content (the ratio between the total number of the words produced for the script and the words used for the events).

Results
A Kruskal-Wallis test revealed a statistically significant difference among the participant groups in the total number of events produced and in the informativeness of the content but not in the number of event repetitions (Table 1). Pairwise analyses, conducted using the Mann Whitney U test, revealed that the miAD group ($U = 22.5$, $p < .05$) and the moAD group ($U = 0.5$, $p < .001$) produced significantly fewer events for the morning script than the NC group. The moAD group generated significantly fewer events for the doctor script than the NC group ($U = 10.5$, $p < .05$) and the miAD group ($U = 18.0$, $p < .05$). Compared to the NC group, the level of informativeness was significantly lower in the morning script generated by the miAD group ($U = 3.0$, $p < .001$) and in both scripts produced by the moAD group (the morning script: $U = 8.0$, $p < .001$; the doctor script: $U = 6.0$, $p < .001$). The informativeness of the doctor script was significantly lower in the moAD group than in the miAD group ($U = 23.0$, $p < .05$).

Conclusions
Our findings indicate that a reduction in the number of events and informativeness of scripts can be found early in AD, but script generation becomes quantitatively and qualitatively more impaired as the disease progresses into the moderate stage. This deficit can be explained by declining episodic and semantic memory in AD (Grafman et al., 1991; Kazui et al., 2003; Pekkala, 2004).

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Table 1

Performance of the NC group, the miAD group, and the moAD group on the script generation tasks

Variables	Morning script					Doctor script				
	NC (n = 10)	miAD (n = 10)	moAD (n = 10)	H (df = 2)	p	NC (n = 10)	miAD (n = 10)	moAD (n = 10)	H (df = 2)	p
Number of events										
Mean (SD)	9.6 (2.4)	6.2 (3.5)	3.1 (2.2)	14.987	.001	7.0 (2.8)	5.0 (2.7)	1.9 (2.7)	11.533	.01
Range	6.0–14.0	0.0 – 11.0	0.0–6.0			2.0–12.0	1.0–10.0	0.0–8.0		
Number of repetitions										
Mean (SD)	0.4 (0.7)	0.3 (0.7)	0.4 (0.7)	.261	.878	0.3 (0.5)	0.1 (0.3)	0.0	3.904	.142
Range	0.0–2.0	0.0–2.0	0.0–2.0			0.0–1.0	0.0–1.0			
Informativeness ratio (%)										
Mean (SD)	73.6 (15.6)	34.6 (15)	28.5 (26.9)	15.891	.001	63.5 (22.3)	38.4 (26.1)	15.6 (16.3)	12.681	.01
Range	45.5–94.3	0.0–47.7	0.0–90.5			9.6–83.9	10.3–85.1	0.0–37.0		

Presented by: **Pekkala, Seija**

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33. Measuring Conversation Change in People with Agrammatic Aphasia

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Issue
Conversation Analysis (CA) has shown that utterances produced by agrammatic speakers in everyday conversation differ significantly from utterances elicited by assessment and therapy tasks (Beeke, Wilkinson & Maxim, 2007). As part of a new intervention for agrammatism focussing directly on grammar in conversation, a measure of change in conversation is being developed to analyse (i) stability in pre-therapy conversations and (ii) any change in post-therapy conversations. Previous research has found that CA can indicate reliability over time in (i) consistency in the nature of trouble sources and (ii) the mechanisms participants use to deal with them (i.e. strategies of both speakers) (Perkins, Crisp & Walshaw, 1999).

Method
Ten dyads where one person has agrammatic aphasia are being studied in three phases of eight weeks each: assessment, therapy and post-therapy assessment. A battery of impairment, activity/participation tests and interviews are administered and each dyad video-records a weekly 20 minute conversation during the assessment phases. Therapy is based on the SPPARC conversation training programme (Lock, Wilkinson & Bryan 2001), with a novel focus on turn construction.

Results
Preliminary analysis suggests that a small number of turn-based measures may capture change. Because the intervention does not target impairment, differentiation between agrammatic versus non agrammatic turns is not likely to be a key feature of post therapy change. Successful intervention is measured by change (i) in the aphasic speaker's turn (still agrammatic but more communicative and/or complete) and (ii) in the partner's response (quicker/more successful repair or no need for repair: partner responds to meaning; see table below).

Discussion
Within applied CA, there is growing acceptance of quantification if the analysis counts sequences that have the same

interactional function, not the same surface structure. Because conversational activities occur on the basis of interactional opportunity, and not time, it is vital to use proportions of any interactional function in relation to the total number of turns, not number of occurrences per time unit. A fine-grained interactional description of a sequence is key to making quantification valid.

References:
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Lock, S, Wilkinson, R. & Bryan, K. (2001). SPPARC (Supporting Partners of People With Aphasia in Relationships and Conversation): A Resource Pack. Bicester: Speechmark.
Perkins, L., Crisp, J., & Walshaw, D. (1999). Exploring conversation analysis as an assessment tool for aphasia: The issue of reliability. Aphasiology, 13, 259-281.

Roy takes a long agrammatic turn but it is complete and meaningful in context; *Di's* repair is quick and she then responds to the meaning of Roy's turn.

1	→	Roy	uh- u::::: e- interesting actually, (0.3) uh-
2	→		bu- bi- because- (2.4) er now, (2.1) me:,
3		Di	m
4	→	Roy	(0.3) I:, (0.9) think no, (0.5) er=er- (0.7) u=special. (0.3) honestly.
5		Di	what, working with children.
6		Roy	yeah, definitely.
7		Di	yeah, not everyone can do it can they?

Presented by: **Maxim, Jane**

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34. The Effects of Neurological Damage on Formulaic Language

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New York University

Background
Interest in formulaic language, including speech formulas, idioms, proverbs, sentence stems, and other fixed expressions (Wray, 2006), has increased in recent years. Although proportions differ with speaker, topic, and context, about 25% of normal discourse consists of formulaic language. However, despite traditional attention to "automatic speech" in aphasia, little systematic investigation of the effect of left (LH) or right hemisphere (RH) damage on formulaic expressions has appeared. This presentation reviews recent findings of neurogenic effects on formulaic language and the implications for clinical evaluation and treatment.

Method and Results
New methods of classification and analysis (Van Lancker Sidtis & Postman, 2006) revealed that LH damaged subjects used significantly more formulaic expressions (29.5%) than matched healthy subjects (24.6%), and that persons with RH damage (16.5%) had reduced incidence of formulaic expressions ($F(2, 12) = 7.343$, $p < .01$). Mean numbers of formulaic expressions also differed significantly for each group (RH: 54.6, LH: 80.0, and NC: 70.4). In several documented cases of aphasic recovery, the larger portion of fluent speech consists of formulaic expressions. A recent study of single cases suggested a possible role of subcortical nuclei in production of formulaic expressions (Sidtis, et al., in press). Examination of the spontaneous speech of four stroke patients with left, right, or subcortical damage, compared to speech samples obtained from 10 healthy speakers, demonstrated that brain damage affected formulaic language competence differently, with a significantly ($p < 0.05$) smaller proportion of formulaic

expressions in subjects with RH or subcortical damage compared to LH damaged or healthy speakers. Proportions for two subjects with subcortical damage were 16.9% and 11.0%; for the RH subject, the incidence was 16.1%; the LH damaged person showed a proportion of 53.8% of words in formulaic expressions. In the first subject, premorbid speech supported a causal role of subcortical nuclei in diminished formulaic production: Patient 1's premorbid tally of 18.3% was not significantly different from normal (Figure 1).

Conclusions
These findings converge with studies from Parkinson's, Alzheimer's and schizophrenic speech that support the proposal of a RH/subcortical circuit in the management of formulaic expressions, based on a dual-process model of language incorporating novel and formulaic language use. An overview of the effects of neurological damage on formulaic language reveals excess as well as impoverishment of this aspect of pragmatic competence. Clinical implications include the valid evaluation of aphasic speech, differentiating formulaic from novel language, and utilizing formulaic language for communication.

References
Sidtis, D. Canterucci, G., & Katsnelson, D. (2009). Effects of neurological damage on production of formulaic language. Clinical Linguistics and Phonetics, in press.
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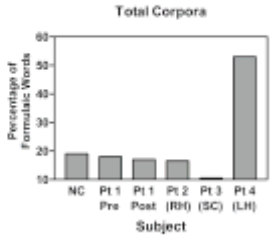
Wray, A. (2002). Formulaic language and the lexicon. Cambridge, UK: Cambridge University Press.

Figure 1. Words in formulaic expressions in normal control (NC) subjects, Patient 1-subcortical damage (SC) (pre- and post-morbid); Patient 2-RH damage, Patient 3-subcortical damage, and Patient 4-LH damage.



Presented by: **Sidtis, Diana**

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35. Formulaic Language in Alzheimer and Parkinson Speech

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Introduction
Formulaic expressions (FEs) are integral in daily interactions. Previous studies showed decreased production of FEs in subcortical damage (Speedie, et al., 1993; Sidtis, et al., 2009). In contrast, clinical descriptions of Alzheimer's Disease (AD), a cortical dementia, reveal preserved FEs despite impaired cognition. We evaluated cortical and subcortical processing of FEs by examining spontaneous speech of persons with PD and AD, hypothesizing that subcortical structures play a role in FE production.

Method
Subjects: In this preliminary report, speech samples from 5 PD, 2 AD and 6 normal-control (NC) subjects matched

for age and education and native American English speakers, were studied.

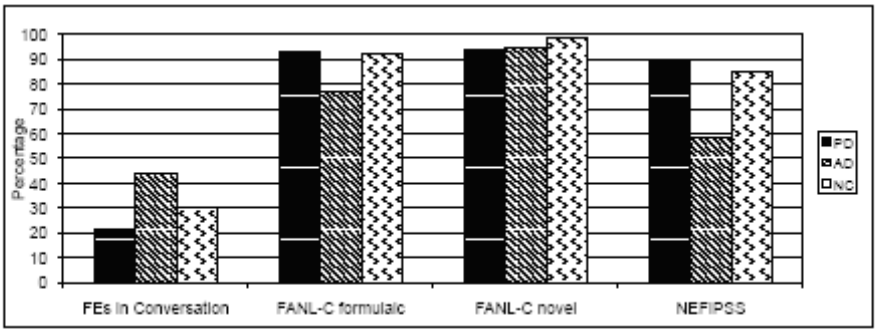
Materials and Procedure: Three protocols were used to examine production and comprehension of FEs: 1. A structured interview designed to elicit FEs in discourse; 2. Formulaic and Novel Language Comprehension Test (FANL-C), which uses line-drawings for responses; 3. The Northridge Evaluation of Formulas, Idioms and Proverbs in Social Situations (NEFIPSS), for which subjects choose a response to a described social scenario. The mean words in texts for PD subjects = 677.2; AD subjects = 538.5; and NC = 731. Transcripts were evaluated by two raters using methodology previously verified (Van Lancker Sidtis & Rallon, 2004).

Results
The PD group had the smallest proportion of FEs (21.6%), while the AD group had the highest (44%). The NC group (30.3%) fell between these values. FANL-C scores indicated intact formulaic and novel language comprehension by PD (93.0% & 94.0%) and NC groups (92.5% &. 98.3%), while AD subjects (77.0% & 95.0%) were impaired in the formulaic subtest. For the NEFIPSS, PD (84.7%) and NC (89.4%) groups performed similarly, while AD subjects performed poorly (58.3%) A Mann-Whitney test yielded a significant difference in FE proportion ($p < .05$) between PD and NC. In a 95% confidence interval procedure, the FEs for both AD subjects (55.4%, 40.2%) were significantly different from PD. FANL-C (formulaic) and NEFIPPS, comprehension tests, showed reduced performance for AD only (Figure 1 below).

Discussion
FE production is reduced in PD, but spared in AD where the basal ganglia are intact, likely reflecting procedural processes. Normal performance on the FANL-C and NEFIPSS in PD and NC indicates declarative knowledge of FEs. AD subjects had the highest proportion of FEs production in conversation, but the lowest comprehension scores (Kempler et al., 1988). Additional subjects are required for confirmation.

References
Kempler, D., et al.. (1988). Comprehension of idioms and proverbs by Alzheimer patients. Alzheimer Disease and Associated Disorders, 2, 38-49.
Sidtis, D. et al. (2009). Effects of neurological damage on production of formulaic language. Clinical Linguistics and Phonetics, in press.
Speedie, L.J., et al., (1993). Disruption of automatic speech following a right basal ganglia lesion. Neurology, 43(9), 1768-1774.
Van Lancker Sidtis, D., & Rallon, G. (2004). Tracking the incidence of formulaic expressions in everyday speech: methods for classification and verification. Language & Communication, 24, 207-240.

Figure 1. FE percentage in conversation and formal tests.



Presented by: **Rogers, Tiffany**

Poster Session 1: Morphology

36. Does Word Morphology Affect Vocabulary Knowledge and Word Retrieval in Old Age?

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Previous research has shown that vocabulary knowledge improves with age but at the same time age is associated with increasingly more word retrieval difficulties. The aim of the current study was to examine whether word morphology interacts with age-related changes in word knowledge and retrieval. We assumed that morphology processing would be insensitive to aging (Kavé & Levy, 2005) and hypothesized that morphological structure would contribute to vocabulary knowledge as well as alleviate age-associated retrieval difficulties.

Forty-eight neurologically intact native Hebrew speakers participated in the study, half young (mean age: 23.5) and half old (mean age 73.9). Three main issues were investigated: (a) the effect of word morphology on vocabulary knowledge; (b) the effect of age on morphological processing; and (c) the possibility that word morphology alleviates age-related retrieval difficulties. Two experimental tasks were constructed to address each of these issues.
(a) Vocabulary knowledge was examined through multiple-choice meaning identification questions, as well as through production of word definition. In each of these tasks, half of the target nouns contained a Semitic consonant root, and half contained no root. As expected, older adults had a greater vocabulary. Yet, unexpectedly, all participants performed more poorly when nouns contained a consonant root relative to nouns with no root.
(b) Age effects on morphological processing were examined through a paper-and-pencil identification of semantically and phonologically ambiguous roots, either by asking participants to determine whether two roots were related to each other or by asking them to produce a related word with a similar root. In both tasks, no age differences were found and all participants were sensitive to the morphological manipulations.
(c) The effects of word morphology on retrieval were investigated through two tasks of naming-to-definition. These tasks examined whether young and old adults experienced the same rate of tip-of-the-tongue (TOT) states and whether their performance was mediated by the degree of semantic and phonological transparency of the word's morphological structure. There were significantly more TOT states in the old group while young adults experienced more "don't know" cases. In both tasks, all participants experienced more difficulties in retrieving words that contained transparent consonant roots relative to words that contained opaque roots.

Our results show that all participants found words with transparent roots more difficult to retrieve than words with no roots. Advanced age was associated with greater word knowledge as well as with more TOT responses, but no differences in morphological processing were seen between old and young adults. These findings do not support the prediction that morphological transparency would be associated with ease of word retrieval, most likely because larger morphological neighborhoods interfere with correct word retrieval. The data shed light on existing models of word production, lexical representation, and processes of cognitive aging, and are thus highly relevant for aphasia research.

References:
Kavé, G., & Levy, Y. (2005). The processing of morphology in old age: Evidence from Hebrew. Journal of Speech, Language, and Hearing Research, 48(6), 1442-1451.

Presented by: **Kavé, Gitit**

37. Testing Cue-Cost and Cue-Validity Concepts on Inflectional Morphology-Error Pattern in a Kannada-Speaking Individual with Agrammatism

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Cross-linguistic error patterns in agrammatic speech have been fairly well-explained by the concepts of cue-cost (associated with computational factors) and cue-validity (associated with informational value) (Bates et al., 1991), but to date this analysis has not been applied to an agglutinative language like Kannada, a South Indian language where complex interplay between cue-cost and cue-validity obtain. In Kannada the noun/pronoun-inflections or case-markers and the verb-inflections are highly valid cues differing in costs. The dative is the only case-marker with three distinct forms, and the genitive case-marker has a phonologically less salient form than the other case-markers, making the genitive- and dative-markers higher in cost than the other case-markers. Verb-inflections carry multiple units of information such as tense, person, number, and gender, making them highly valid cues. Further, the informational value of verb inflections is far greater than the noun-inflections as the language allows for subject and object ellipsis (Sridhar, 1990). Considering the aforementioned cost and validity factors with respect to nouns/pronouns and verbs, we hypothesized that in agrammatic Kannada discourse
1) Datives and genitives will occur less frequently than accusatives, locatives, and instrumentals, relative to controls' proportions.
2) Verb-inflections will be preserved, even though structurally-simpler forms exist.
We present data from four participants. The patient, AG, was a 42-year old male with agrammatism resulting from a single stroke. The three normal controls were matched for linguistic background with AG. The tasks included picture description and story narration. Tape-recorded language samples were transcribed and analyzed. As the purpose of this study was to examine the linguistic output in terms of the frequency of the different kinds of inflections, a token-counting method was employed. Findings revealed that AG produced datives less frequently (3.66%) than the controls (M=22.7%, SD=5.3), supporting hypothesis 1. However, contrary to hypothesis 1, we found that the frequency of genitives was comparable to that of the controls and to AG's own accusative production, which motivated us to carry out an additional analysis that examined the root words that the inflections were attached to. Whereas for the controls, at least 50% of genitives occurred on nouns, almost 100% of genitives occurred on personal pronouns for AG. Attaching genitives to personal pronouns follows a uniform pattern and involves only a slight morphophonemic modification unlike noun modifications, making the former a relatively less "costly" computation. Consistent with the second hypothesis concerning "validity" of verb-inflections, these were preserved despite the availability in the language of relatively simple verb forms such as imperatives and infinitives. In sum, in this highly-inflected language, the results are consistent with both cue-cost and cue-validity predictions.

References
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Sridhar, S. N. (1990). Kannada. London: Routledge.

Presented by: **Karthikeyan, Sethu**

38. Compounds in Different Aphasia Categories: A Study on Confrontation Naming.

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Introduction
This study investigates the production of compounds in Italian-speaking patients affected by different aphasia categories, i.e. Broca's, Wernicke's and Anomic, in a confrontation naming task. Interesting differences in processing compounds have been found in the past (e.g., Semenza, Luzzatti and Carabelli, 1997; Chiarelli, Menichelli and Semenza, 2007). However, in the most recent and linguistically complex studies the limited amount of patients for each category or the limited amount of items did not allow firm conclusions. This study was designed to test a sufficient number of patients, on a sufficient number of items, allowing fruitful comparisons among different syndromes.

Methods
A picture naming task was administered, consisting of 50 pictures which are consistently named with a two-word compound noun. These pictures were intermixed with 50 pictures which are named only with simple nouns. Compound types included Verb-Noun compounds, the most productive type of compound in Italian, as well as other compounds (Noun-Noun, Noun-Adjective, Adjective-Noun) that were collapsed for the purpose of statistical analyses into a the single group "Other". This was done because compounds that can be pictured in Italian are very limited in number and their categories in such collections cannot be equally represented.

Participants
Nine Broca's, 23 Wernicke's and 16 Anomic patients participated in this study.

Results and Discussion
The main results were the following:
1) The "compound effect" was confirmed. In word substitutions, patients tended to replace compounds with compounds and simple words with simple words. This shows that patients retain information about the morphological structure of a word whose phonological form they cannot retrieve. Nothing in the each picture could in fact suggest whether its name was a compound or not.
2) Broca's patients committed more single component omissions than substitutions, while the reverse was found in the other two aphasia categories.
3) A different position effect was found among the three aphasia categories: while Broca's aphasics omitted or substituted the first component about three times as often as the second component, such difference between components was not found in both Wernicke's and Anomic aphasia.
4) A triple interaction was found of position effects with the category of aphasia and the type of compound. Broca's aphasics omitted/substituted the first component irrespective of the compound category. Wernicke's and Anomic patients more frequently omitted/substituted the second component in Verb-Noun compounds and the first component in Others.

These findings confirm and extend findings obtained in previous research. Aphasia category is shown to interact significantly with the position of the components and their grammatical class.

Chiarelli, V., Menichelli, A., and Semenza, C. (2007) Naming compounds in Alzheimer's disease. The Mental Lexicon, 2, 259-269.
Semenza, C., Luzzatti, C., & Carabelli, S. (1997). Morphological representation of a noun: A study on Italian aphasic patients. Journal of Neurolinguistics, 10(1): 33-43.

Presented by: **De Pellegrin, Serena**

39. The Mental Parsing of Italian Nominal Compounds: Evidence from Deep Dyslexia.

Marelli M. [1]*, Aggujaro S.* [2]*, Molteni F.* [2]*, Luzzatti C.* [1]
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Whether compound words are accessed through their constituents or stored as a whole in the mental lexicon is a long-debated issue. Indeed, a number of priming experiments (e.g., Libben et al., 2003) suggest that constituents are accessed during compound processing. Converging evidence is also provided by neuropsychological studies (e.g., Mondini et al., 2004). However, it has been suggested that high-level properties of compounds (i.e. semantic transparency) can modulate access to the constituent representations: opaque compounds would be represented as a whole, while transparent compounds would be accessed through their constituents (Sandra, 1990). In the present study, we investigate the processing of Italian compound words in two reading experiments with a patient, RG, suffering from deep dyslexia.

RG was unable to read pseudowords and function words. Regarding content words, she made several semantic and morphological errors. A concreteness effect was also found, but no frequency effect.

RG's reading ability of nominal compound was tested. In the first experiment, verb-noun (VN) compounds and their individual constituents were employed as stimuli. In a following experiment, the same procedure was applied with noun-noun (NN) compounds to assess the effect of semantic transparency.

Figure 1 summarizes the results of the first experiment. When constituents were presented individually, RG read nouns better than verbs. However, when asked to read VN nominal compounds, she made as many errors as for simple verbs, even though VN compounds are globally nouns. Moreover, these errors (omissions and substitutions) concerned more often the verbal than the nominal constituent, with a rate that was similar to that emerged for verbs and nouns in individual presentation. Also in the second experiment (reading of NN nominal compounds), RG's reading accuracy was higher with the individual constituents (56%) than with the compound stimuli (33%). Errors were mostly omissions and substitutions of either the first or the second constituent (no position effect). The accuracy rate was inversely related to the semantic transparency of the stimuli.

In the first experiment, RG made more errors with the verbal than with the nominal constituent of VN compounds. Since VN compounds are nouns, results indicate that Italian compounds are parsed during reading, thus providing converging evidence to what was observed by Mondini et al. (2004) for compound naming. The results of the second experiment indicate that the more transparent a compound is, the more likely it is that segmentation takes place, confirming that the parsing procedure is modulated by the semantic transparency of the compound (Sandra, 1990).

References
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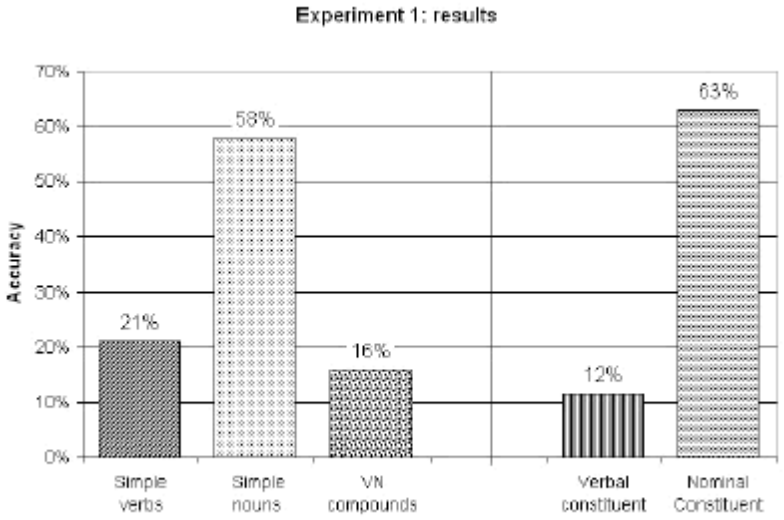
Mondini, S., Luzzatti, C., Zonca, G., Pistarini, C., Semenza, C. (2004), Brain and Language 90, 470-477.
Sandra, D. (1990), The Quarterly Journal of Experimental Psychology 42A, 529-567.



The left-side graph shows the reading accuracy for simple verbs, simple nouns and VN nominal compounds; the right-side graph portrays the accuracy in reporting the verbal and the nominal constituent when reading VN nominal compounds.

Presented by: **Marelli, Marco**

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40. Morphological Therapy Protocol: New Therapy for Language Impairment after Stroke

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Investigations of morphological impairment in aphasia have revealed that patients may retain knowledge of a word's morphological status even when they cannot access that word (Delazer and Semenza, 1998). Aphasiological investigations have also shown that patients display more difficulty (i.e., morphological, phonological, and semantic paraphasias) with words that have internal morphological structure than with simple words (e.g., Nasti & Marangolo, 2005). Furthermore, according to recent neurolinguistic and psycholinguistic research, complex words are represented and accessed in terms of their constituents. Individuals with aphasia seem to have retained sensitivity to morphological status and morphological structure of words, yet they are unable to process morphologically complex words with ease. The goal of this study was to investigate whether a therapy that specifically focuses on morphology will activate areas of morphological ability that may not be computed in these patients.

The morphological therapy protocol (MTP) specifically addresses morphological deficits in aphasia. Through word game tasks the MTP reveals linguistic components that encompass our morphological ability: the tacit understanding of the morphological rule system of a particular language (i.e., which morphemes combine to make legal words) and the awareness of the combinatorial nature of words (i.e., inflected and derived versions of words). Essentially, patients decompose and compose inflected, derived, and compound words with the help of the computer-assisted MTP.

The results of four English-speaking adult non-fluent individuals with aphasia demonstrate the therapeutic effectiveness of the MTP by comparing pre-therapy naming with post-therapy naming of simple and complex words. Word naming improvement was highly significant ($p < 0.0001$).

References
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Nasti, M., & Marangolo, P. (2005). When “macrocefalo (macrocephalous)” is read “minicervello (minibrain)”: Evidence from a single case study. Brain and Language, 92, 212-218.

Presented by: **Nault, Karin**

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41. Novel Compound Processing in Broca’s Aphasia

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Introduction
Complex words, i.e., inflections (raining), derivations (rainy), or compounds (rainbow), are generally processed effortlessly by adult unimpaired speakers, but might pose specific difficulties for developing or impaired populations.
To date, research on compound processing in aphasia has mainly focused on lexicalized compounds. Aphasics’ abilities to process novel compounds (e.g., cricket mom) are assumed to be intact, based on the morphological well-formedness of their neologisms and substitution errors (Delazer & Semenza, 1998).
Using hybrid object stimuli in a naming task, traditionally employed to investigate the acquisition of compound processing in children, Borgwaldt and Bose (2008) presented data from three fluent aphasics, who showed severe impairments in the production, but not in the comprehension of novel compounds. The current study investigates whether the above findings replicate for Broca’s aphasia.

Method
Participants. Participants were two English-speaking moderately aphasic individuals with non-fluent Broca’s aphasia. They were at least 1 year post-onset to their neurological disorders and had no other significant sensory and/or cognitive deficits that interfered with their performance in the study.
Tasks and procedure. The tasks and procedure were identical to Borgwaldt and Bose (2008): The stimuli were digitally manipulated photographs, depicting hybrid objects composed of two equally salient components, such as apple tent.
In the production task, 50 hybrid object images had to be named as compounds. In the comprehension task, 50 auditorily presented novel compounds had to be matched with the corresponding hybrid object image that was presented along with three distractors.

Scoring
Production performance was scored for well-formedness: either as morphologically correct (apple tent), or as one of two types of errors, (a) insertions such as “and” between the components (apple and tent), or (b) other, such as descriptions. Comprehension performance was scored for accuracy.

Results and Discussion

Participants	Aphasia Type	Production (n = 50)			Comprehension (n = 50)
		Morphologically correct	Errors		Correct
			Insertions	Other	
1	Broca	64%	0%	36%	94%
2		66%	6%	28%	58%
3 fluent aphasics, reanalysis of Borgwaldt & Bose (2008)	Anomia (2) & Wernicke (1)	4.7%	72.7%	22.7%	81.3%

Table 1. Results for novel compound production and comprehension tasks.

Broca's aphasics displayed relatively intact novel compound production abilities, in contrast with the production patterns of the fluent aphasics. For both types of aphasia, comprehension accuracy for novel compounds was relatively high.
The striking difference between the two groups' novel compound production performances supports the assumption that novel compound processing mechanisms involved in explicit naming tasks might be selectively impaired across aphasia types.

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Acknowledgments
This research was supported by a German Academic Exchange Service Research Grant to S. Borgwaldt and A. Bose.

Presented by: **Bose, Arpita**

Platform Session 2: Semantics

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42. The Influence of Phonological Competition on Lexical-Semantic Processing: Evidence from Aphasia

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Lexical-semantic access is affected by phonological competition. Younger normal subjects show a greater magnitude of semantic priming for words with onset competitors (Zwitserlood, 1989) and for words from low density compared to high density neighborhoods (Apfelbaum et al., in preparation). Recent lesion and neuroimaging studies suggest that parietal areas are involved in phonological processing and resolving phonological competition (Prabhakaran et al., 2006; Caplan et al., 1995), and frontal areas are involved in resolving semantic competition

(Thompson-Schill et al., 1997).

This ongoing study used the visual world paradigm to examine how damage to parietal and frontal areas modulate the effects of phonological competition on the magnitude of semantic priming. It was hypothesized that damage to parietal areas would result in a loss of phonological competition effects, yielding an equal magnitude of semantic priming for high and low density words. In contrast, the presence of competitors for both high and low density words would result in a loss of semantic priming with damage to frontal areas. Eight age-matched control subjects, four left posterior and three anterior aphasics participated. In each trial, participants viewed four pictures, listened for a word, and touched the corresponding picture while eye movements were monitored. Critical trials consisted of a high or low density target word (e.g. “MOON”), a word semantically related to the target (e.g. “STAR”), and two phonologically and semantically unrelated controls (e.g. “TAIL”). Results for the age-matched control subjects showed normal modulatory effects of phonological competition on semantic priming. As hypothesized, posterior patients showed normal semantic priming but no effects of density, and anterior aphasics showed neither priming nor density effects.

The evidence that phonological competition modulates access to the lexical-semantic network in normal participants is consistent with cascade models of lexical processing (Rapp and Goldrick, 2000). The loss of this modulatory effect with parietal damage suggests that insensitivity to phonological competition has a cascading effect on the activation of the lexical-semantic network. The failure of the anterior aphasics to show semantic priming for either high or low density words suggests frontal areas are recruited in selecting among competing semantic alternatives irrespective of the source of the competition.

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Supported in part by NIH Grant DC00314.

Presented by: **Blumstein, Sheila**

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43. Contrasting Effects of Near and Distant Semantic Neighbors on Picture Naming in Aphasia

Mirman D.
Moss Rehabilitation Research Institute

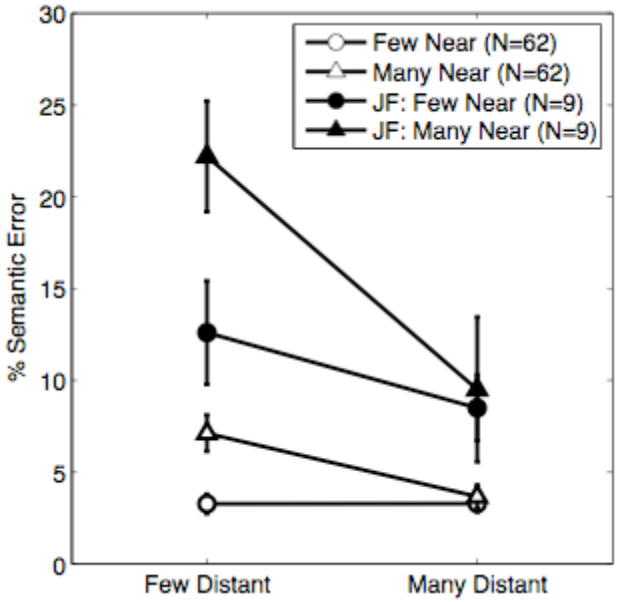
This study investigated the integrity of semantic processing in aphasia by examining the effects of semantic neighborhood density on picture naming. A recent study testing word recognition in college students found opposite effects of near and distant neighbors [Mirman, D., & Magnuson, J. S. (2008). Attractor dynamics and semantic neighborhood density: Processing is slowed by near neighbors and speeded by distant neighbors. Journal of Experimental Psychology: Learning, Memory, and Cognition, 34(1), 65-79]: distant neighbors speeded word recognition, but near neighbors slowed word recognition. This pattern was found to be consistent with an attractor dynamical model of semantic processing. The opposite effects of near and distant neighbors provide a novel way to

examine whether and how semantic processing may be impaired in aphasia.

As in the earlier study, near and distant neighbors were defined based on distance between semantic feature vectors derived from a large feature norm corpus [McRae, K., Cree, G. S., Seidenberg, M. S., & McNorgan, C. (2005). Semantic feature production norms for a large set of living and nonliving things. Behavior Research Methods, 37, 547-559]. The picture naming data were drawn from a database of patient performance on the 175-item Philadelphia Naming Test (PNT). Ninety-five of the PNT words were in the feature norms; these words were divided into four sets that independently manipulated near and distant neighborhoods (few vs. many neighbors of each type) and were matched on all other criteria. Error rate data were analyzed using logistic regression. The first analysis examined a group of 62 patients with clinically diverse chronic aphasia as a result of a left-hemisphere cerebrovascular accident. The proportion of semantic errors was greater for targets with many near neighbors ($B=0.816$, $X^2(1)=15.7$, $p<0.0001$) and lower for targets with many distant neighbors ($B=-0.002$, $X^2(1)=12.3$, $p<0.001$). There was also a significant interaction ($B=-0.841$, $X^2(1)=12.1$, $p<0.001$), reflecting the particularly high rate of semantic errors for targets with many near and few distant semantic neighbors (Figure 1, open symbols). The semantic neighborhood manipulation had no effect on the proportions of phonological errors (all $p>0.3$), indicating that the pattern of semantic errors was not due to general difficulty differences between conditions.

A second analysis considered a different group of nine patients, for whom there was independent evidence of a core semantic deficit. This group exhibited an exaggerated version of the semantic neighborhood effect on semantic errors (Figure 1, filled symbols), with reliable opposite effects of number of near neighbors ($B=0.685$, $X^2(1)=4.63$, $p<0.05$) and number of distant neighbors ($B=-0.433$, $X^2(1)=8.05$, $p<0.01$), but no interaction ($B=-0.566$, $X^2(1)=1.25$, $p>0.25$).

The observed pattern -- increased semantic errors for targets with many near neighbors and decreased semantic errors for targets with many distant neighbors -- suggests that the dynamics of semantic processing are disrupted in aphasia. Previous computational modeling work has shown that the opposite effects of near and distant neighbors are consistent with an attractor dynamical model of semantic processing. Ongoing computational modeling work is investigating what kind of deficit would cause this particular pattern of errors.



Presented by: **Mirman, Daniel**

44. Direct Evidence for Two Distinct Anatomical Circuits for Lexical-Conceptual Categories

Papagno C. [1], Gallucci M. [1], Caramazza A. [2], Casarotti A. [1], Bello L. [3]
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Introduction
Several studies have reported patients with specific lesions, disproportionately impaired in conceptual knowledge of objects from one category compared with others. Different theoretical accounts have been proposed, varying in the degree to which they assume domain-specificity as a major organizational principle of conceptual knowledge in the brain (Warrington and Shallice, 1984; Caramazza and Shelton, 1998; Tyler and Moss, 2001). We used direct cortical and subcortical stimulation to map naming of living/inanimate entities during surgical removal of gliomas in eloquent areas.

Methods
Thirty-eight patients were tested. Each patient was submitted to a specific intraoperative protocol designed according to pre-surgical performance. During surgical removal blocks of items (living, non-living, faces, verbs), counterbalanced across patients, were presented. The number of stimulated sites varied between 30 and 40 for each subject.

Results
Naming of living objects was disproportionately affected when DCS was delivered to the posterior part of BA 21 (p=0.035) and BA 45 (p=0.028), while naming of non-living things was selectively disrupted when DCS was applied over the posterior third of the supramarginal gyrus (BA 40) (p=0.036) and over the anterior part of BA 22 (p=.023). After having identified relevant cortical sites of dissociation, we further investigated whether the cortical areas differentially involved in lexical retrieval of living and non-living things are part of distinct networks connected by subcortical fibers. We used diffusion tensor tractography in five patients who showed the relevant dissociations. Two connection pathways were found: the first between T2-5 and BA 45; the second pathway connected T1-3 to BA 40. In order to verify the selectivity of these systems, we examined the effect of direct stimulation to the fiber streams themselves in three additional patients. No disruption was found for non-living items when stimulation was applied over the fibers connecting T2-5 and BA 45, while there were 27.4% errors for living items (exact p=0.0004); when stimulation was applied to the connection between T1-3 and BA 40, naming of non-living objects was severely impaired (49.6%) relative to living objects (4.3%; exact p=0.043).

Conclusion
We have provided the first direct evidence for two distinct, distributed neural circuits involved in processing different lexical-conceptual categories, in line with the view that evolution has prompted the development of specific circuits dedicated to processing different categories of objects.

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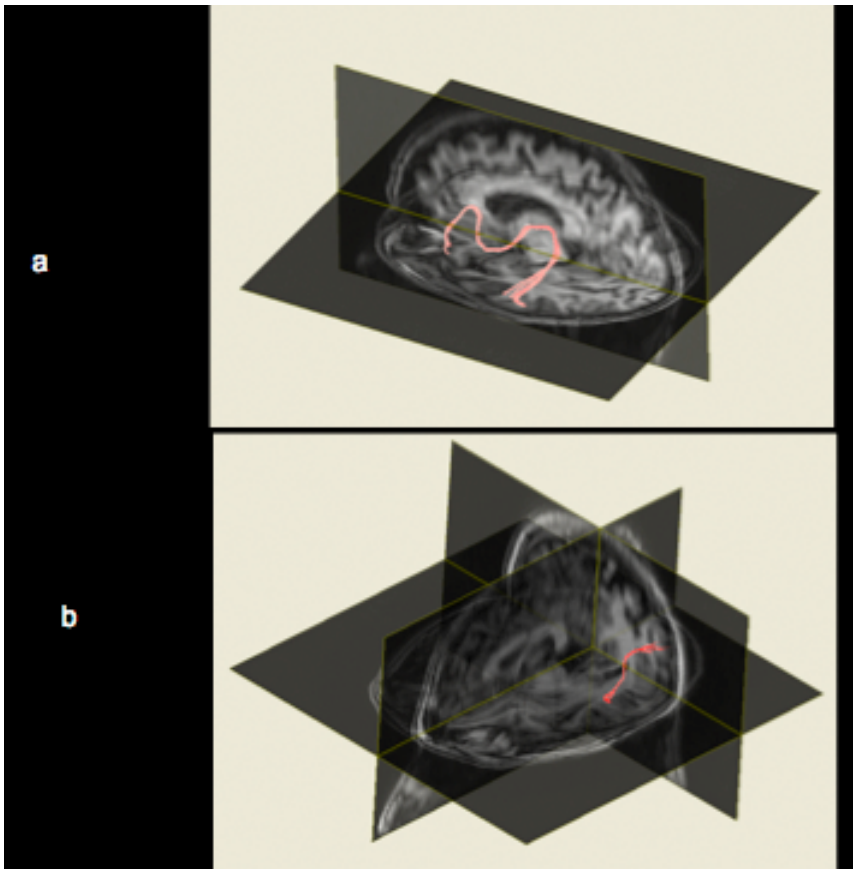

Figure - Tractography reconstruction: (a) T2-5 /BA45, (b) d T1-3 / BA40.

Presented by: **Papagno, Costanza**

Poster Session 2: Memory

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45. Treating Phonological Short-Term Memory Impairments with Computer-Assisted Treatment: Results from Seven Cases.

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Introduction
Impairments in verbal short-term memory (VSTM) are common in aphasic individuals. Studies with aphasic participants have provided evidence for the involvement of VSTM in language comprehension (Van der Linden & Poncelet, 1998). Although very rare, rehabilitation studies of phonological short-term memory deficits have yielded

encouraging results (Majerus et al., 2005). Here we report exploratory results of a computer-assisted treatment (CAT) designed to improve storage capacity of phonological information in participants with verbal short-term memory deficits. We also examined the relationship between performance on span and sentence comprehension tasks.

Methods
Participants
Seven individuals (aged 19-59) with outstanding phonological short-term memory impairments participated in the study. All had suffered left brain injury and initially presented aphasia. One was recruited from the inpatient service (2 months post-injury) and the remaining six were outpatients (1 month to 8 years post-injury).

Procedure: evaluation and CAT material
Patients were examined at baseline and at post-tests with a selection of four span tasks: forward digit-span, Corsi block-tapping task, number-repetition and pseudoword-repetition. In the number-repetition task, stimuli (n=168) were controlled for syllable length (4 to 17 syllables). In the pseudoword-repetition task stimuli (n=144) were matched for syllable frequency and length. Half of the items of both lists were used for CAT. Three control tasks of oral comprehension were used: Token Test, Oral Text Comprehension, and a task of negative sentences comprehension.
Four patients underwent therapy on both numbers and pseudowords (crossover design); three patients worked on numbers only. Therapy duration was established by a self evaluation of progress by the patients themselves (varied from two to six weeks).
Two specific and interactive computer-assisted therapy programs were developed on alphabetical (CAT-pseudowords) and numerical (CAT-numbers) material. The task consisted of immediate and/or delayed keyboard writing of material presented orally and/or visually.

Results
After CAT-numbers (for the 7 patients) a significant improvement was observed in the number-repetition task, in forward digit-span, and in oral text comprehension (for 3 patients only). Performance on the other tasks remained stable. After CAT-pseudowords, a significant effect was observed in pseudoword-repetition for the 4 patients, and performance remained stable on the other tasks. Without reaching significance (three patients tested only), the performance in the Token Test improved by 11% and 31% for 2 patients.

Conclusions
The present data suggests that CAT for phonological short-term memory impairment is effective and may be material-specific. These results need to be replicated and extended with other participants with phonological short-term memory deficits.

References
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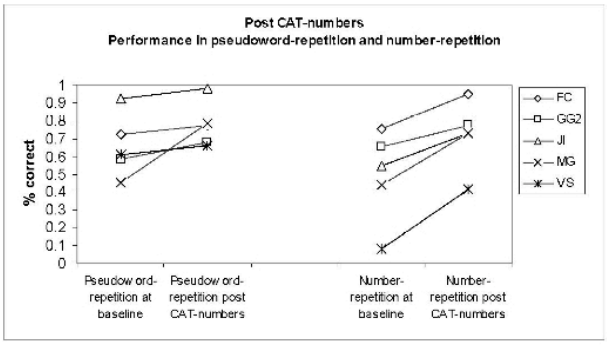

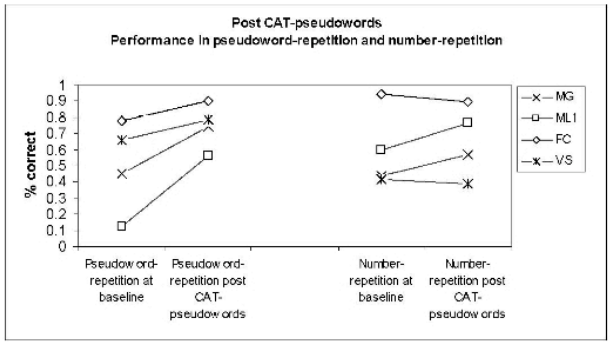

Presented by: **Di Pietro, Marie**

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46. Using Item Response Theory to Examine the Effects of Short-Term Memory Demands on Minimal Pair Discrimination

Hula W. [1], Kalinyak-Fliszar M. [2], Martin N. [2]
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Recent studies of word processing impairments in aphasia have focused on temporal aspects of language processing. Martin (2006), for example, reported data from a phoneme discrimination task that included a 5-second interval between presentation of two stimuli. For some participants, performance improved after the interval, but for others, it became worse. Directly comparing percent-correct scores in the two conditions is informative, but raises psychometric issues that deserve closer inspection, including the fact that percent correct scores are demonstrably nonlinear. Item response theory (IRT) (Embretson and Reise, 2000) offers a framework in which items from different tests may be calibrated to a common interval scale. The purposes of this study were (1) to evaluate whether phoneme discrimination performance in aphasia demonstrates adequate fit to the 1-parameter logistic (1-PL) model and (2) to evaluate the impact of common interval scaling on the identification of STM effects in individual cases.

We analyzed data from 72 individuals with aphasia on two versions of a 160-item word and nonword minimal-pair phoneme discrimination task (including some data from Martin, 2006). Seventy-one participants were tested with a 1-second unfilled delay between the stimulus words (1-sec UF) and 56 were tested with a 5-second unfilled delay between the words (5-sec UF).

To evaluate the model, we used mean-square item fit statistics. To establish fit criteria, parameter estimates obtained from the data were used to simulate a distribution of fit statistics under the null hypothesis that the data fit the model, and a 95%CI was obtained. For each statistic,

To examine effects of STM demand, person scores were estimated separately for the two conditions. A significantly higher score in the 1-sec UF condition indicates a detrimental effect of the 5-second delay, which can be interpreted as poor ability to maintain activation of the target. A higher score in the 5-sec UF condition indicates that the 5-second delay benefits performance, suggesting slowed target activation. A cross-plot of the person ability estimates is presented in Figure 1. The estimates correlated at 0.61, >0.99 when disattenuated for measurement error. Model standard errors were used to conduct independent t-tests (α=0.05) between the 1-sec UF and 5-sec UF score estimates for each participant. Eight (14.5%) of these comparisons were significant, with 4 participants scoring lower on the 5-sec UF items and 4 participants scoring higher.

The present analysis has two advantages over direct comparison of percent-correct scores. First, IRT-based scores provide an interval measure of performance change, in addition to a test of statistical significance. Second, the procedure does not require that the same items be given in both delay conditions, provided that the item difficulty

estimates have been previously established.

References
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Martin, N. (2006). Two effects of time passage on performance of phoneme discrimination judgments: Sometimes it helps and sometimes it hurts. Brain and Language, 99, 174-175.

Presented by: **Hula, William**

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47. Metamemory, Phonological Memory and Word Relearning in People with Aphasia: A Preliminary Investigation

Ramachandra V., Jones J., Flanagan K., Bollinger N., Reilly M.
Marywood University

There are only a few published studies that have examined the relearning abilities of people with aphasia, which are important for the treatment of these individuals given the enormous reorganization ability of the brain. To our knowledge, only one study investigated the phonological aspects of word relearning (Gupta, Martin, Abbs, Schwartz, & Lipinski, 2006). There are no studies, however, that have explored the roles of both metamemory and phonological memory capacity of word relearning in people with aphasia, which are important for learning novel linguistic information. The current study investigated the potential interaction between metamemory (measured by Judgments–of–Learning) and phonological memory (measured by nonword repetition and digit span) in the novel word learning abilities of people with aphasia.

Six people with aphasia and 10 healthy controls were exposed to four different aliens presented in the form of a slide show. Each slide had the picture of an alien with pre-recorded audio narrative describing them. The subjects had a total of five exposures to each of the alien names. The exposure phase was followed by the Judgments–of-Learning (JOL) phase in which subjects had to judge the total number of aliens they would remember from the exposure phase (global JOL ratings), and also the percentage of accuracy with which they would recognize the name of each alien (item-by-item JOL ratings). Following the JOL ratings, all subjects completed a Post-Exposure Recognition for the four alien names. In this phase, the subjects were asked to identify the alien named by the examiner from an array of five aliens (4 from the exposure phase and 1 unexposed alien). This was followed by phonological memory tasks, which included digit span and nonword repetition.

A multivariate analysis of variance revealed that people with aphasia performed poorly when compared to healthy controls on digit span [$F(1,14) = 33.8$, $p < 0.001$, $\eta 2 = 0.019$] and nonword repetition [$F(1,14) = 50.237$, $p < 0.001$, $\eta 2 = 0.782$]. They did not significantly differ on novel word learning [$F(1,14) = 0.273$, $p > 0.05$, $\eta 2 = 0.019$], and metamemory measures which included global absolute predictions [$F(1,14) = 0.170$, $p > 0.05$, $\eta 2 = 0.012$], and item-by-item absolute predictions [$F(1,14) = 0.017$, $p > 0.05$, $\eta 2 = 0.019$]. There was also a positive correlation between metamemory measures and nonword repetition among people with aphasia ($p < 0.05$). Overall, the findings here indicate that people with aphasia have some ability to learn novel words. The findings also suggest that people with aphasia have an unimpaired metamemory. Therefore, more efficient learning of novel lexical items can be improved in aphasics by allocating more time to words that are judged as not well-learned (low JOLs) and less time to words that are judged as well learned (high JOLs). The positive correlation between metamemory and nonword repetition (a measure of phonological memory) indicates a common neural substrate subserving them.

Reference
Gupta, P., Martin, N., Abbs, B., Schwartz, M., & Lipinski, J. (2006). New word learning in aphasic patients: Dissociating phonological and semantic components. Brain and Language, 99, 8-219.

Presented by: **Ramachandra, Vijayachandra**

48. Effects of Memory Load and Typicality of Semantic Category on Semantic Processing in Aphasia

Kamen R., Martin N., Kohen F., Kalinyak-Fliszar M.
Temple University

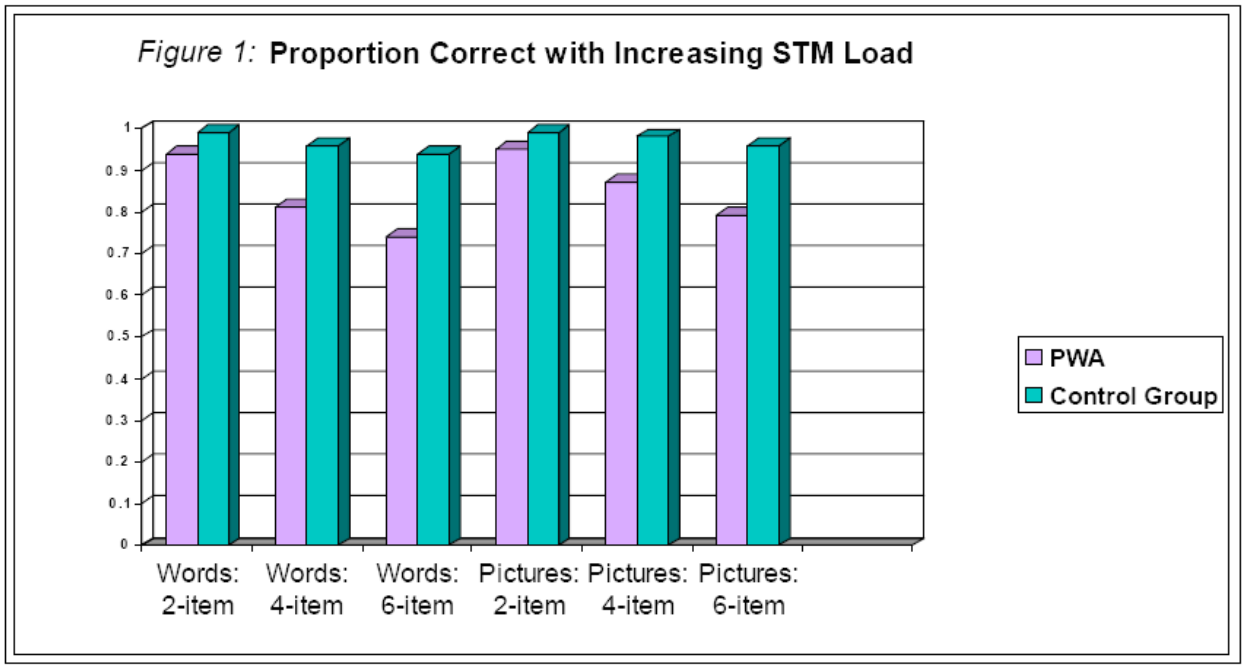
Background
This study explored the hypothesis that impaired performance on semantic tasks in persons with aphasia (PWA) is based on difficulty accessing semantic representations and maintaining their activation in verbal short-term memory (STM) for the period of time required to perform these tasks (Martin, 2005). In a category judgment task, we varied the number of semantic items to be compared, the typicality of category exemplars, and the visual array. We predicted that performance would decline as the number of semantic items to be compared increased and the typicality of category membership decreased.

Method
Fifteen adults with aphasia and 15 age-and educationally-matched controls participated. The task was to determine if two items in a visual array were from the same semantic category. Memory load was tested by varying the number of items to be compared: two, four, or six. The typicality of category membership was also varied in three ways: typical-typical (TT), typical-atypical (TA), and atypical-atypical (AA). There were two stimulus conditions: (1) pictures and (2) spoken with written words. Also, there were two visual array conditions: (1) split screen (two horizontal rows) and (2) circular. Items belonged to one of six categories: animals, vehicles, body parts, clothing, instruments, and fruit. Stimuli were controlled for word length, and frequency.

Results
There were main effects of load for PWA and the control group ($f(2,28)=48.40$, $p<.001$; $f(2,28)=20.596$, $p<.001$), typicality ($f(2,28)=10.079$, $p<.001$; $f(2,28)=8.527$, $p<.05$), and picture vs. word presentations ($f(1,14)=6.437$, $p<.05$; $f(1,14)=5.882$, $p<.05$). Performance was better on 2 than 4-item, and on 4 than 6-item trials for PWA ($t(14)=5.596$, $p<.001$; $t(14)=6.886$, $p<.001$) and for the control group ($t(14)=4.468$, $p<.001$; $t(14)=2.882$; $p<.05$). The effect of visual array was not significant for PWA ($f(1,14)=3.937$, $p=.067$), or for the control group ($f(1,14)=1.777$, $p=.204$). There were no significant interaction effects for the PWA group. The magnitude of difference in performance was significantly greater for PWA than the control group for load conditions ($f(2,56)=25.949$, $p<.001$), and approached significance for typicality ($f(2,56)=2.265$, $p=.08$). The magnitude of difference in performance between TT and AA conditions was significantly greater for PWA than for controls ($t(28)=2.295$, $p<.05$).

Discussion
For persons with and without aphasia, the processes required for semantic judgments are sensitive to: differences in short-term memory load, typicality of semantic category membership, and picture vs. word presentations. The effect that these factors have on semantic processing is more profound, and therefore debilitating, for PWA than for the control group.
The finding that performance was worse on word than picture versions for PWA supports the hypothesis that the nature of semantic impairment in aphasia is not related to the degradation of the semantic or phonological representations themselves, but in accessing and maintaining the activation of these representations.

References
Martin, N. (2005). Verbal and nonverbal semantic impairment in aphasia: An activation deficit hypothesis. Brain and Language, 95, 251-252.



Presented by: **Kamen, Rachel**

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49. Analysis of Sentence Repetition in Aphasia (part 1): System for Coding Responses

Gruberg N., Martin N., Afman R.
Temple University

Introduction
A novel system for coding sentence repetition errors was developed for use in aphasia. The purpose of the coding system was to give a more complete description of error patterns, allowing a deeper understanding of the difficulties with sentence processing/repetition demonstrated by persons with aphasia (PWA). The system was developed and tested on data collected between 1987 and 2003 from the performance of PWA on a sentence repetition task reported by Saffran and Marin (1975). These sentences were chosen because the structure and content were varied enough to maximize the range of potential difficulties for our coding system.

Parameters and Procedures
Each morpheme of each target sentence was listed individually down the leftmost column of the coding form (Figure 1). The subject's utterance was transcribed in IPA and each morpheme was numbered. When a morpheme in the utterance corresponded to a morpheme in the target sentence, its number was placed on the appropriate row. Corresponding morphemes could be "correct", or they could be "substitutions". If entered as a "substitution", the number was also entered into all appropriate error-type columns. If no corresponding morpheme exists, an omission would be entered for this row. Although there may have been multiple attempts at a single target, each target morpheme could only correspond to one morpheme of the participant's utterance. We coded further attempts under the "additions" column.

Analysis

After coding, the next step is to extract the desired information. We created an excel macro that determined which error-type columns were associated with each “substitution”. The error-types can be analyzed individually, or grouped into classes such as “semantically related errors” and “order errors”.

Next, we can extract error information based on properties of the targets. Each target morpheme can be characterized for frequency, part of speech, function in the sentence (subj/verb/obj/etc.), and position in the sentence. Thus errors can be analyzed based on both error-type and properties of the target item. For example, semantically related errors occur in earlier positions in the sentence than omissions ($t(26)=3.053$, $p=.005$).

Finally, we can look at subject factors and item/error-type factors together. Each subject can be characterized based on aphasia type, extent of lesion, and performance on other language tasks. These measures can then be correlated with performance on the sentence repetition task. For example, as semantic ability increases errors tended to occur in later positions of the sentence ($r(28)=.535$, $p=.003$).

Discussion

In studies currently underway, this coding system has revealed greater rates of errors at earlier positions of the sentence in individuals with more severely impaired access to semantics. This pattern is consistent with the hypothesis that the semantic system contributes to the primacy effect in sentence repetition. The coding system also identified a pattern of semantic and omission errors that could be a useful diagnostic marker; the former were associated with better access to semantics than the latter.

References

Saffran, E. M. & Marin, O. (1975). Immediate memory for word lists and sentences in a patient with deficient auditory short-term memory. Brain and Language, 2, 420-433.

Analysis of Sentence Repetition in Aphasia (part 1): System for coding responses

Figure 1. Sample of coding form for analysis of sentence repetition responses.

	Corresponding Morpheme				Error-Type Categories														
					Phonologic		Semantic							Part Of Speech		Order			
	CORRECT	SUBSTITUTION	OMISSION	ADDITIONS	Formal	Literal	Synonym	Categorical	Associative	Contextual	Mixed Error	Tense/ Infl Error	Expletive Replacement	Correct POS	Incorrect POS	Perseveration	Anticipation	Correct Relative	Incorrect Relative
Patient's Sentence:	people1 follow2ing3 /kɔr/4ly5 in6 the7 ancient8 /entʃ/9 people10																		
Sentence 1																			
The			The																
people	1													1				1	
file		2			2				2		2			2				2	
ed		3										3		3				3	
calm		4				4												4	
ly	5													5				5	
into		6			6		6							6				6	
the	7													7				7	
ancient	8			9		9								8		9		8	9
cathedral		10												10		10			10

Presented by: **Gruberg, Nicholas**

50. Analysis of Sentence Repetition in Aphasia (part 2): Semantic Influence on Position and Type of Errors

Martin N., Gruberg N.
Temple University

Introduction
This study examined the influence of semantic processing on patterns of recall and errors in a sentence repetition task for individuals with aphasia. In a seminal study of a person with phonological STM impairment, Saffran and Marin (1975) demonstrated that a reliance on semantic representations in sentence repetition led to production of paraphrases of the target sentence. Martin & Saffran (1997) demonstrated an association between semantic impairment and reduced primacy effects in word span tasks. Based on these findings we hypothesize the following:

(1) Individuals with more severe semantic impairments will more likely lose target words/morphemes altogether, producing an omission, while individuals with more intact semantic abilities will more often retain some semantic trace of the target, producing a semantic substitution.
As semantic ability increases:
a. The proportion of semantic substitutions should increase.
b. The proportion of omissions should decrease.
(2) Given the relationship between semantic impairment and reduced primacy effect, we expected that the strength of the semantic system would disproportionately affect performance on items early in the sentence.
a. More severe semantic impairment should predict earlier errors.
b. Omissions should occur later than semantic substitutions.

Participants
Participants included 29 individuals with aphasia resulting from left CVA (at least 1 year post onset). Because our aim was to assess the impact of semantic processing on sentence repetition we selected participants with good semantic ability relative to phonological ability, which could provide an alternative means of repetition. We excluded 5 participants whose phonological z-scores were at least one point above their semantic z-scores.

Task
Participants repeated 20 sentences (varied for length and complexity) adapted from Saffran and Marin's (1975) study.

Scoring
A novel error coding procedure was used to analyze performance in the sentence repetition task in terms of type and position of errors. We used six measures of input lexical-semantic processing to establish estimates of lexical-semantic ability measured as z-scores.

Results
As semantic ability increased: (1) the proportion of semantic substitutions increased (β=.450, $t(28)$=2.62, p=.014), (2) the proportion of omissions decreased (β=-.553, $t(28)$=-3.45, p=.002), and (3) errors tended to occur in later positions of the sentence (β=.535, $t(28)$= 3.287, p=.003). Also, semantic substitutions tended to occur earlier in the sentence than omissions ($t(26)$=3.053, p=.005).

Discussion
Better semantic z-scores predicted proportionally more semantic substitutions and fewer omissions. This result suggests that semantic substitutions and omissions in repetition could serve as diagnostic markers for semantic processing ability. Within sentences, semantic substitutions tended to occur earlier than omissions. Additionally, individuals with better semantic z-scores tended to make errors later in the sentence, and performed better on early items than individuals with lower semantic z-scores. This pattern confirms the hypothesis that the semantic system provides support for the primacy effect in sentence processing.

References
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Saffran, E. M. & Marin, O. (1975). Immediate memory for word lists and sentences in a patient with deficient auditory short-term memory. Brain and Language, 2, 420-433.

Presented by: **Gruberg, Nicholas**

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51. The Independence of STM Deficits and the Shifting Component of Executive Function

Allen C., Martin R.
Rice University

Hoffman and colleagues (2009) proposed that semantic STM deficits in aphasia result from disruption to a domain-general semantic control system, the operation of which is reflected in performance on global tests of executive function (EF) such as the Wisconsin Card Sorting Test (WCST). Martin and Allen (2008) argued that the causation may go in the other direction, as they found that patients' phonological STM capacity predicted performance on the WCST, which has a verbal STM component (Dunbar & Sussman, 1995). However, STM was uncorrelated with performance on another EF task, the Tower of Hanoi (TOH), argued to contain a visual-spatial component (Handley et al., 2002).

Because of the complexity of standard EF tests like the WCST, it is valuable to focus on simple tasks that tap mainly one aspect of executive function. Martin and Allen (2008) found that both semantic and phonological STM deficits were related to impaired performance on simple inhibition tasks. The present study examined the shifting component of executive function, which involves the ability to switch tasks sets.

Five aphasic patients with reduced STM capacities but normal single word processing were tested on a cued task-switching paradigm, which has minimal STM demands. On the nonverbal shifting task, a cue appeared before each trial indicating whether to respond to the color or shape of the upcoming object. In the verbal task, the cue indicated whether to respond to the size or animacy of the referent of an upcoming written word. Switch costs were calculated as the difference in RTs and errors between switch and non-switch trials. Shift costs for all but one of the patients were within the range of controls on verbal and nonverbal tasks.

The results indicate that STM deficits do not derive from a disruption of the shifting component of EF and contrast with the findings on inhibition. Thus, they are consistent with theories emphasizing the importance of inhibition in STM (Zacks & Hasher, 1988), rather than executive function in general (Hoffman et al., 2009).

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Presented by: **Allen, Corinne**

Poster Session 2: Written Production

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52. Patterns of Breakdown in Spelling in Primary Progressive Aphasia

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Introduction
Primary Progressive Aphasia (PPA) has recently been divided into three clinical subtypes. Progressive Nonfluent Aphasia (PNFA) is characterized by impaired grammatical sentence production and motor speech with spared word comprehension. Semantic Dementia (SD) is characterized by deterioration of word and object meanings. Logopenic Progressive Aphasia (LPA) is characterized by poor sentence repetition and word retrieval, with spared word and object meanings and motor speech.
Dysgraphia is often among the earliest symptoms of PPA. Distinct patterns of spelling impairment might predict the subsequent course of language deterioration. We sought to identify which cognitive processes underlying spelling were impaired in 17 patients with PPA, based on detailed analysis of performance across tasks and stimulus types.

Methods
Diagnosis was based on history, neurological examination, brain MRI, brain SPECT or PET scan, battery of language tests, and neuropsychological battery. Spelling evaluation included written spelling to dictation of 326 words and 34 pseudowords, oral spelling of 42 words and 20 pseudowords, delayed copy transcoding of 42 words and 20 pseudowords; and written naming of 30 objects and 30 actions. We evaluated (with chi squared tests) effects of word frequency, concreteness, word length, grammatical word class, lexicality (words vs pseudowords), and "regularity" by controlling for the other variables. Errors were categorized as: phonological plausible error (PPE), phonologically implausible nonword (PIN), semantically related word, phonologically similar word (PSW), partial response, or unrelated word (UW).

Results
Among 15 patients, we identified 4 patterns of spelling that could be explained by damage to one or more cognitive processes underlying spelling. Eight patients (4 unclassifiable, 2 with LPA, 2 with SD) had dysgraphia explicable by impaired access to lexical representations, with reliance on sublexical phonology-to-orthography conversion (POC), characterized by a predominance of PPE's, effect of regularity; and/or pseudowords spelled more accurately than words (see Table 1). Two patients showed this pattern initially, and later showed a reduction in PPEs and increase in PINs. One patient (with PNFA) showed dysgraphia explicable by impaired access to lexical representations and complete disruption of sublexical POC, characterized by the absence of PPEs and inability to spell pseudowords. Errors included omissions, unrelated words, PSW, semantically related words, and PINs. She had spared word comprehension, indicating that the problem was in accessing lexical representations rather than lexical-semantic representations. Five patients (3 with LPA, 2 with SD) showed dysgraphia explicable by impaired access to lexical-semantic representations and/or lexical representations with partially spared sublexical POC mechanisms, characterized by a predominance of PIN and PSW, with <25% PPE's and other errors. One patient (with PNFA) showed dysgraphia explicable by impairment of the graphemic buffer, characterized by production of mostly PINs and significant effect only of word length.

Discussion
Any cognitive process underlying spelling can be affected in PPA, but sublexical POC mechanisms and the graphemic buffer appear to relatively spared early in the course of LPA and SD. Patients with PNFA showed no PPEs, but evidence of damage to the graphemic buffer or POC and lexical mechanisms.

Presented by: **Sepelyak, Kathryn**

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53. Accessing allographic representation of letters but not their graphemic identity

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Case Report
This study documents the case of a 69-year-old woman (VA), who, following a left posterior brain lesion, showed an extremely severe deficit in reading and writing letters, words, and numerals. She had a right homonymous hemianopia, a mild right hemiparesis and a limb ideomotor apraxia. VA did not show perceptual deficits, visual agnosia or unilateral visuospatial neglect. VA's speech was fluent, unaffected by paraphasias, but with occasional perseverations, hesitations, anomias and circumlocutions; her repetition and auditory comprehension were unimpaired; picture naming was only 13/80 correct but improved almost to ceiling on phonemic cueing. She was submitted to an exhaustive evaluation of reading and writing abilities.

Results
The main findings in VA's case may be summarized as follows: 1) VA maintained spelling competency for words suggesting that the access to the orthographic structure of words was spared; 2) the preserved ability to recognize shape (among letters, numbers and Aramaic graphemes) and canonical orientation of letters indicates that VA could access the representation of letters and numbers as visual objects with particular features. No low level perceptual deficit can be advocated to account for this performance; 3) VA displayed an essentially preserved ability in lowercase-uppercase matching, suggesting that she could access, at least in the form of the task used for this study, the representation of abstract letter identities independently of their visual forms; 4) nevertheless VA was completely unable to name words, letters and Arabic numbers and could not match spoken letters or, to a lesser degree, numbers to their graphic form.

Conclusions
A rather similar patient has been described in a case of optic aphasia (GV) by Miozzo and Caramazza (1998). However the two patients cannot be easily compared. GV, unlike VA, did not seem to be able to match upper case to lower case, but a probably more difficult task was used in his case. Another crucial point that makes the comparison hard is that in GV matching spoken letters to their visual form was not performed.
Our findings suggest that VA could only access allographic representation of letters from visual input but not their full identity; she also could not access graphemic identity from spoken input and use this graphemic information in orthographic and phonological output. An independent stage in reading where the canonical form, position and allographic alternatives are stored seems to be preserved in this patient.

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Presented by: **Volpato, Chiara**

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54. Processing of Compound Nouns in Deep Dysgraphia: Limitations to Orthographic Autonomy

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It has been demonstrated that writing may be independent of phonology, for example, in subjects with deep dysgraphia (e.g., Rapp et al., 1997). However, orthographic autonomy has not been demonstrated convincingly for stimuli other than simple nouns (cf. Bub & Kertesz, 1982). The present study assessed writing of compound nouns in a deep dysgraphic subject.
The subject, MD, suffered from Broca's aphasia with deep dyslexia and dysgraphia (Bormann et al., 2008). Nonword writing was impossible (0% correct), and semantic errors occurred in writing to dictation. Thus, MD was relying almost exclusively on his lexical-semantic writing routine. Three experiments were carried out to assess whether compound nouns are really processed independently of phonology.
In experiment 1, MD correctly wrote 28 of 45 compound nouns but only ten out of 45 length-matched simple nouns (ChiSquare(1)=14.7, $p < 0.01$). The distribution of his segmental errors respected morphological boundaries (fig. 1).
In experiment 2, MD was better at writing compounds without a linking element (47/100 correct) in comparison to compound nouns with a linking element (12/100 correct; ChiSquare(1)=29.45, $p<0.01$). In German, compounds frequently combine their morpheme constituents by means of a linking element ("Bauer-n-hof"). Also, more morphological errors were observed for target words with linking elements (ChiSquare(1)=19.22, $p<0.01$) as MD tended to delete the linking element (e.g., writing "Sonne-n-brille" ["sun glasses"] as "Sonnebrille").
Across all responses, the majority of his lexical errors (semantic or formally related) affected morphemes, but not compounds as a whole: In the whole corpus, there were 39 errors of which nine were ambiguous (morpheme or whole word substitution). Thirty lexical errors affected a single morpheme only (e.g., writing "oil cinema" in response to "oil film").
However, there was evidence of a conscious strategy based on oral output mediating MD's writing of compounds as he occasionally wrote the second morpheme first. In experiment 3, two lists of 27 compounds were compiled. One list consisted of 'easy-difficult compounds' (Schiffsreise [lit. "ship journey", "cruise"]) while the other consisted of 'difficult-easy compounds' ("Wunderkind" [lit. "miracle child", "prodigy"]). MD wrote the first morpheme more often for the 'easy-difficult' compounds (ChiSquare(1)=17.12, $p < 0.01$) and second morpheme more often for 'difficult-easy' compounds (ChiSquare(1)=9.64, $p<0.01$).
Although MD's writing of simple words was independent of phonology, he nevertheless appeared to use a strategy to support spelling of complex words (i.e. separating the compound in speaking and then writing its morphemes). This suggests that phonological information may be necessary to guide writing of complex words and, probably, phrases and sentences. Comparable limitations to 'orthographic autonomy' have been discussed previously by Bub and Kertesz (1982).

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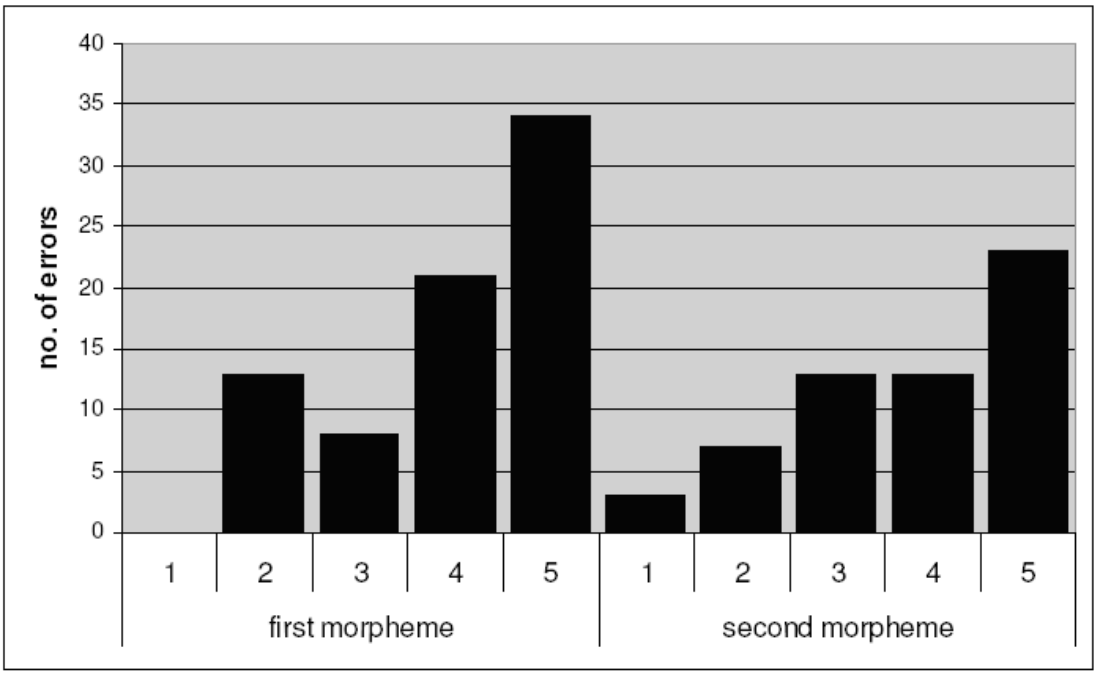

Presented by: **Bormann, Tobias**

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55. Visuospatial Agraphia: A Case Report

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Introduction
Visuospatial skills are necessary for the proper formation of letters and words. Spatial orientation must interact with graphemic output in order that letter components (strokes) can be properly formed by the system of graphemic output programming. Disruption of this ability has been termed as 'visuospatial agraphia'. This condition is characterized by reiteration of strokes, inability to write on a straight line, and insertion of blank spaces between graphemes (Roeltgen, 2003). In this report, a subject with visuospatial agraphia is presented who did not exhibit these classic features.

Case Report
A 52-year-old right-handed medical nurse presented with sudden onset of difficulty in writing. At onset, she experienced difficulty signing in the hospital attendance register. Subsequently, the medical examination revealed normal sensory skills and motor power. The MRI scans revealed altered signal intensity in the high posterior parietal areas of the left hemisphere. The Kannada version (Karanth et al., 1991) of Western Aphasia Battery revealed normal linguistic performance (Fluency, AQ=9; Auditory Verbal Comprehension, AQ=8.8; Repetition, AQ=9.2; and Naming, AQ=8.1). The praxis section of WAB was performed flawlessly by the subject. Oral reading and reading comprehension were intact. The ability to spell words was well preserved. On tasks of copying, dictation, and spontaneous writing (in Kannada and occasionally in English), her performance was highly compromised (See Figure to compare post-morbid performances with pre-morbid). Interestingly, she could correctly key in the letters of English words (e.g. banana) using a computer keyboard and she also performed fairly well on copying of cursives. Further, Mrs. P. was required to write spontaneously as well as to copy in Kannada with her left hand.

However, written output was highly illegible and paralleled right hand performance. On administration of Addenbrook's Cognitive Examination (Mathuranath et al., 2000), she performed effortlessly on all the subtests except the visuospatial section (see Figure).

Discussion

The subject apparently showed normal linguistic performance and preserved reading, spelling, and typing skills in the presence of severely compromised written output. The written output was characterized by illegible and poorly formed letters. Despite her poor performance on visuospatial tasks, copying of cursives was fairly preserved. In addition, she was able to write on a straight line without many involuntary reiterations and blank spaces between the letters. These observations reveal that visuospatial agraphia may manifest as poorly formed letters in the absence of reiterations and blank spaces between letters with relatively preserved cursive writing.

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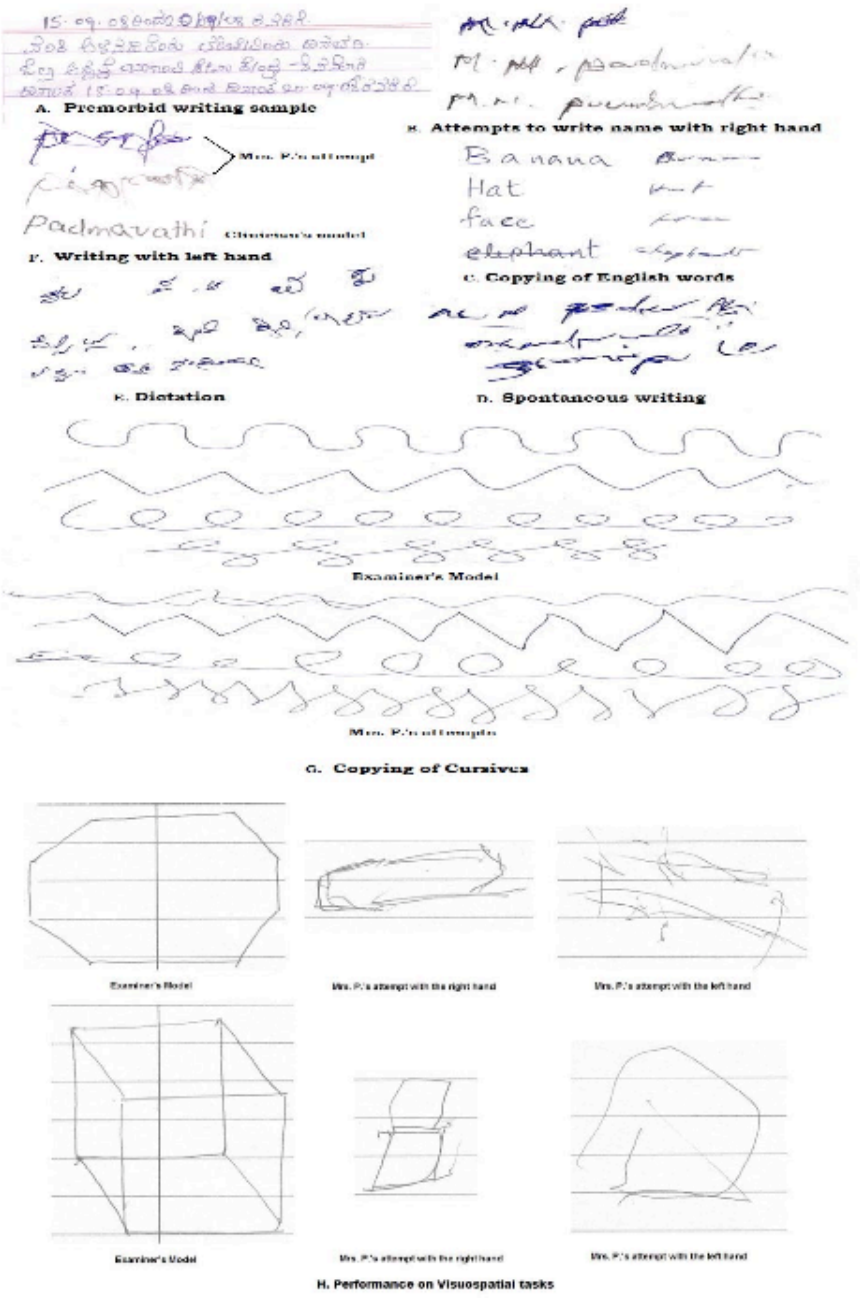

Presented by: **Krishnan, Gopee**

56. Retention of Music Notation "Spelling" in a Semantic Dementia Patient

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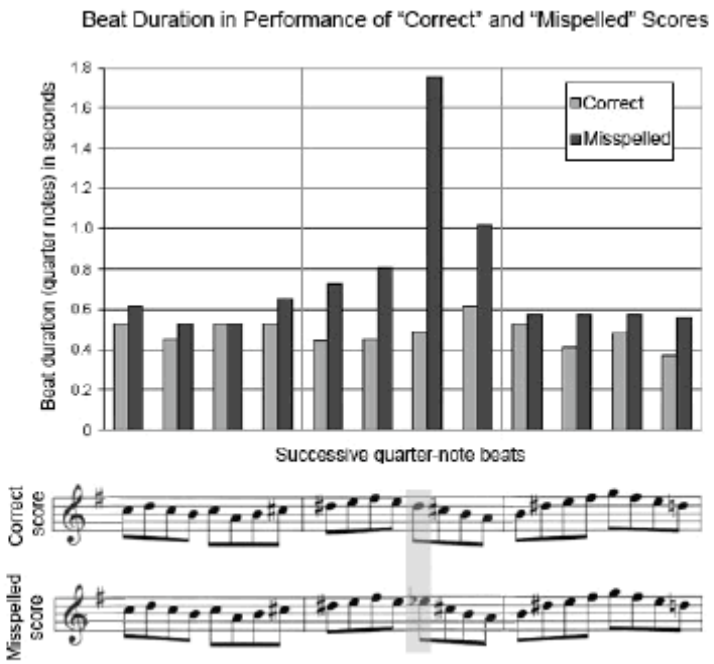
Introduction
Impaired speech, comprehension, and naming in semantic dementia (SD) reflect semantic memory loss. However, the disease can spare abilities (such as mathematical competence) which involve knowledge of concepts and symbolic representation apart from language. Music, like language, involves creativity within rule-governed structures, temporal sequencing, and communicative expression, and is represented by symbolic notation—yet music contains no words or external referents. Thus, examining retained musical ability in SD may shed light on the language-specificity of the disease's effects.

We assessed knowledge of tonal structure and its notational "spelling" in TM, a 64-year-old male SD patient and former semi-professional Baroque harpsichordist. TM is mute with no aural or written language comprehension, yet he can sight-read novel music scores and play complex works which he creatively embellishes with stylistically appropriate ornaments.

Procedures and Results
Any musical pitch can be notated in various ways. For instance, the pitch produced by the black piano key located between the white keys C and D can be notated (i.e., spelled) as either C-sharp or D-flat. Tonal context dictates which notational spelling is correct, just as sentential context in language dictates whether the spoken utterance /fit/ is spelled "feet" or "feat." A musician reading a piece in the key of D Major would be surprised by the D-flat spelling, just as a reader of fairy tales would be surprised to see Cinderella's slippers described as fitting her feat.

We created a novel musical score in two versions which would sound identical if played as notated, but one of which contained a spelling error. The scores were presented to TM during separate sessions. He sight-read both scores accurately, but was challenged by the spelling error. The "correct" and "misspelled" scores were performed at fairly even tempos of, respectively, 2.37 (±.66) sec and 2.71 (±.78) per four-beat measure; however, TM took 4.88 seconds to play the measure containing the misspelling, in contrast with 2.03 seconds for the corresponding correct measure. The Figure illustrates the duration of each beat of the relevant measure and those flanking it; the misspelled note and its correct counterpart are highlighted. We corroborated these results by assessing TM's performance from an unfamiliar score containing several misspellings. We analyzed two three-measure passages, one with four misspellings and the other with none, which were otherwise matched for technical, harmonic, and visual complexity. TM played the "correct" passage in 5.94 seconds without error, but played the "misspelled" passage in 10.35 seconds with a 20% error rate.

Conclusion
TM, a semantic dementia patient who understands neither spoken nor written language, has retained understanding of both tonal structure in music and the symbolic notation by which such structure is visually represented. Although his preserved musical abilities in the face of devastating language loss suggest separate neural substrates for music and language, his understanding of musical "spelling," an aspect of musical knowledge with language analogs, suggests that his aphasia reflects a specifically semantic impairment, while abilities that language shares with other forms of knowledge are spared.



Presented by: **Koenig, Phyllis**

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57. Cross-Language Treatment Generalisation in Welsh-English Bilingual Dysgraphia

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Although there are some treatment studies of spoken language in bilingual aphasia (Miertsch et al., 2009), evidence-based treatment studies of acquired dysgraphia are restricted to monolingual speakers, usually of English. Our goal was to study the possible cross-language generalisation of treatment effects in bilingual dysgraphia, as a function of deficit type and language treated. We hypothesized that general cross-language transfer might occur in graphemic buffer disorders but might be restricted to translations of treated words in orthographic lexical disorders.

Participants
Two Welsh-English early proficient bilinguals literate in both languages pre-morbidly:
1. RON, age 59, suffered a left-hemisphere stroke in 2003. He now presents with mild anomia, moderate syntactic difficulties, phonological dyslexia and moderate dysgraphia in both languages.
2. CWS, age 61, suffered a right frontal stroke in 1994. He now presents with moderate anomia, syntactic difficulties, phonological dyslexia and severe dysgraphia in both languages.

Spelling assessment
An extensive investigation of spelling abilities revealed that: 1. RON's deficit affects primarily the graphemic buffer, with letter omissions, substitutions and reversals (e.g., "cigarette"-> GIGAREET) and a length effect.
2. CWS's deficit affects primarily the orthographic lexicon, with phonologically plausible errors ("eighteen"-> ATEEN) and a regularity effect.

Treatment study
The treatment was based on Rapp & Kane (2002), the essential difference being that we measured generalisation from English to Welsh, and, 6 months later, Welsh to English.

1. Baseline testing. Before treatment, performance was measured twice on five sets of words matched for length, lexical frequency and performance (N=24 per set for CWS; N=36 for RON): 1) English treated, 2) English untreated repeated, 3) English untreated control, 4) Welsh untreated translations of English treated words, and 5) Welsh untreated controls.
The languages in each set were swapped 6 months later for the Welsh treatment.
2. Treatment. Patients received treatment twice a week until no further improvement was observed for 4 consecutive sessions (around 20 weeks for each language). After spelling each word to dictation, patients studied cards of the correct spelling while each letter was read out to them. This procedure was repeated until a correct spelling was achieved. Words from the repeated set were dictated at each session but not treated.
3. Post-tests. The five sets of words assessed at baseline were re-assessed twice at the end of treatment.

Results and discussion
Both patients improved on treated words, but only RON, the graphemic buffer case, showed generalisation to within-language untreated words. However, neither showed evidence of cross-linguistic generalisation, regardless of which language was treated (see Table 1). The within-language results replicate Rapp & Kane (2002) and confirm that generalization patterns are linked to deficit type. However, we did not confirm our hypotheses about cross-language generalisation. This highlights that treatment effects do not automatically transfer from one language to another. New avenues for the development of treatments with more generalisation potential in bilingual populations will be presented.

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Table 1: Percent improvement between baselines and post-tests as a function of stimulus set and language treated (values in bold indicate significant improvement using McNemar test).

	RON	CWS
Phase 1: Treatment of English words		
English treated	**+69%**	**+33%**
English repeated (untreated)	**+62%**	+10%
English control	**+22%**	-4%
Welsh translations of English treated	-4%	+2%
Welsh unrelated control	+2%	+2%
Phase 2: Treatment of Welsh words		
Welsh treated	**+53%**	**+40%**
Welsh repeated (untreated)	**+18%**	+13%
Welsh control	**+21%**	-4%
English translations of Welsh treated	+14%	+4%
English unrelated control	+10%	-10%

Presented by: **Roberts, Jennifer**

Poster Session 2: Phonology, Phonetics and Acoustics-1

58. Perceptual Discrimination of Shona Lexical Tones and Hums by Left and Right Hemisphere Damaged Patients

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This study investigated the ability to discriminate Shona lexical tones and hums by left hemisphere damaged patients (LHD), right hemisphere damaged (RHD) patients and a control group. Research that has been done on the perception of lexical tones has shown that LHD patients are more impaired than RHD patients. Van Lancker (1980) proposed that the more linguistic pitch contrasts are, the more laterized they are to the left hemisphere while the less linguistic pitch contrasts are laterized to the right hemisphere. According to Van Lancker's functional lateralization hypothesis, hemispheric specialization is associated with different domains of pitch contrast, with lexical tone being the "most linguistically structured" and affect and voice quality being the "least linguistically structured." The present study tested six LHD and six RHD patients in two discrimination tasks. The two tasks measured the participants´ accuracy in making same/different judgments on pairs of hums and pairs of Shona words. The RHD patients performed significantly better than the LHD aphasic patients on both tasks. The LHD patients discriminated the lexical tones at only 59% and the hums at 61% accuracy, while the RHD patients discriminated the hums at 81 % and the lexical tones at 82% accuracy. These results are in line with what has been found in Asiatic studies that lexical tones are relatively more impaired in LHD patients in comparison to RHD patients. Despite different tonal systems between the Asiatic and Bantu languages, a unilateral brain damage also results in tonal impairment in Shona patients.

Presented by: **McLoddy, Kadyamusuma**

59. The Treatment Effects of Phonological Complexity on Apraxia of Speech: An Implicit Alternative

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Implicit treatments were applied successfully in individuals with fluent aphasia and apraxia of speech (AOS) with aphasia (Davis, Farias, & Baynes, 2009). Here mental practice, rather than overt speech, was used in training complex consonant blends. Prior research (Maas, Barlow, Robin & Shapiro, 2002) showed generalization to simpler consonant blends when treating AOS. In this design, word initial complex consonant blends were trained to assess their effects on simpler consonant blends in treatment of AOS.

Our hypotheses follow:

1. Would implicit phoneme manipulation improve production of targeted complex consonant blends?
2. Would treatment generalize to production of simpler consonant blends?
3. Would visual inspection and size effects verify the benefits of implicit treatments?

Method
Subject: SB was a 56 y/o male s/p CVA with a discrete lesion in the left insular region. AOS was the primary diagnosis at 6 months post CVA.
Intervention: This multiple baseline intervention was applied three times weekly for 1-1.5 hours. It required SB to make choices based on the mental manipulation of sounds (deletion, insertion, substitution, rhyme) without verbal output. For example, SB was asked to select the target from 4 pictures when given an auditory request " 'eak' what would it be if you added 'str' to the beginning." The foils were phonologically related to the target such as "speak," "peak," and "sneak" for the target "streak." Eleven complex consonant blends (squish, stroke) and 11 simpler consonant blends (swish, stoke) were selected for training based on 200 screening items.

Results
Clear response to training on complex consonant blends (List A) resulted in a d statistic of 5.7 on trained probes and 4.2 on untrained probes (see Figure 1). Training generalized to untrained probes of simpler consonant blends (List B) giving a d statistic of 4.8. Improvements were maintained on both complex and simpler consonant blends 6 months after training. Improvements on the Western Aphasia Battery and on auditory discrimination testing were noted.

Conclusions
Findings support the use of mental practice as a complementary technique to overt practice. Treatment for AOS is well suited to mental practice as it requires the individual to focus on inner speech, a necessary precursor to self-correction and self-monitoring for accurate overt speech. Results support prior findings that training of complex consonant blends generalized to simpler blends. An improvement in auditory discrimination may be a byproduct of mental practice, self-monitoring and correction of motor plans required for the selection of the target in implicit training.

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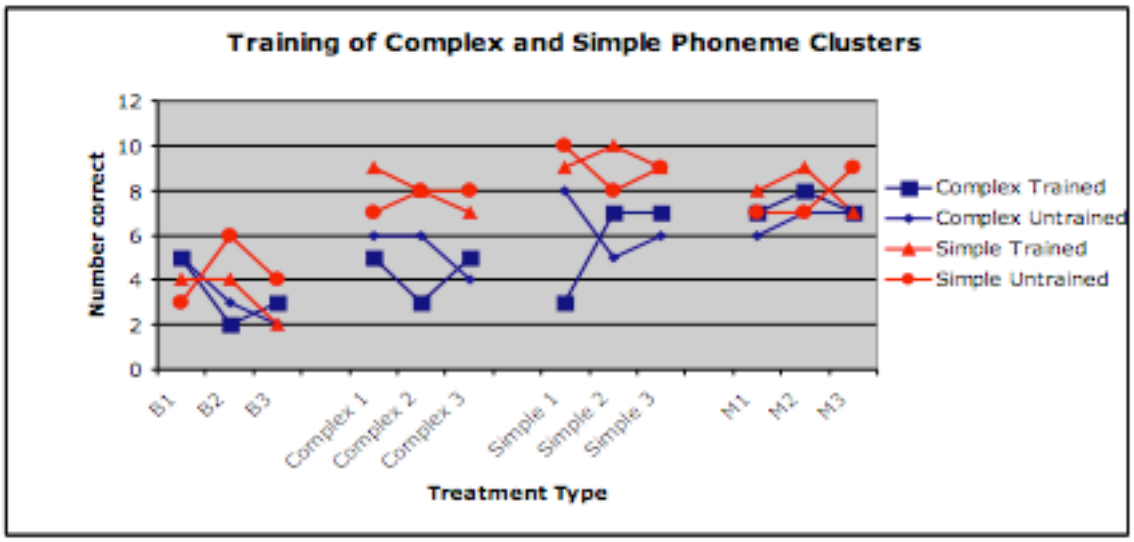
Presented by: **Davis, Christine**



60. Acoustic Analysis of Prosody for Normal and Aphasic Discourse of Cantonese Speakers

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Background
Previous studies on prosodic problems in aphasia have focused the investigation on the sentence level. However, the evaluation should be based on connected sample as it is considered the most sensitive task to different dimensions of atypical prosody (Leuschel & Docherty, 1996). Recently, Tseng, Pin, Lee, Wang and Chen (2005) proposed a top-down, multi-layered framework, which considers all relevant levels (prosodic phrase group, breath group, prosodic phrase, prosodic word, and syllable) that constitute discourse prosody. While Tseng et al.'s model is developed based on speech samples of normal Mandarin speakers, the present paper reports a pilot study that has applied this framework to analyze discourse prosody in Cantonese-speaking normal speakers and individuals with aphasia.

Method
The subjects were two individuals with aphasia (one female of 47 years old with transcortical motor aphasia and one male aged 49 years old with anomic aphasia) and two age-, gender- and education level-matched normal individuals (one 44-year-old female and one 47-year-old male; education level was secondary or below). Each speaker partook in passage reading, picture description, story telling and monologue. The speech samples were recorded using a digital recorder and a condenser microphone in a quiet room. Broad phonetic transcription, boundary break annotation (based on Tseng et al.'s guidelines) and acoustic analysis were conducted using Praat version 5.1.02 (Boersma & Weenink, 1992-2009). The following parameters were measured: fundamental frequency, peak intensity, duration of each syllable (in millisecond), duration of each break, speaking rate and articulation rate (in syllable per minute).

Results
The speakers with aphasia showed lower speaking rate and articulation rate than the normal speakers because more and longer breaks and prolonged syllables were used. For intonation, smaller variations in fundamental frequency and intensity were observed in the speakers with aphasia compared to normal speakers. The results of some of the acoustic measures also differed according to speech tasks. In general, the speakers showed lower speech rate and smaller intensity variation in reading than in picture description, story telling and monologue.

Discussion and conclusion
The lower speech rates were probably due to word retrieval problems in the speakers with aphasia. The smaller fundamental frequency and intensity variations in the speakers with aphasia might be related to the use of more breaks, which has disrupted the overall intonation pattern. Tseng et al.'s framework is shown to be applicable for discourse by normal Cantonese speakers. It can be extended to capture the prosodic disturbance in aphasia through modification of the boundary breaks annotation guidelines and additional parameters, such as measuring the use of inappropriate breaks based on language analysis.

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Presented by: **Lee, Alice**

61. The development of a Standardized Assessment of Phonology in Aphasia.

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Statement of the Problem
Impaired phonology in adult aphasia is common and has profound and measurable consequences upon reading (de Partz, 1986; Kendall et al, 1998, 2003; Conway et al, 1998), language comprehension (Blumstein, 1998; Milberg et al, 1988), speech production (Nadeau, 2000; Kendall et al, 2003; Kendall et al, 2008; Browman and Goldstein, 1992) and working memory (Baddley and Hitch, 1974; Friedman et al, 2000). Unfortunately, there is no standardized measure of phonology for use with aphasic persons. The purpose of this research is to describe an impairment level measure of phonology in aphasia.

Methods/Procedures
Item response theory (IRT) formed the basis for development of items in 3 subtests of phonology (reading, repetition and perception).
Item Development
Reading: 69 items across 4 categories were constructed (real words, irregular words, pseudohomophones and non-words). All words were controlled for number of graphemes and phonemes, lexical and phoneme frequency, and complexity. Repetition: 113 items across 6 categories were constructed: real- and non-word repetition and real- and non-word parsing/blending. All words were controlled for syllable length, phonotactic probability and lexical frequency.
Perception: 216 items across 4 categories (real and nonword rhyme, lexical decision, minimal pairs) were constructed. All words were controlled for phoneme and lexical frequency, syllable length and phonotactic probability.

Data Collection
Thirty-seven individuals with aphasia met inclusion criteria of a single left hemisphere stroke, right-handed, monolingual English speaking, and presence of aphasia. Exclusion criteria included prior CVA, pre-existing neurological illness or severe impairment in vision or hearing and presence of developmental speech-language impairment. Tasks and stimuli were randomized and presented with an ISI of 8.0 seconds on a Dell Latitude X1 Laptop. For the reading task, participants were asked to read each word aloud. Verbal responses were recorded digitally for subsequent analysis.

Analysis
Responses were scored for accuracy and data were analyzed using WINSTEPS Rasch analysis (Bond & Fox, 2001; Linacre, 2005; 1994).

Results/Discussion
Results for item misfit, person separation reliability, person strata, Chronbach's alpha and item floor/ceiling effects are presented in Table 1. Our assessment of phonology in aphasia demonstrates a reasonable fit to the Rasch model. The reading items demonstrate good measurement qualities, good point measure correlation, and are separating people into at least 2 strata. The items in repetition, parsing and blending demonstrate adequate measurement qualities. The range of misfitting items was low (0-2), demonstrating good point measure correlation. There were significant floor effects for all tasks and one ceiling effect (real word repetition). There was a good point measure correlation for all tasks except lexical decision, for which 14 of the 36 showed correlations below .30. Future research will focus on the creation of a short form that will eliminate redundant items and the creation of new items to address the ceiling and floor effects.

Presented by: **Kendall, Diane**

62. White Matter Fiber Tracts for Phonological Processing

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Objectives
In this study, white matter fiber pathways were tracked in a large-scale fronto-parietal language network which was functionally defined by an fMRI experiment investigating different phonological transformation processes in German. In a suprasegmental transformation task, a shift of stress placement was required in transforming a pseudo-country into a pseudo-language, or vice-versa. In a segmental transformation task, in turn, a vowel segment change was elicited by having subjects transform a pseudo-noun into a pseudo-diminutive, or vice-versa.

Methods
DTI was performed in 20 subjects (mean age=34 y, range=20-69 y, 8 females). Language areas were defined based on the results from an fMRI experiment contrasting suprasegmental and segmental transformation with repetition. Fronto-parietal as well as interhemispheric pathways between these functionally defined core-regions were tracked with a probabilistic diffusion-tensor based imaging method.

Results
Connectivity between areas active during suprasegmental transformation, namely left inferior parietal lobule, intraparietal sulcus (IPS) and left inferior frontal gyrus (IFG), pars opercularis (BA 44) is provided by a dorsal pathway via the arcuate fascicle (AF) and superior longitudinal fascicle (SLF) fiber system. Areas active during segmental transformation, namely IPL, IPS and IFG, pars triangularis (BA 45) are connected in both hemispheres by a ventral pathway via the extreme capsule (EmC), while IPL and IFG (BA 44) are connected by a dorsal pathway via the AF.

Conclusions
The segregation of fronto-parietal white-matter pathways into dorsal and ventral pathways (Saur et al., 2008) suggests a functio-anatomical dissociation for different language processing routines. For phonological processing, the dorsal pathway seems to act as a fast, bottom-up route for mapping suprasegmental and segmental phonemic information from phonological working-memory in IPL to the inferior-frontal articulatory network, whereas the ventral pathway could be important for top-down modulation of phonological transformation processes through lexical-semantic information. It will be interesting to further investigate, if and how disruptions of particular subcomponents of this network are consistent with a dual pathway model for phonological processing.

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Presented by: **Kellmeyer, Philipp**

63. Tomato to Baritood: The Source of Non-Words in Jargon Aphasia

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Introduction
Some aphasic individuals produce excessive non-words, resulting in speech that sounds like jargon. The source of jargon is attributed to impairments in psycholinguistic processes such as lexical-semantic retrieval, phonological encoding, and self-monitoring (Moses, Nickels & Sheard, 2004). Few studies have systematically examined self-generated speech to identify a locus of deficit resulting in jargon production. In this study, the nature of jargon errors and their relationship to target was compared across three tasks employing lexical processes to different extents: word repetition, non-word repetition and picture naming. They all entail phonological encoding, but differ in whether they place heavy (picture naming), light (word repetition) or no (non-word repetition) demands on semantic processes. Additionally, stimulus length (monosyllabic/multisyllabic) places different demands on phonological encoding.

Methods
Three English-speaking fluent-aphasic individuals whose picture descriptions contained at least 10% of non-words participated (age:55-65 years, one female). The stimuli were 120 nouns from the Picture Naming Project (Szekely et al., 2004) and non-words created by altering these nouns. Phonological retrieval was assessed by examining production accuracy and error types (phonological/semantic relationship to target) for each task (picture naming, word repetition, non-word repetition). Integrity of phonological encoding processes was evaluated by inspecting phonemic overlap between targets and errors as a function of phoneme position within the target and allotting a graded target-error approximation score (TEAS; 1=phoneme in same position, 0.5=different position, but same syllable, 0.25=different syllable) as well as examining production accuracy sorted by word length.

Results and Discussion
All participants demonstrated greater difficulty with lexical-phonological retrieval than post-lexical phonological encoding processes as evidenced by 1) lower accuracy in picture naming than word repetition (GB=12.5% versus 77.5%; LV=2.5% versus 85%; PH=3.3% versus 25.8%), 2) more errors unrelated to target in picture naming compared to word repetition (mean=55.5% versus 13.6%), 3) poorer phonemic overlap with target (mean TEAS:0.15 versus 0.76; Table 1)
Additionally, participant PH demonstrated difficulty with post-lexical phonological encoding as indicated by 1) no influence of lexical demands on phonemic relatedness between errors and target (TEAS score; Table 1)with more unrelated errors on all tasks, and 2) significant word length effect ($\chi 2=4.1, 8.3, p<.05$).
This study of jargon production presents a novel analysis procedure that enables a finer delineation of lexical-semantic and phonological processes. Results indicate that the primary breakdown occurs during retrieval of phonological information following lexical-semantic access. Hence phonological encoding proceeds with underspecified information about target word form, leading to jargon. When a clearly specified surface form of the target enters the phonological planning processes directly (as in word repetition), these individuals produce less jargon. Moreover, their jargon is a closer phonological approximation to target. However, some individuals may experience additional breakdown during phonological encoding (as in PH) which can compound the severity of jargon production.

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Table 1. Results of picture naming, word repetition, and non-word repetition for three individuals with jargon aphasia. Distribution of error types, target- error approximation score (TEAS) and the overall percent accuracy as a function of stimulus length, for each task and participant is given.

	Picture Naming			Word Repetition			Non-Word Repetition		
	GB	LV	PH	GB	LV	PH	GB	LV	PH
Error Analysis (n=120)									
Correct Responses (%)	12.5	2.5	3.3	77.5	85	25.8	33.3	49.2	1.7
Phonologically unrelated errors (%)	42.5	40.8	83.3	1.7	0.0	39.2	8.3	5.0	61.7
Phonologically related errors (%)	16.7	4.2	3.3	15.8	14.2	28.3	58.3	45.0	36.7
Semantic errors (%)	8.3	0.8	2.5	0.8	0.0	0.0	0.0	0.0	0.0
Other† *(%)*	20.0	51.7	7.5	4.2	0.8	6.7	0.0	0.0	0.0
Target-Error Approximation Score (TEAS)	0.3	0.1	0.1	0.9	0.9	0.4	0.8	0.8	0.3
Accuracy by Word Length									
Monosyllabic (in %; n=60)	13.3	1.7	5*	66.7	78.3	33.3*	33.3	53.3	1.7
Multisyllabic (in %; n=60)	11.7	3.3	1.7*	88.3	91.7	18.3*	33.3	45	1.7

* Statistically significant on chi-square (χ^2) test
† *Other* includes no responses and semantically/phonologically unrelated real word responses

Presented by: **Sampson, Monica**

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64. Phonemic Errors in Conduction Aphasia: Vowels versus Consonants.

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Introduction
A pervasive finding in the literature on phonological errors in speech is that, on average, aphasics and normal speakers make more errors on consonants than on vowels. This study focuses on phonemic substitution errors in conduction aphasia, a condition whereby the disturbance is believed to affect phonological planning. The study is conducted on speakers of Italian, a language wherein non-stressed vowels are not reduced (thus not resulting, as in English, in the production of the neutralized central vowel "schwa"), allowing us to better compute errors committed on vowels. Stress in fact has been shown to "protect" vowel production in aphasia. The aim of this study is to investigate whether vowels and consonants are categorically distinct or whether they belong to the same continuum along the parameter of sonority, whereby vowels would be at the highest sonority extreme. Only single case studies of the extremely rare condition whereby vowels are more affected than consonants have so far investigated this issue (Caramazza et al., 2000; Semenza et al., 2007).

Method and Results
Data were collected from a sample of 19 conduction aphasic patients, diagnosed via the Italian version of the Aachen Aphasia Test. Phonemic substitution errors were collected from the patients' performance in both the naming and repetition tasks from this battery. Three independent judges agreed on a transcription of patients' errors. Only errors where the target phoneme was identifiable were counted and entered the analysis. A total of 182 errors (1.7% with respect to the number of target phonemes) were collected in repetition and 96 (1.8%) in naming.
As expected, patients committed significantly more errors on consonants rather than on vowels (keeping into account the relative frequency of consonant and vowels in Italian) in both tasks. This effect was found in all patients but one. Correlations were calculated for both tasks between the sonority scale for Italian consonants, the percentage

of errors for each target consonant segment, and the percentage of consonant types produced as an error. Both correlations were non-significant. Notably, sonorous consonants (i.e., /l/ and /r/) were not affected any more than other consonants (e.g., /t/, the less sonorous consonant).

Conclusion
These data argue in favor of those theories viewing consonants and vowels as occupying distinct representations rather than different places along a sonority continuum.

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Presented by: **Mori, Ileana**

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65. Lesion Sites in Acquired Neurogenic Stuttering: Implications for Neural Models of Fluent Speech

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Although the conceptualization of left hemisphere control of speech (Broca, 1863) came to be widely accepted among neuroscientists, contemporary studies (van der Merwe, 1997) seem to promote a broader concept of neural control of speech and language. A study of neural lesions associated with acquired neurogenic stuttering (ANS) might offer new data to reflect on 1) the neural bases of cognitive, linguistic, and motoric processes of speech production, and 2) neural plasticity observed in spontaneous and training-induced recovery.

The current study reports on a series of five adults who had ANS following stroke induced lesions in bilateral parietal lobe (case 1), right frontal and pontine lesion (case 2), left fronto-temporal lesion (case 3), white matter underlying left parietal and frontal lobes (case 4) and left basal ganglia (case 5). Each case was tested on speech production tasks such as extemporaneous speech, and oral reading of paragraphs. Following the widely accepted clinical criteria of sound/ syllable repetition and sound prolongation, stuttering was identified in our subjects. The occurrence of stuttering in each case is discussed in the context of contemporary neural models of speech production (Alm, 2004., Gunther, 2003., van der Merwe, 1997., Indefrey, 2007., Ingham etal, 2003), and lesion data reported in previous studies of ANS (Ludlow et al, 1987). The cases reported in the current study strongly suggest that any component process of fluent speech production can be impaired following lesion to the integrated complex, neural network that is widely distributed in both hemispheres . Hence, the lesion data reported in the current study appear to support the view of bi-hemispheric foundation for speech. However, we suggest that the currently available imaging technologies can be applied to investigate the natural history of lesion induced dysfluency and the compensatory functional support of the intact areas of the hemispheres.

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Presented by: **Balasubramanian, Venu**

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66. The Phonetic Echoes of Deficits to Lexical Access

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Introduction
Recent research suggests that the difficulty or ease of retrieving phonological information during lexical access influences the fine-grained articulatory properties of a word. Many theories assume that lexical neighbors--words that share segmental structure--become active during lexical access in production (Gordon, 2002). Baese-Berk & Goldrick (2009) report that the effect of these neighbors on lexical access is reflected in phonetic processing. Initial consonants of words with a minimal pair neighbor (cod-god) were phonetically enhanced relative to matched words lacking such a neighbor (cop-*gop). This enhancement was interpreted as arising from competition during lexical access between contrasting sounds in targets and their minimal pair neighbors (/k/-/g/).
This study examines the productions of an individual (CSY) with a lexical access deficit. This disruption to retrieval of the target's phonology should lead to increased competition between the target and its lexical neighbors--increasing the degree of phonetic enhancement in words with minimal pair neighbors.

Case study
CSY suffered an intracerebral hematoma near the left fronto-temporal-parietal junction at 51. Although he exhibited normal comprehension, he was significantly impaired in picture naming (64% correct, N = 260). A significant lexical frequency effect suggests this impairment arises in the course of lexical access. Consistent with a lexical locus, CSY is highly accurate in repetition (97%) and reading (98%)--suggesting post-lexical production processes are intact.

Method
A set of 36 word pairs with voiceless initial stops was constructed. One member of each pair had a minimal pair neighbor (cod-god) while the matched word did not (cop-*gop). These were matched for length, lexical frequency and phonotactic probability. The pairs were embedded in a set of 36 filler items. The list was presented in 3 random orders to CSY and 14 neurologically intact young adults for self-paced reading aloud. Any mispronounced item and its matched word were excluded from the analysis.

Results
As shown in Figure 1, relative to controls CSY showed a significantly greater degree of phonetic enhancement for /p/-initial words with minimal pair neighbors. The lack of a significant effect at the other places of articulation likely reflects a ceiling effect. /t/ and /k/ have longer VOTs than /p/ (Volaitis and Miller, 1992); intrinsic limits on VOT may mask any increased phonetic enhancement for these segments.

Conclusion
These data provide further support for interactive models of speech production. Interaction allows disruptions to lexical access processes to influence phonetic enhancement during articulatory planning.

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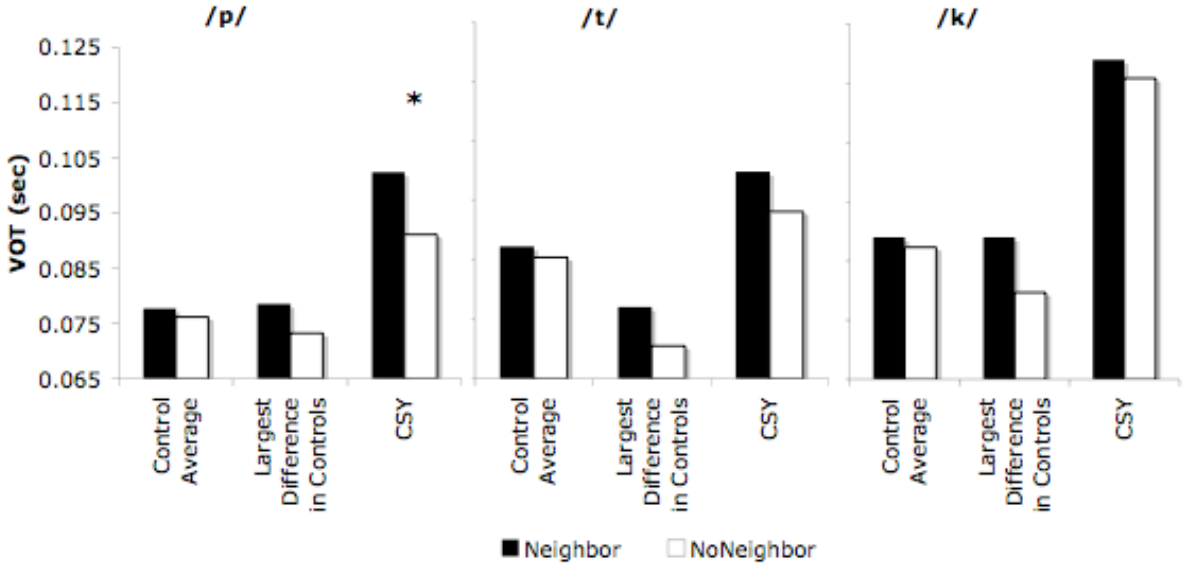

Figure 1. Average voice onset time (VOT) for initial stops at each place of articulation for words with (cod-god) and without (cop-*gop) minimal pair neighhors. VOTs are grouped by: the average VOTs for 14 controls; the individual with the largest percentage increase in VOTs for minimal pair neighbors in the control group; and CSY. To compare CSY's phonetic enhancement for words with minimal pair neighbors to controls, the percentage increase in VOTs (VOT in word with minimal pair neighbor/VOT in word without neighbor) was calculated for each participant. CSY's increase for /p/ exceeded that of all participants in the control group. Crawford & Howell's (1998) modified t-test was used to assess this difference. CSY's percentage increase was significantly different from controls for /p/ ($t(13)=3.47$, $p < .005$). For /t/, CSY's increase was not significantly different form controls, falling in the upper quartile of the control group ($t(13)=.98$, $p < .20$). CSY also showed no significant increase in enhancement for /k/ initial words. His increase fell near the median of the control group ($t(13)=0.12$, $p < .5$).

Presented by: **Goldrick, Matthew**

Poster Session 2: Noun and Verb Processing

67. Naming Proper Nouns from Sound and Vision: Analysing the Role of the Temporal Lobe with fMRI

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Belin (2006) argued for modality-specific processing in the anterior temporal lobe, namely a voice-selective area in the upper bank of the anterior superior temporal sulcus (STS) with higher activity in the right hemisphere. Other imaging studies observed increased activity in anterior temporal regions when subjects named famous faces or landmarks (Gorno-Tempini, & Price, 2001) and suggested hemispheric differences with a stronger involvement of the left temporal pole in lexical retrieval and of the right temporal pole in sensory or semantic processing of these unique entities (Gainotti, 2007). Accordingly, proper name anomia was often observed after lesions of the left temporal pole (Grabowski, Damasio, Tranel, Cooper, Boles Ponto, Watkins, & Hichwa, 2003).
Three fMRI experiments tested whether the cortex along the anterior STS is selectively activated by human voices, and whether there is a left hemispheric preference for named voices.
In experiment 1, subjects listened to short phrases spoken by famous and unfamiliar persons plus sounds of animals and musical instruments. Subjects were asked to push a button if they recognised the person, animal, or musical instrument. In experiment 2, subjects classified speakers as unfamiliar or familiar, or described or named them overtly. In experiment 3, subjects saw pictures of cartoon characters, animals, and fruit & vegetables and named or described them overtly. The data were analysed by defining regions-of-interest (ROI) in the temporal lobes (Figure 1) in each individual subject.
Human voices caused higher activity in both temporal cortices compared to other sounds. These differences gradually increased when moving from the auditory cortex (Figure 1, AC) to ventral and anterior ROIs that were activated by voices only. In all ROIs, the difference was larger in the left than in the right hemisphere. Moreover, named voices produced stronger activation than non-named voices, especially in the anterior temporal lobe and the lower bank of the STS, and these differences were more pronounced in the left hemisphere. Incompatibly to a strict view of voice-selectivity, pictures of cartoon characters also caused strong activation in temporal cortices, which was significantly stronger than for animals or fruit & vegetables. Again, the left hemisphere showed larger differences between the semantic categories than the right hemisphere did.
Thus, our results suggest that the anterior temporal lobes and the lower bank of the STS are engaged in the modality-independent processing of unique entities. Furthermore, the left hemisphere differentiated better between named and non-named voices and between unique and generic items, indicating its role in the retrieval of proper names.

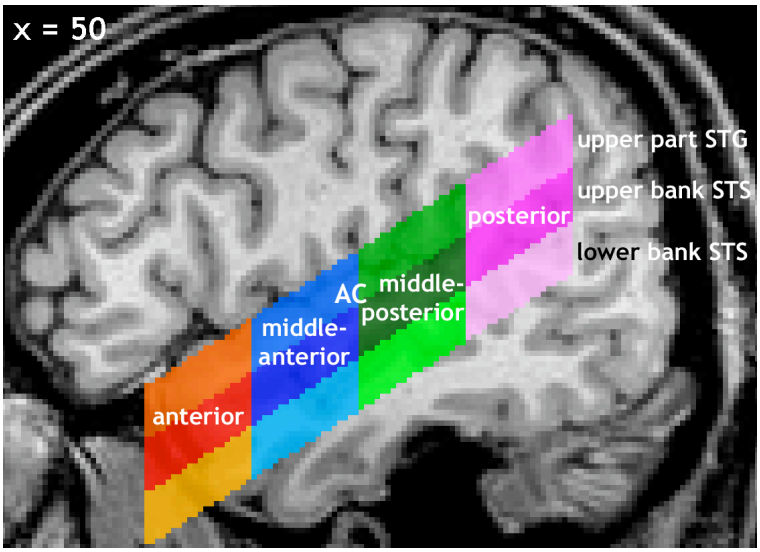

Figure 1. ROI definition in the temporal lobes.

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Presented by: **Bethmann, Anja**

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68. Verb Retrieval and the Influence (or not) of Verb Argument

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Introduction
The retrieval of verbs in aphasic speakers is thought to be affected by a number of factors. The number of arguments a verb takes has been found to be associated with ease of retrieval in agrammatic aphasia (Thompson 1997), and McCann reported an association in fluent aphasia (McCann and Edwards 2004). In this paper we report on verbs and argument structure in connected speech in two fluent aphasic speakers who participated in a verb treatment study (Edwards & Tucker 2006).

Method
Participants: JD (63 years old, 6 months post-onset) and CB (75 years old, 18 months post-onset) were diagnosed with Wernicke's aphasia based on clinical assessments.
Treatment: Treatment, which followed 3 sessions of assessment to establish base-line measures, lasted 4 months. Verb naming, sentence production and spontaneous speech were assessed before and after treatment and 3 months post treatment. Spontaneous speech samples comprised the centre 25 utterances from each of the four Aesop tales (Goodglass, Kaplan and Baresi 2001) and the analysis was based on Thompson, Shapiro and Schendel (1995). The

proportion of grammatically well formed sentences was tallied and verbs were coded for number of the optional/obligatory arguments, as complement verbs, or as copular verbs. The percentage of verbs used with the correct argument was calculated.

Results
Single verb retrieval and single sentence production improved for both participants. CB, but not JD, retrieved more intransitive than transitive verbs. Omission of arguments in the theme role contributed to CB's errors in sentence construction, but not for JD, for whom incorrect verb selection was more problematic. CB's sentence construction improved as he retrieved more obligatory arguments after treatment, while the improvement in JD's sentence production was related to moving from production of general 'light verbs' to more target verbs after treatment (see Figure 1). Both participants produced more high frequency than low frequency verbs in these tasks.

Discussion
Both participants improved after receiving the same treatment, despite differences in the degree and detail of their verb retrieval problems. This suggests that targeting verb retrieval in a systematic manner can have an effect on conditions that differ in detail. It is not known whether more targeted treatment as argued by (Webster et al 2004) would have produced even greater improvement.

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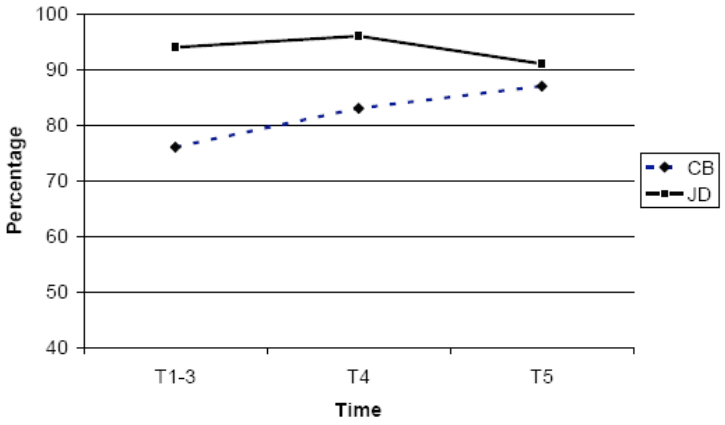

Figure 1: Percentage of verbs with correct argument structure pre- and post-treatment.

Presented by: **van Ewijk, Lizet**

69. Do Noun and Verb Processing Really Recruit Spatially-Segregated Neural Circuits?

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The functional independence of noun and verb lexical retrieval has been reported several times over the last decade (e.g., Rapp and Caramazza, 2002); however, the evidence produced so far on whether these processes recruit separate neural circuits is far less clear (e.g., Bedny & Thompson Schill, 2006; Berlingeri et al., 2008). This may be due to the lack of homogeneity in the tasks that were used in the various imaging experiments. The meta-analysis described in this study aims at disentangling the brain regions that are systematically associated with a given grammatical class from those whose grammatical class specificity is modulated by the task used.
We collected 620 activation stereotactic coordinates associated with either nouns or verbs in simple effect analyses from 22 neuroimaging studies published from 1996 to 2008. A hierarchical cluster algorithm was used adopting the Ward (1963) criterion to automatically segregate groups of coordinates into separate clusters (mean standard deviation < 7.5 mm in the x, y, and z directions for each cluster; Jobard et al., 2003). This procedure produced a set of 49 clusters, which were assessed with a binomial test for specificity for grammatical class and/or task, and with a Fisher test for task-by-grammatical class interaction.
Two clusters were associated with nouns across different tasks (Figure 1a: areas in yellow), while five were associated with verbs (Figure 1a; areas in orange); the locations of these clusters do not support the notion of the existence of spatially segregated neural circuits for nouns and verbs, as suggested in some previous work (e.g., Cappa & Perani, 2003). Five clusters showed instead a task-by-grammatical class interaction (Figure 1b), which was mainly driven by noun-specific activation in derivational tasks and by verb-specific activation in picture naming and fluency tasks: among these areas, the left inferior frontal gyrus, previously associated with verb processing alone. These results will be discussed in the light of the cognitive processes entailed by the individual experimental tasks.

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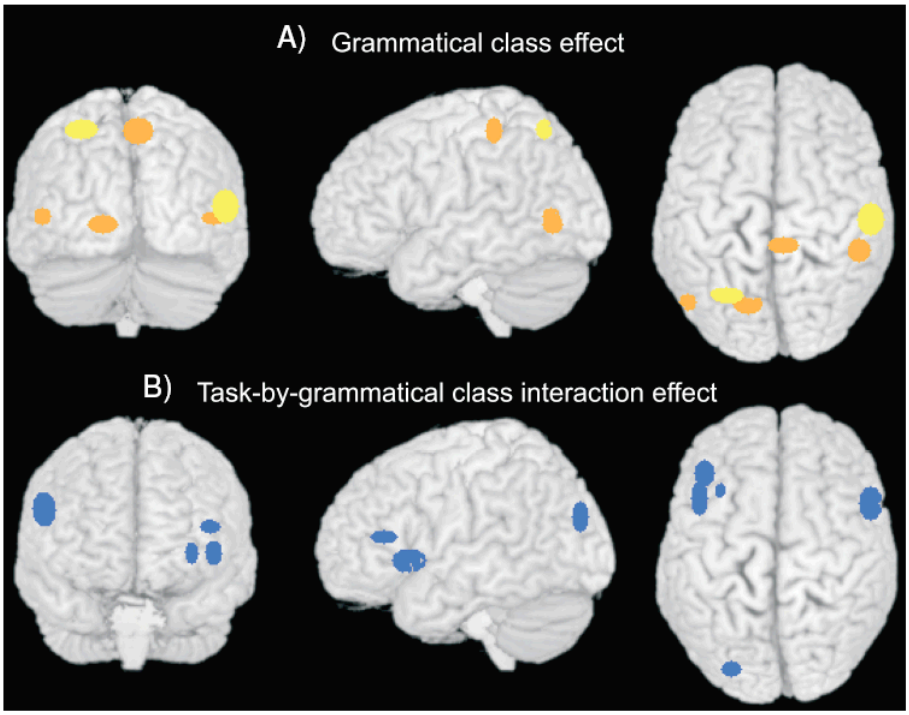

FIGURE CAPTION
(a) Clusters associated with nouns are reported in yellow, while clusters associated with verbs are plotted in orange. (b) Clusters showing a task-by-grammatical class interaction.

Presented by: **Crepaldi, Davide**

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70. Verb Retrieval and Inflection in Aphasia: Insights from Different Verb Classes in Greek

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Previous studies on aphasia revealed two main vulnerable domains: a) verb inflection and b) verb retrieval. Verb inflection is found to be impaired in a range of languages and for various aphasia types (for Greek, Stavrakaki & Kouvava, 2003; Varlokosta et al., 2006). With respect to verb retrieval there was found an effect of verb argument structure (VAS) on agrammatic performance. Transitive verbs (Thompson, Lange, Schneider, & Shapiro, 1997) and unaccusative verbs (Thompson, 2003) were found to be more difficult to retrieve than unergative ones. The difficulties have been related to problems with the grammatical encoding of arguments (Bastiaanse & van Zonneveld, 2004).
We address the following questions: 1) are transitive and unaccusative verbs problematic for Greek-speaking aphasic patients? 2) does inflection affect retrieval?
We tested four patients, one agrammatic (AG), one anomic (AN) and two Wernicke's aphasics (W1, W2) on the following tasks:
1) Sentence elicitation with video stimuli, in which the participants were presented with videos and had to describe what was happening. Correct responses were those including (i) correct verb lemma and (ii) correct VAS retrieval.

2) Sentence elicitation and tense marking task, in which the participants were presented with the same video stimuli preceded by a phrase prompting for a specific tense/aspect (T/A) marking. They were instructed to combine the phrase and the video in order to produce a correct sentence. Correct responses were those including (i) correct verb lemma (ii) correct VAS retrieval and (iii) correct T/A marking.
In Task 1, all patients (except for W1) found unaccusative verbs the most difficult to produce. As for Task 2, AG's performance dropped remarkably in comparison to Task1, whereas the performance of the fluent patients (except for W1) improved (see Figure 1). In other words, there was a facilitative effect of verb inflection on verb lemma and VAS retrieval only for two of the fluent patients and not for the agrammatic patient.
We argue that production of unaccusative verbs is problematic across aphasia types. We claim that this is related to the mapping mismatch between the patient theta-role and the syntactic subject position. In addition, we suggest that verb inflection affects verb production, either facilitating it in fluent aphasia or hampering it in agrammatism.

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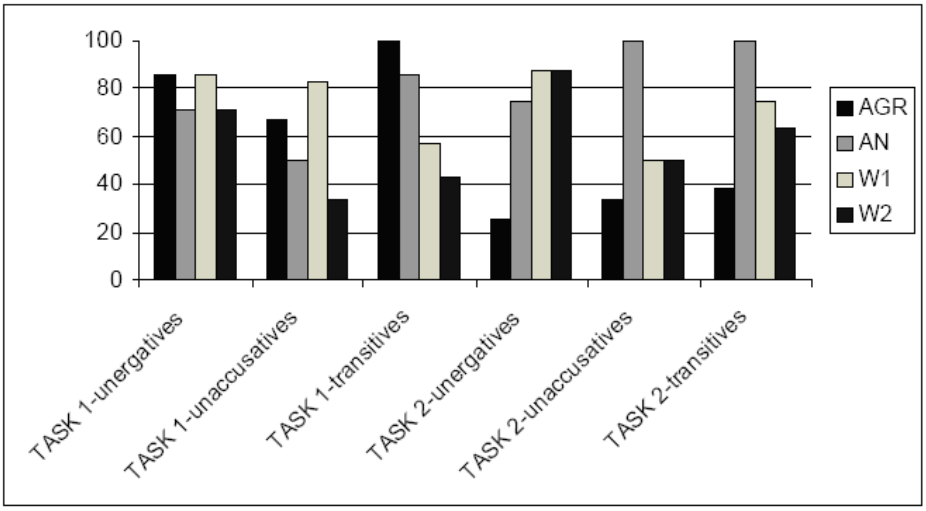
Figure 1. The patients' correct performance (%) on unergative, unaccusative, and transitive verbs in Task 1 and Task 2



Presented by: **Koukoulioti, Vasiliki**

71. Improved Action Naming in a Severe, Nonfluent Aphasia Patient following Transcranial Magnetic Stimulation plus Constraint-Induced Language Therapy

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Introduction
Suppression of R pars triangularis (PTr) with slow (1 Hz) repetitive transcranial magnetic stimulation (rTMS) has been observed to significantly increase naming at 2 months post-rTMS in chronic, nonfluent aphasia (Naeser et al., 2005a; 2005b). Constraint-induced language therapy (CILT) is a program observed to improve object and action naming, where patients may only respond with verbal output (no gestures, writing, sound effects) (Maher et al., 2006). Results are presented for a severe nonfluent patient who received a second series of rTMS treatments, where CILT was administered daily, immediately post-rTMS.

Method
P003 was R-handed, college-educated, 51 Yr., F, with L intracerebral, basal ganglia bleed that resulted in severe nonfluent, global aphasia. At 6.5Yr. poststroke, she underwent the first series of ten rTMS treatments to suppress the R PTr. Her Boston Naming Test (BNT) increased from 4, pre-TMS, to 7 and 12, at 2 and 8 Mo. post-TMS (Naeser et al., 2005b).

At 12.5Yr. poststroke (5Yr.10Mo. after first rTMS series) she underwent a second series of ten, identical rTMS treatments, followed immediately by three hours of CILT (5 days/week, 2 weeks). Prior to intervention, her naming was tested on 500 color pictures (3x). During CILT, one-third of color pictures presented had never been named on pre-testing (0/3); one-third, sometimes (1-2/3); one-third, always (3/3).

To understand changes that might occur during intervention, BDAE naming subtests (Actions, Animals, Tools/Implements), and BNT were administered 12x pre-TMS; and daily, immediately post- each CILT session; and 10x post-TMS (Fig. 1). These time-series data were analyzed using a double bootstrap method: http://www.stat.wmich.edu/slab/Software/Timeseries.html.

Language outcome measures included BDAE and BNT examined at Baseline, pre-TMS (x3); and at 1 and 6 Mo. post-TMS. Significant improvement was defined >2 SD above Baseline.

Results
On the time-series analysis, there was significant improvement on BDAE Action Naming (p=.035) (Fig. 1); Tools/Implements (p=.010). On language outcome measures, there was >2 SD improvement on BDAE Action Naming (Fig. 1); Tools/Implements and Single word repetition.

Conclusions
Suppression of R PTr may have promoted less inhibition of R pars opercularis (R POp) from R PTr, via U-fibers. Improvement may have been associated with better modulation of POp, an area with mirror neurons. Improvement in verbs was observed only following the second rTMS series, with CILT. If potential for re-organizing neural networks for language exists post-TMS, then language therapy administered immediately post-TMS may promote maximal recovery.

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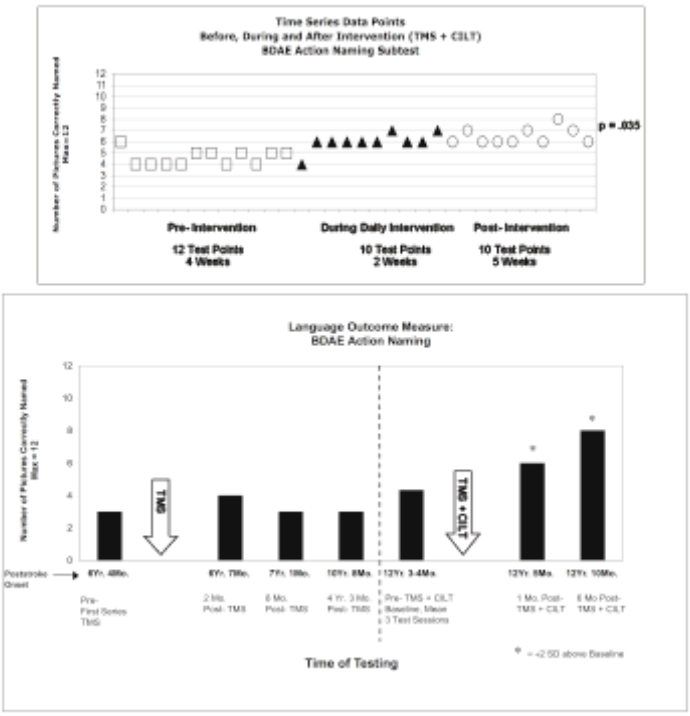
Figure 1. Significant Improvement in Action Naming Test Scores Post- TMS + CILT for Severe Nonfluent, Global Aphasia Patient



Presented by: **Naeser, Margaret**

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72. fMRI Study with Error Analysis of Overt Action Naming by People with Chronic Aphasia

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Introduction
Naming of action pictures has recently become the center of growing interest in research on normal language processing and aphasia. In an fMRI study with healthy adults, Liljeström et al. (2008) focused on the more complex perceptual characteristics of action over object pictures. They found that these affected cortical activation for silent naming, notably as increases in right middle frontal and bilateral occipitotemporal and parietal regions.

Methods
Nine stroke patients with chronic aphasia (1-10 years post-onset, 38-73 years old, 5 females) participated in this fMRI study of overt naming of 144 line drawings of actions. All patients had left frontal-insular-parietal damage, were right-handed native English speakers, and presented with anomia but good comprehension.

Behavioral Results
Voice recordings of patients' naming responses to action pictures revealed that, on average, they achieved 50% accuracy, and that their errors consisted of semantic paraphasias or descriptions (50%), omissions (40%), phonemic paraphasias (8%), and neologisms (2%).
Semantically related errors consisted of verbs denoting related actions (61%, eg., pour-->drinking), objects displayed in pictures (22%, eg., stack-->boxes), phrases (13%, eg., crawl-->on the floor), formulaic expressions (3%, eg., sneeze-->achoo), and adjectives (1%, eg., carry-->heavy). All verb types were equally likely to elicit omissions and non-verb semantic errors. Actions designated by instrumental verbs, unaccusative and unergative verbs, and non-instrumental transitive and ditransitive verbs induced object responses (eg., stir-->spoon; melt-->ice cream; march-->soldier; bite-->dog) in approximately equal proportions (20-23% errors).

Functional Results
Contrasts of accurate and inaccurate action naming vs. rest (cross-fixation) revealed that for all patients, perilesional activation was evident for all responses. However, activation in right (contralesional) Inferior Frontal Gyrus was much more robust for inaccurate than accurate responses. These findings replicate results for object naming reported in Postman-Caucheteux et al. (to appear). Moreover, bilateral temporo-occipital and precuneus activation was much greater for action naming errors than accuracies. Critically, for some patients, activation in portions of the right Middle Frontal Gyrus was present for both correct and incorrect responses (see figure).

Implications
Our results bear on the nature of potential compensatory mechanisms of right (contralesional) frontal areas in patients with lesions affecting left frontal cortex. Since contralesional activation in the IFG was linked to action naming errors but not accuracies, it may represent an ineffective compensatory processing route. In contrast, our finding of right MFG activation for both accurate and inaccurate action naming suggests that, in conjunction with temporo-occipital and posterior parietal regions, it may support visual search and attention mechanisms required for analyzing action pictures, as proposed by Liljeström et al. Therefore, it may represent task-related rather than compensatory activation.

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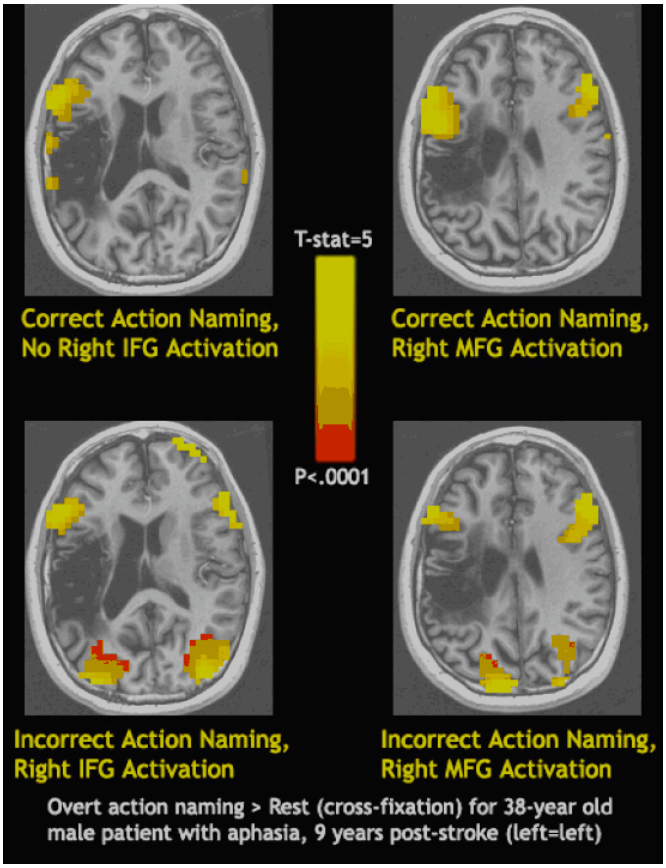

Presented by: **Postman-Caucheteux, Whitney Anne**

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73. Electrophysiological Correlates of Nouns and Verbs: Effects of Task and Stimulus Characteristics

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During the last decade over one hundred studies have explored the processing of verbs, in contrast with nouns, in different populations in behavioural, lesion and imaging studies with the aim of understanding the functional underpinnings of noun-verb differences and finding the neuro-anatomical correlates of noun and verb representations and/or processing. Despite this research effort, there is still no consensus about most questions under investigation. Past studies used predominantly the picture naming paradigm that conflates noun-verb differences with differences between object and action knowledge and/or picture interpretation, or conflated grammatical class with morphological processing by using tasks that involved inflected nouns and verbs or by employing a morphological transformation task. ERP studies to date used sentences which again might introduce additional confounds unaccounted for response variables.
The main objective of the current study was to find behavioural and electrophysiological evidence for grammatical class distinctions. To that end we compared event-related potentials (ERPs) in response to (1)naming line drawings of object and action pictures,(2)lexical decision (a task that has been previously used in similar studies), and (3) grammatical class judgment task in which participants decide if a word is a noun or a verb. This is a novel task that

is expected to tap into information about the grammatical class of words directly.
20 native speakers of English participated in the study. The materials for task (1) consisted of line drawings of 100 object and 100 action pictures whose verbal labels were matched for age of acquisition (Druks & Masterson, 2000), and for tasks (2) and (3), of 47 concrete nouns and verbs 47 abstract nouns and verbs. Care was taken that all words included in the study were unambiguously either nouns or verbs.
The ERP results showed evidence for grammatical class distinction only in the grammatical class judgment task which was more pronounced for abstract nouns and verbs. No differences in ERP responses were found in the object and action naming task or in the lexical decision task.
The results showed strong evidence for grammatical class distinction only in the grammatical class judgment task in which the difference was more pronounced for abstract nouns and verbs both in the behavioural and electrophysiological tasks (see Figure 1). No clear processing differences were found in the lexical decision task or in the object and action naming task. The results highlight the importance of task and stimulus material in the investigation of grammatical class differences. We argue that differences between nouns and verbs that are due to grammatical class (and not to conceptual-semantic differences between objects and actions) can only be demonstrated in conjunction with abstract nouns and verbs, and the grammatical judgement task (albeit an effortful task) is suitable to tap such differences.

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Presented by: **Druks, Judit**

74. Differential Effect of Constraint-Induced Aphasia Therapy on Noun Related/Non-Noun Related Verb Production.

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Introduction
Jonkers and Bastiaanse (2007) found that in addition to grammatical variables that had been reported to influence verb production in aphasia (e.g., argument structure), lexical/phonological variables affected action naming performance of individuals with anomic aphasia. Their participants with Broca's aphasia, by contrast, did not show consistent differences between verbs that are phonologically related to nouns (e.g., hammer- to hammer) and verbs that have no noun relation (e.g., to eat), possibly due to great inter-individual variability in the data.

In the current study we set out to examine whether both verb types (noun-related verbs vs. non-noun-related verbs) are equally produced by individuals with Broca's aphasia and whether the two verb types respond differently to a constraint-induced aphasia therapy (CIAT) that targets verb production.

Method
To achieve these goals, three speakers with Broca's aphasia, ranging in age from 38 to 61 and in years post onset from 2.5 to 7, received CIAT which required a four-week period of intensive language therapy (2.5-3hrs/day, 3-4 days/week). During the treatment sessions, the participants were discouraged from using any communicative modalities other than oral production and were encouraged to produce verbs in complete sentences. An action-naming task, consisting of 96 items (57 noun-related / 39 non-noun-related verbs), was administered before and after treatment. During the action-naming task, a picture was shown and the participants were asked to describe in a sentence what the person in the picture was doing. Production of the target verb was considered a correct response, regardless of sentence completion.

Results and Conclusions
In the pre-treatment measurement, the participants produced noun-related verbs more accurately than non-noun related verbs; this finding was statistically significant for two participants, but not significant for one participant. Post treatment testing revealed that CIAT facilitated significant improvements in verb production (Odds ratio 2.27). Furthermore, when we compared the therapeutic effects on the two different verb types, we found that for all three participants, non-noun-related verbs benefited more from treatment (Odds ratio 3.16) than noun-related verbs (Odds ratio 1.39) (See Figure 1).

We hypothesize that a noun-related verb shares a lemma with its related noun, which may facilitate its retrieval for individuals with Broca's aphasia (who typically experience greater difficulty with verb than noun retrieval; Kim and Thompson, 2000). By contrast, non-noun related verbs do not have this advantage, and are therefore more difficult to retrieve. The emphasis on verb production during treatment may have strengthened the route to verb retrieval, facilitating particularly the retrieval of verbs that cannot be retrieved via their related noun.

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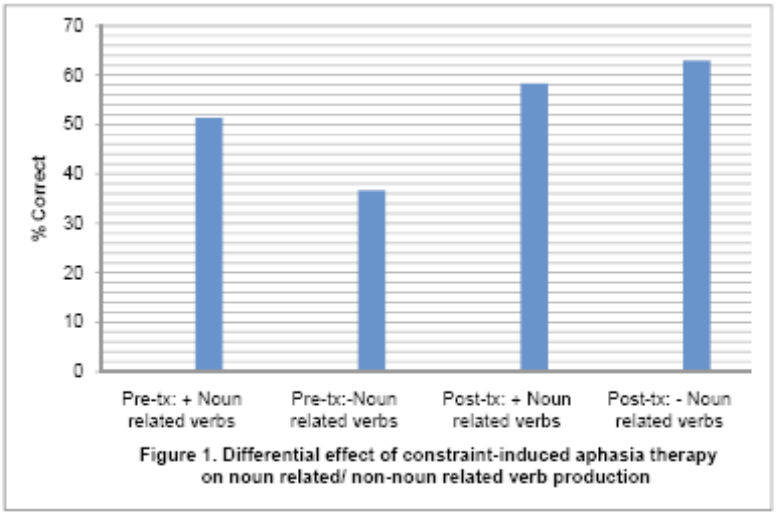

Figure 1. Differential effect of constraint-induced aphasia therapy on noun related/ non-noun related verb production

Presented by: **Park, Youngmi**

Poster Session 2: Reading

75. Semantic Paralexias: Incidence and Underlying Linguistic Deficits in 343 Consecutive Italian-speaking Aphasics

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Introduction
Reading requires both lexical-semantic mechanisms (words) and sublexical grapheme-phoneme conversion (GPC) procedures (pseudowords). Most theories assume that the two sets of mechanisms interact (eg, the summation hypothesis). On this view, at least in some conditions the target word in reading may be selected based on converging information from lexical-semantic and GPC procedures. The interaction between lexical-semantic and GPC processes allows interpreting dyslexic patterns. In the presence of lexical-semantic damage, “functional” GPC procedures block semantically incorrect reading responses; whereas, semantic paralexias occur when GPC mechanisms are essentially “non-functional”. In agreement with this account, semantic paralexias were reported in aphasics with lexical-semantic impairments and severe GPC damage, but not in aphasics with lexical-semantic damage and “functional” GPC mechanisms.
Several issues remain underspecified. Semantic paralexias were described in single-case reports, but their occurrence in large aphasic populations is unknown. In addition, even though semantic paralexias were reported more often in opaque than transparent languages (eg, in approximately 40 English-speaking subjects, but in only 3 Italian aphasics), it is not yet clear if their occurrence differs across languages as a function of orthographic transparency/opaqueness. Furthermore, while all subjects who produce semantic paralexias read aloud pseudowords very poorly, measures of GPC damage are limited to the percentage of incorrect responses, that provide only rough estimates of the status of GPC procedures.

The goal of this study is threefold: 1. to evaluate the number of aphasics who produce (SP+) and do not produce (SP-) semantic paralexias; 2. to verify if combined lexical-semantic and GPC damage is a prerequisite for these errors; 3. to quantify GPC damage necessary to result in semantic paralexias in Italian.

Materials and methods
We analyzed the performance of 343 consecutive, Italian-speaking aphasics in word-picture matching, picture naming and reading aloud tasks (words and pseudowords). We evaluated the occurrence of lexical-semantic errors to words in these tasks. The percentage of GPC rules applied incorrectly (rather than the percentage of pseudowords read incorrectly) was retained as an index of GPC status.

Results
Semantic paralexias occurred in 8/343 (2.3%) SP+ aphasics. Without exception, these subjects had combined semantic-lexical and GPC impairment. When contrasted to SP- aphasics with similar semantic-lexical damage (25-30% semantic errors in picture naming), SP+ subjects showed substantially more severe GPC impairment. On average, they applied incorrectly 73.1% GPC rules (range: 96.9-48.7%). In 28 matched SP- subjects, the corresponding figure was 7% (range: 26.3-0.4%).

Discussion
Subjects who produce semantic paralexias are extremely rare in Italian (2.3% in an unselected aphasic population). Semantic paralexias occur only in the presence of combined semantic-lexical and GPC impairment. GPC damage is always very severe in these cases, as the SP+ subject with the least severe GPC damage applied incorrectly 48.7% GPC rules. The corresponding figure for the SP- subject with the most severe GPC damage was 26.3%. The quantitative data reported here can inform computational models of reading. They provide also a large database for cross-linguistic studies on the role of orthographic transparency/opaqueness in the interaction between lexical-semantic and sublexical conversion mechanisms in transcoding tasks.

Presented by: **Miceli, Gabriele**

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76. Word Stress Assignment in Surface Dyslexia: A Case Study in Slovenian

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In this paper we report evidence in support of the distinction between lexical and non-lexical mechanisms in oral reading in a language (Slovenian) with transparent orthography/phonology mapping at the segmental level. The newest aspect of the present study concerns a relatively neglected aspect of the mapping relation between orthography and phonology: the assignment of word stress. As already noted by other studies, in a language where stress is lexically specific (such as Italian or Slovenian) the production of stress errors in oral reading is a predicted outcome in the case where the following two conditions obtain: 1) the phonological representations are not activated normally, and 2) there is relative sparing of the ability to convert orthographic strings into phonological representation by means of sub-lexical, orthography to phonology conversion procedures. On this view, the form taken by such errors would reflect the nature of the phonological knowledge that is used to assign stress to an unfamiliar phonological string.

BI was a 60 years old male, with 13 years of education, who suffered from damage of ischemic nature in the left hemisphere. At the time of testing he had recovered from well articulated fluent aphasia, but he still had problems in reading.

BI was asked to read aloud a list of 266 words two to four syllables in length (128 nouns, 37 adjectives, 60 verbs in the infinitive form and 18 function words in Slovenian, 23 highly familiar English or French words that are commonly used in Slovenian as loans, e.g. “blue jeans”) and 68 non-words two to four syllables in length. All real words were read flawlessly by a group of 30 age and education matched controls.

BI read all Slovenian words slowly, without committing omissions, substitutions or other phonemic errors; when reading loans from English or French, he read them through strict grapheme-to-phoneme conversion, thus resulting in non-words. However, in Slovenian BI was at loss with the word stress. In fact he committed 39 stress errors on nouns, 8 on adjectives, 49 on verbs, 5 on function words. Importantly, a considerable proportion of these errors (up to 100% on verbs!) did not result from the application of the default strategy of putting the stress on the most frequently stressed syllable. The stress appeared instead in positions not allowed in Slovenian for that category of words. In reading verbs, for instance, BI tended to put the stress on the last syllable, which is never the case in Slovenian infinitive.

BI showed the pattern of surface dyslexia: he used almost exclusively the grapheme-to-phoneme conversion routine, resulting in non-words during the reading of the list of English words and in stress errors during the reading of Slovenian words. Errors whereby the word stress is assigned to a position that is not allowed have never been reported so far. This finding may indicate the existence of a separate stage, disturbed in BI, where allowed patterns of stress are stored.

Presented by: **Semenza, Carlo**

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77. Neural Response to Word and Pseudoword Reading after a Left Fusiform Gyrus Resection: An fMRI Investigation

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Introduction
Our understanding of neural reorganization subsequent to brain lesion and functional recovery is fairly limited, particularly in the area of orthographic processing. Findings from the neuropsychological and neuroimaging literature have attributed an important role of the left fusiform gyrus in reading (Cohen et al., 2000; but see Price & Devlin, 2004; Mechelli et al, 2003). We report on a individual with a left hemisphere fusiform resection and the results of an fMRI study of silent-reading of words and pseudowords as well as visual processing of faces and objects that allowed us to compare his activation patterns to those of a group of normal age- and education-matched control participants. This comparison allowed us to evaluate neural changes that take place subsequent to damage to critical orthographic processing areas.

Case Study
DPT underwent a resection that produced a lesion affecting the left mid-fusiform and adjacent inferior temporal cortex. In Tsapkini & Rapp (in press) we have documented the behavioral deficits compared to a group of controls . DPT showed intact visual processing with faces and objects as well as intact processing of nonwords in both reading and spelling. However, he showed evidence of lexical impairments in reading and spelling. With regard to reading , he was impaired (in latency) in reading words as well as in rapidly access the meaning of written words. Pseudoword processing was intact.
Methods and results. DPT and 8 matched control participants were scanned using 1.5T fMRI while during silent reading of words and pseudowords as well as passive viewing of faces and objects.
With regard to passive viewing of faces and objects DPT exhibited the same topography of activations as control subjects. Regarding the silent reading of pseudowords DPT exhibited the same activation as control subjects in the left fusiform, but not in the right fusiform. Whereas controls showed right mid-fusiform activation, DPT showed only posterior fusiform activation. In silent reading of words, DPT exhibited the same right posterior activation that was not observed in the controls. In addition in word reading he exhibited anterior middle temporal gyrus activation in both the right and left hemispheres This area was not activated for pseudowords for either DPT or controls. It has generally beenassociated with semantic processing (Mummery et al., 1998).

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Presented by: **Tsapkini, Kyrana**

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78. Reading Compounds in Neglect Dyslexia

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Introduction
Neglect dyslexia manifests itself with misreading of letters, words or strings of words located in the contralesional side of visual space. Thus, left-sided neglect errors produced in single word reading can be omissions and substitutions of the leftmost portion of the word. The literature reveals that errors may be influenced by the lexical status of the target. Thus, stored lexical knowledge seems to partially compensate for the attentional problem.
When reading compounds, patients affected by neglect dyslexia seem to respect the boundaries between the first and the second component. Thus, in left-sided neglect, they would omit or substitute the first more often than the second component. The present study exploits this finding in order to assess the influence of “headedness.” The “head” of a compound is the component that determines the morphological and semantic properties of the compound as a whole. The question arises of whether the privileged status of the head constituent influences processing and determines behavioural patterns in the breakdown of the spatial attention present in neglect.
Positional and headedness effects cannot be easily teased apart in languages like English where the head is always on the right. The present study overcomes this difficulty by using Italian, where compounds can be both right- and left-headed.

Materials and Methods
Participants: Eighteen Italian-speaking patients affected by left-sided neglect participated in the study.
Materials: Fifty-six Italian Noun-Noun compounds were used: (a) 28 transparent left-headed compounds (e.g., capobanda, band leader), and (b) 28 transparent right-headed compounds (e.g., astronave, spaceship). Length, Frequency, Familiarity and Age of Acquisition (AoA) were taken into account. Patients read aloud each word displayed on a computer screen. Noun-Noun compounds were randomly intermixed with 55 Verb-Noun compounds in a different random order.

Results
Only errors (n=416) made exclusively on the left component of Noun-Noun compounds were considered for data analysis. More errors were found with right-headed than with left-headed compounds [$p < 0.001$]. No participants made more errors with left- than with right-headed compounds and only one made an equal number of errors in left- and right-headed compounds. Logistic regression was used to further analyze the data. Coefficients were: 0.27 [$z = 2.25$, $p < 0.05$] for headedness (assuming right headedness as reference level), 0.25 [$z = 4.48$, $p < 0.001$] for familiarity, 0.0007 [$z = 2.006$, $p < 0.05$] for frequency, and -0.17 [$z = -4.57$, $p < 0.001$] for length. No effect was found for AoA because of the high collinearity with familiarity.

Discussion
These findings are rather clear-cut. Patients with left-sided neglect make omission and substitution errors on the left component of the compound. However, headedness seems to partially protect these patients' reading as they make significantly more errors when the leftmost component is the non-head compound constituent. This finding converges with recent data from aphasia and ERPs in indicating the crucial role of headedness and its neurological underpinnings.

Presented by: **Semenza, Carlo**

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79. Are Reading Strategies in Aphasia Reflected by Eye Movements?

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Introduction
Except for recent work on pure alexia (Behrmann et al., 2001; Johnson & Rayner, 2007), no research has so far attempted to analyze word based viewing time measures and local fixation patterns in acquired dyslectics. We report data on two aphasic patients whose reading performance indicated that WG relied primary on segmental and CM on lexical information take-in (De Bleser, 2000). The current study focused on the question whether their reading strategies are also reflected in eye movement parameters and whether these parameters differ from those of a control group.

Methods
Both patients as well as the control group (n=34) were asked to read six words in sequence presented simultaneously on a computer screen while their eye movements were recorded from the right eye. Stimuli consisted of 180 words, equally divided into short, middle, and long stimuli and balanced for word frequency.

Results
Total reading time. - Both patients differed significantly from controls; CM showed a significantly higher total reading time than WG.
Total number of gazes. - CM needed significantly more gazes than WG.
Gaze duration (first gaze). - Only WG's first gaze duration differed significantly from those of controls. It increased with increasing word length while it decreased in CM.
Total number of fixations (first gaze). - There was a significant increase across word length in WG and a decrease in CM.
Mean progressive saccade amplitudes. - WG's mean progressive saccade amplitudes differed significantly from those of the controls for short and long words.
Initial fixation landing position. - WG started scanning at letter position one independently of word length (see figure 1). CM showed different distributions of landing positions for short and long words.

Discussion
We were able to confirm our expectations that lexical and segmental reading strategies differ in temporal and spatial parameters of eye movements.
WG's segmental reading was characterized by scanning in small steps as reflected in short progressive saccade amplitudes and very long first pass gaze durations that increased substantially with word length. Re-inspections of the same word were quite rare, with number of passes comparable to controls. Initial saccade landing sites were centered on the first letter irrespective of word length.
In contrast, CM showed dramatically shorter gaze durations, which even decreased for longer words, combined with a dramatic increase in total reading time. It appeared that, with long words, CM tended to give up on whole word recognition during first pass reading and preferred to re-inspect words several times. This 'resignation effect' did not have an impact on first fixations and saccade landing position varied with word lengths.

Our findings underline the useful role of eye movement measurement to explore the underlying reading mechanism in acquired dyslexia. Further research is needed to corroborate our data for a larger patient sample.

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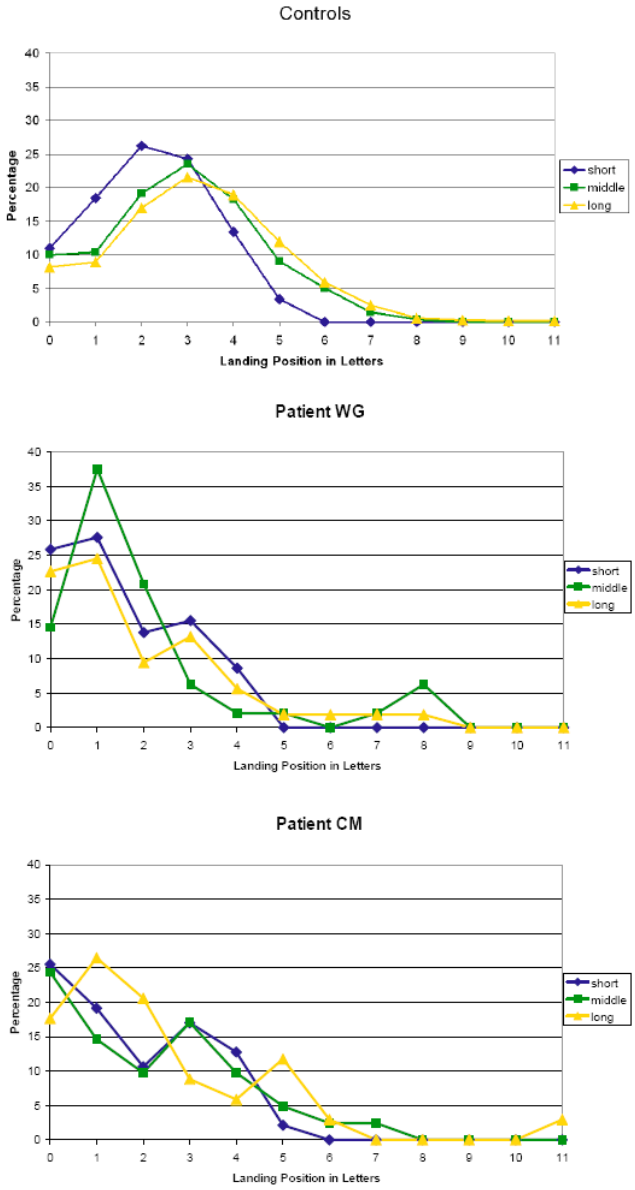

Fig Figure 1. Initial landing site distribution for progressive saccades.

Presented by: **Schattka, Kerstin**

Platform Session 3: Sentences and Sequences

80. Different Mechanisms for Role Assignment for Functional and Lexical Categories

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A major component of sentence processing is the assignment of words to their correct semantic roles and arguments, so that TOM receives the agent role and the subject argument in the sentence TOM GREETS SALLY. Verbs vary in the set and number of roles and arguments they can take and the set of syntactic structures that they can be expressed in. In contrast, it has been observed, cross-linguistically, that prepositions and other grammatical constituents (e.g., quantifiers) differ from verbs in that their arguments can only be expressed within specific syntactic structures. For instance, English locative prepositions like IN, ON, or UNDER typically occur with the verb "to be". These prepositions denote spatial relations and entail figure/ground role distinctions. For example, in THE PEN IS ON THE BOOK, PEN (the figure) takes the subject argument, whereas BOOK (the ground) corresponds to the reference object. These differences between verbs and functional categories have motivated the proposal that argument assignment involves different mechanisms for these word classes (e.g., Baker, 2003; Croft, 1991). Specifically, for verbs, argument assignment is based on information within the lexical entry, while for at least some other grammatical categories, it relies critically on information associated with the specific syntactic structures they are expressed within. In this work, we report evidence from an aphasic, English-speaking individual (GFE) that provides clear support for this proposed distinction.

GFE is a left-handed, college educated male who suffered a left-hemisphere stroke. He had difficulty identifying figure and ground in locative sentences, as evidenced by frequent role-reversal errors. For example, when asked in a forced-choice task to point to the picture of a circle on the square, GFE chose the picture of the square on the circle (35/96 trials, 36%). GFE produced similar role-reversal errors when verbally describing the same scenes (circle on square > “The square is on the circle”). Additional testing ruled out difficulties in understanding spatial terms or a general spatial deficit. Like locatives, English comparatives occur with to be verbs (TOM IS TALLER THAN SALLY). GFE also made role-reversal errors with comparatives, both in comprehension and production tasks, despite preserved access to adjective meaning. However, in striking contrast, role-reversal errors were rarely produced with role-reversible verbs. For example, when presented with pictures of a boy greeting a girl and a girl greeting a boy, GFE made role-reversal errors only 5% of the time. With locatives and comparatives, role-reversal error rates were 36% to 29%.

GFE's error pattern contrasts with the one typically observed in agrammatic patients, who produce role-reverse errors with verbs. The finding of selective role-reversal difficulties with locatives and comparatives but not verbs fits well with those linguistic accounts that draw a distinction between verbs, which can directly assign roles to arguments, and grammatical classes such as locative prepositions, for which role assignment depends on the required syntactic structures.

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Presented by: **Miozzo, Michele**

81. The Role of Phonological Working Memory in Sentence Comprehension: The Interaction Between Type of Processing and Output and Input Buffer Deficits

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Introduction
This study explored the nature of the relation between phonological working memory (pWM) impairment and sentence comprehension, focusing on sentence comprehension in conduction aphasia. The two main comparisons made were between sentences that require semantic-syntactic reactivation and sentences that require phonological reactivation, and between input-buffer conduction aphasia (repetition) and output-buffer conduction aphasia (reproduction) (Shallice, Rumiati, & Zadini, 2000; Shallice & Warrington, 1977).

Method
The participants were 14 individuals with conduction aphasia and 214 control participants without language or memory impairments. All participants had pre-morbidly full control of Hebrew, and at least 12 years of education. Ten recall and recognition span tasks were used to measure their pWM capacity. To assess phonological output buffer we used a full transcription of spontaneous speech, repetition of words and nonwords, picture naming, and various phonological manipulation tasks such as spoonerism and sound deletions. To exclude a deficit in the early auditory processing stage, we also included auditory rhyme judgment tasks and auditory discrimination tasks. Experiments 1 and 2 tested the comprehension of relative-clauses, which require semantic-syntactic reactivation, using sentence-picture matching of 168 relative-clauses, and plausibility-judgment of 80 relative-clauses. Experiments 3 and 4 tested phonological reactivation, using a paraphrasing task for sentences with lexical ambiguity in which the disambiguation requires re-access to the word-form (148 sentences), and rhyme judgment (184 sentences). The distance between a word and its reactivation site was manipulated in terms of number of words/syllables, number of intervening arguments, and the number of intervening embeddings.

Results
All the participants with conduction aphasia showed very limited recall spans compared to the control group. Two participants performed similarly to the controls in recognition spans, suggesting a selective output buffer deficit, further supported by their error pattern in naming, repetition, spontaneous speech, and phonological manipulation tasks. Of the remaining 12 participants, 7 showed phonological errors in the output tasks in addition to limited recall and recognition spans, suggesting a mixed (input and output) conduction aphasia, and 5 participants had pure input conduction aphasia, with limited recall and recognition spans but without phonological errors in the output tasks. Although their pWM was very impaired, the twelve individuals with input-buffer deficit comprehended relative-clauses well and without distance effect. They did, however, have difficulties understanding and judging sentences that required phonological reactivation, but only when the phonological distance was long (Figure 1). The participants with output conduction aphasia comprehended well and not different from the healthy controls.

Conclusions
The results suggest that pWM is not involved in sentence comprehension when only semantic-syntactic reactivation is required. It does support comprehension in very specific conditions: when phonological reactivation is required after a long phonological distance. The results also show that a pWM deficit only in the output-buffer does not affect the comprehension of sentences of any type.

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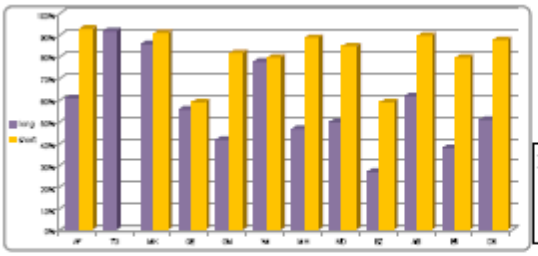

Figure 1. Individuals with input or input-output conduction aphasia: %correct on sentences with an ambiguous word that require phonological reactivaton.

Presented by: **Gvion, Aviah**

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82. Position Representation in Spelling and Verbal Working Memory

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Producing word spellings involves working memory (Glasspool, 1998). In this research, we ask: Does orthographic working memory use the same representations and processes as are used in other working memory domains? Previous research reveals a number of similarities between orthographic and verbal working memory. For example, both exhibit a serial position function where more errors are produced towards the middle of the string than at either edge (Glasspool, 1998). However, this similarity is difficult to interpret as it may be coincidental (Glasspool, 1998) or only superficial. Indeed, when the serial position functions are analyzed carefully, consistent differences are found between spelling and verbal working memory (Wing & Baddeley, 1980). In the research reported here, we compare orthographic and verbal working memory using a novel procedure we have developed to test if order is represented the same way in orthographic (spelling) and verbal working memory.
In prior work we developed analysis tools for investigating the representational system used to represent the order of elements in any type of sequence (Fischer-Baum, McCloskey & Rapp, 2007). These analysis techniques are applied to perseveration errors – items intruded into a spelling from a previous response – and they allow us to compare different systems for the representation of order. Briefly, for perseveration errors, the analysis considers the position of the perseverating letter in the source word and the target word and evaluates which type of representational system best accounts for the relationship between source and target position.
For this report, we analyzed perseveration errors made by both individuals with acquired dysgraphia (n=2) and unimpaired subjects (n=200), in both (1) spelling-to-dictation and (2) verbal serial recall tasks. We applied the analysis techniques to evaluate which of various candidate representational system best explain the position maintained by perseveration errors made in these tasks. We consider the following representational systems: Start, End, Center, Closest-End, Both-Ends, Preceding-Element and Following-Element. The results indicate that both verbal working memory and spelling employ a representational scheme that represents the positions of elements in a sequence relative to both the start and the end of the sequence. This was found to be the case for both the individuals with acquired impairments and the unimpaired subjects. These results provide clear support for the hypothesis that orthographic and verbal working memory make use of the same representational system for order.
Our analysis addresses a core property of any working memory system: how order is represented. As order is represented the same way in orthographic and verbal working memory, we raise the possibility that both-edges representation is a general order representational system for sequences from different domains.

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Presented by: **Fischer-Baum, Simon**

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83. Selection for Position: The Role of Left Inferior Frontal Gyrus (LIFG) in Sequencing Nouns

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LIFG patients famously show syntactic deficits. They also show greater interference in serial recall and semantic blocking studies. Conceivably, both deficits could arise from inadequate biasing of competitive interactions during language production. To test this hypothesis, we manipulated "positional" interference during multiword naming by priming one of the nouns in the same or different position. We hypothesized that LIFG patients would show heightened interference compared to controls. Based on previous results (Schnur, Schwartz, Kimberg, Hirshorn, Coslett & Thompson-Schill, 2009) we also predicted that damage to dorsal BA 44 might be particularly relevant.

Participants
Four patients with substantial damage to LIFG (BA 44, 45 and 47) and minimal damage to posterior language areas participated. All were proficient in single word naming (Philadelphia Naming Test: 88-95% accuracy). Six healthy controls (age: 52-70) also were tested.

Methods
On each trial, participants named two pictures shown on a computer using a simple "x and y" phrase. Pictures disappeared upon speech onset, encouraging concurrent planning of the two nouns. Each session contained 2 blocks. Each block contained 200 naming trials. This included 40 3-trial sets ("triads") in which one of the nouns repeated. On the first two trials of the triad, the repeated noun always appeared in the same position (first or second, 50% each). On the critical third trial, it either stayed in the same position ("consistent") or switched ("inconsistent"). We measured naming latency from digital recordings. We calculated baseline RTs from 120 non-repeat trials in each block (80 fillers and 40 first trials in triads). For the critical trials, normalized RTs were calculated as (RT-Baseline)/Baseline. This controlled for baseline RT differences across participants. Our interference measure was (Normalized RT on inconsistent) minus (Normalized RT on consistent) trials. Patient means were calculated from two sessions, control means from one session.

Results & Discussion
Two patients (TB, CBD) showed heightened interference effects in RTs (>1 SD) compared to controls; the remaining two (MD, UT) did not (Fig. 1a). On non-repeat trials, the former group made more omissions (Fig. 1b) but fewer errors overall when animacy was a useful cue for sequencing (Fig. 1c). As predicted, damage to dorsal BA 44 separated the former from the latter (Fig. 1d).

Our results extend the biasing competition hypothesis for LIFG to a sequencing task, and indicate a more precise anatomical locus. Damage to dorsal BA 44 (border of 44 and 6) identified a subgroup of LIFG patients who showed greater positional interference and overall difficulty with multiword naming. These results suggest that LIFG's role in syntax may include selection for position.

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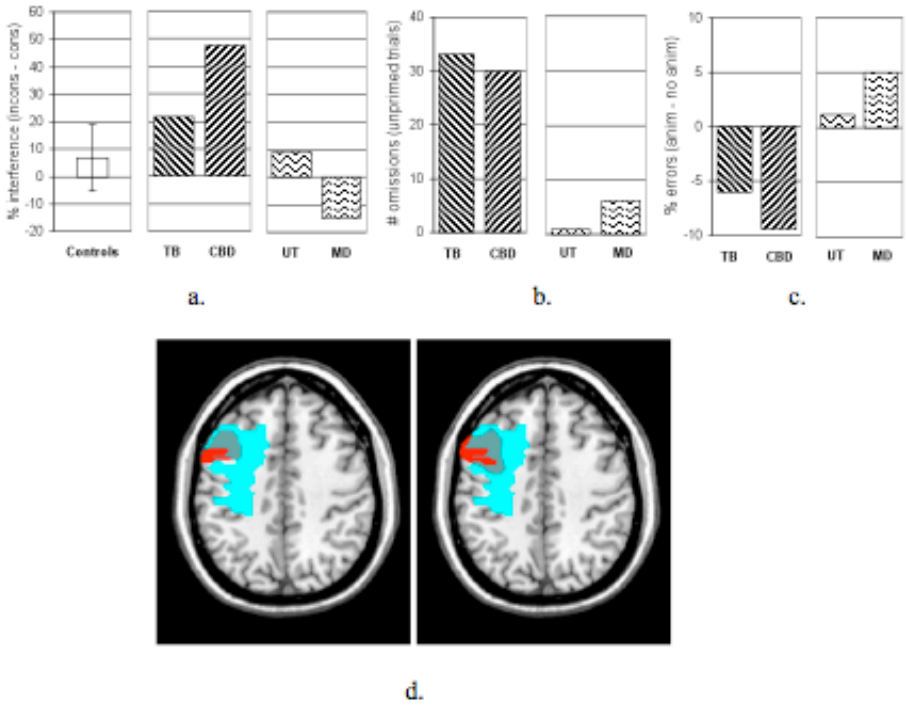

Fig.1. All measures result in clustering of (TB and CBD) versus (UT and MD): a. Residual RT scores on inconsistent position minus consistent position trials. Larger difference indicates greater interference. Error bar = 1 SD; b. Number of omissions on unprimed trials. One word omitted in an attempted multiword utterance; c. Percent error on trials where ordering is consistent with animacy (animate is first) minus error on trials with no helpful animacy cues (both nouns inanimate or animate is second); d. Axial slices showing lesions of TB and MD (left); CBD and MD (right). MD (blue) has a larger lesion volume overall, but TB and CBD (red) have damage to dorsal BA 44, at the border of BA 6. UT's lesion is confined to ventral LIFG and does not extend to this slice.

Presented by: **Thothathiri, Malathi**

Poster Session 3: Syntactic Representations and Processes-1

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84. Errors Patterns in Sentence Comprehension Among Malay Adults with Aphasia: A Case Series Study

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Within the last three decades, individuals with aphasia have been observed to have difficulty understanding sentences despite having good performance in single word comprehension (Bastiaane, Edwards, Maas, & Rispens, 2003; Berndt, Mitchum, & Wayland, 1997; Caramazza, & Zurif, 1976; Hillis, 2002; Schwartz, Saffran, & Marin,

1980). These difficulties limit their ability to communicate and interact with people around them. The objective of this paper is to examine error patterns produced by Malay adults with aphasia in sentence picture matching. Five Malay adults with aphasia were given two sentence comprehension tasks: reversibility and complexity. The former contains 20 active and passive reversible sentences and the latter contains 26 sentences with increased sentence complexity. Five normal individuals were recruited as controls and were aged, education and L1-matched. Our findings showed that there were significant differences between the mean scores for reversible active vs. passive sentences for both groups, $F(1, 30) = 5.34$, $p < 0.05$, effect size = 0.352 and power of 0.56. Error patterns in the reversibility task consisted of lexical and thematic role assignment errors (mean=97.5%), thematic role assignment errors (mean=85%) and lexical errors (mean=75%). In the sentence comprehension task, normal adults (mean=25.7) performed better than adults with aphasia (mean=20.33). A two-way mixed (repeated measure) ANOVA was conducted to investigate effects between groups. It indicated that there were significant differences in the mean scores of both groups, $F(1, 10) = 6.45$, $p < 0.05$, effect size = 0.392 and power of 0.63. There were also significant differences observed in the mean scores for sentences with different numbers of arguments, $F(3, 30) = 117.04$, $p < 0.05$, size effect = 0.921 and power of 1.0. Results indicated that most comprehension errors were in the form of wrong argument structure and wrong thematic role mapping (41%, n=7), no response (29%, n=5), wrong verbs (18%, n=3). A case series presentation of the types of errors made by each individual Malay aphasic in the study will be presented. Implications for the management of sentence comprehension difficulties amongst the 5 aphasics will be discussed.

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Presented by: **A Razak, Rogayah**

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85. The Production and Comprehension of Grammatical Time Reference in Agrammatic Aphasia: A Cross Linguistic Study

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Introduction

Data from Dutch (Bastiaanse, 2008), Greek (Stavrakaki & Kouvava, 2003) and Turkish (Yarbay Duman & Bastiaanse, 2009) suggest that verb inflection in agrammatic production is selectively impaired for reference to the past, raising the following questions:

• Is the selective deficit for reference to the past through grammatical morphology similarly impaired in languages with (1) a rich verb inflection paradigm (Turkish); (2) a poor verb inflection paradigm (English); (3) no verb inflection, but aspectual adverbs (Chinese)?
• Is comprehension of reference to the past selectively impaired as well?

For this study, simple past, present continuous and future were tested in English. In Turkish finite verbs were examined, rather than verb clusters (1), and in Chinese, freestanding grammatical morphemes were tested (2).

(1)	adam	mektup	okuyor	okudu	okuyacak
	the man	a letter	[is reading]	read	[will read]
(2)	zhe ge ren	[zai du]	[du le]	[yao du]	yi fong sin
	the man	[is reading]	read	[will read]	a letter

Methods

The Test for Assessment of Time Reference (TART: Bastiaanse & Thompson, experimental version) was used, which includes photographs of 20 verbs representing the action in past, present, and future. For the production test a sentence production priming paradigm was used, which involved prompting patients with the target verb form. A neutral form was added as a fourth condition for English (infinitive) and Chinese (neutral adverb + verb); Turkish has no neutral form. For comprehension, a spoken sentence-to-picture-matching test was used. For each language, 8 agrammatic patients and 10 control subjects were tested.

Results and Discussion

The control subjects scored maximally. The results for the agrammatic patients are shown in Figure 1. Two-tailed Wilcoxon-signed-rank tests were used for comparison. Only when $p<0.05$ (*), a difference was accepted as reliable.

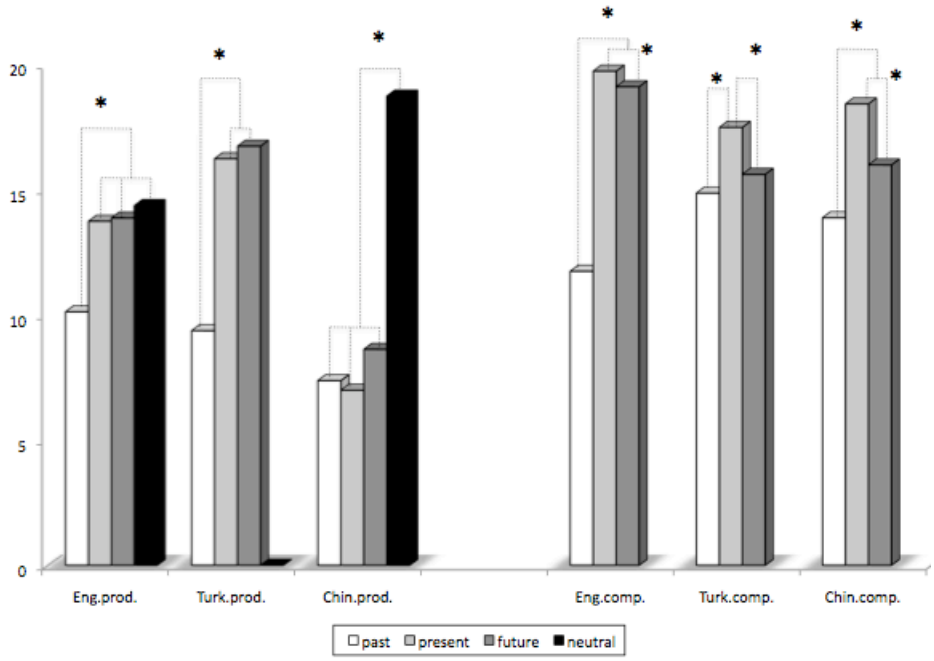

Figure 1: Mean number correct on the production (left) and comprehension (right) tasks in the three different languages (max. = 20). The broken lines represent the statistical comparisons (*p≤0.05).

Production: For English there is no difference between the neutral form and the present. For English and Turkish, past is more difficult than both present and future. For Chinese, the sentences with a neutral adverb are easier than those with an aspectual adverb referring to past, present and future. The latter three are equally difficult.
Comprehension: For each language, reference to past and future is more difficult than to present. The past is more difficult than the future in English and Chinese, but not in Turkish.

Conclusion

Reference to the past by grammatical morphology is selectively impaired in both production and comprehension,

regardless of the language. In Chinese production, however, present and future is relatively more severely impaired than in English and Turkish. It is not yet clear whether this is because in Chinese Aspect instead of Tense is used for time reference or whether aspectual adverbs are more difficult than verb inflections.

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Presented by: **Bastiaanse, Roelien**

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86. Treating Specific Verbs May Impede Generalization in Non-fluent Aphasia

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Aphasia treatment protocols often target specific items. For example, to improve action naming, a client will practice naming a pre-assembled list of items. The efficacy of the treatment is assessed by comparing pre- vs. post-treatment naming performance on this trained list. Generalization effects are assessed by comparing pre- vs. post-treatment performance on a comparable list of untrained items (e.g. Raymer & Ellsworth, 2002; Webster, Morris & Franklin, 2005). Studies have shown significant improvement on trained items alongside limited generalization to untrained items.
It is possible that we can increase generalization by focusing treatment on the general habit of producing verbs rather than practicing the production of specific verbs. To that end, we have compared two treatment protocols designed to improve verb production in people with non-fluent aphasia. In one protocol the participant produce specific verbs ("Specific Verb Training"). In the other protocol the participant was encouraged to produce appropriate verbs, but stimuli and responses were varied and multiple responses all semantically appropriate verbs were considered accurate ("Habit Training").

Methods
Two individuals with chronic non-fluent aphasia subsequent to unilateral left hemisphere stroke participated. Both participants' language production was non-fluent and agrammatic; both had relatively preserved auditory comprehension.

Treatment
Both participants received a total of 60 hours of treatment. Treatment was intense, averaging 7.5 hours per week. Both participants received a treatment block (30 hours) of drill-based therapy and a treatment block (30 hours) of informatively structured therapy. Drill-based treatment consisted of repetition, reading and picture description activities. Informative therapy consisted of language games that required exchange of new information (e.g., "go fish").
Participant 1 received therapy geared towards improving production of a specific list of 32 verbs (Specific Verb Training) in each treatment block; specific verb targets were practiced repeatedly. Participant 2 received similar treatment protocol but without a focus on specific verbs (Habit Training); a large variety of picture stimuli were used to elicit sentence production in both treatment blocks.

Pre- and Post-testing
Before and after each treatment block, the participants completed a 96-item action picture naming task and produced personal narratives.

Results and Conclusions
Participant 1 showed improved naming of the verbs practiced during treatment and little improvement on untrained verbs, regardless of treatment type (informative vs. drill). There was no change in narrative production, which remained very limited. Participant 2 demonstrated modest improvement on verb naming following the two treatment blocks as well as in narrative production (see figure 1). These findings suggest that therapy which aims to reinforce the habit of producing a general category (i.e., any relevant verb) rather than one that practices particular verbs, may lead to greater change in functional tasks such as narrative production.

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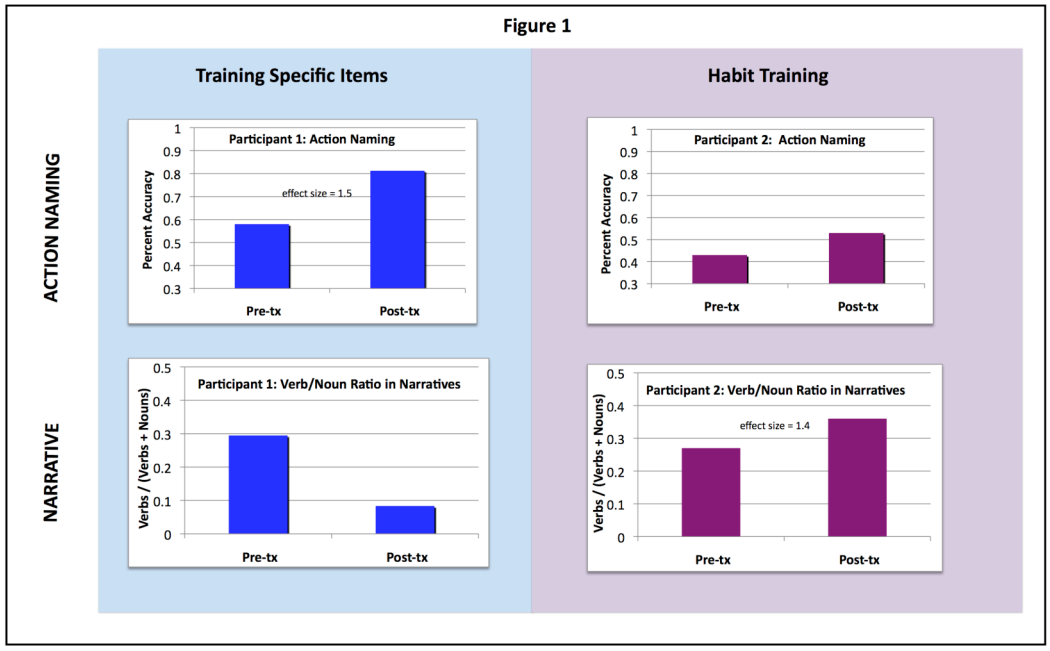

Figure 1. After receiving therapy focussed on specific verbs, participant 1 improved in action naming, but not narrative production, as gauged by verb ratio in personal narratives (left panels). In contrast, after therapy focused on producing verbs generally ("Habit Training"), participant 2 showed no significant improvement in action naming but showed a clear increase in the verb ratio produced in narratives (right panels).

Presented by: **Kempler, Daniel**

87. Neural Correlates of Functional Category Learning and Recovery: An fMRI Study of Verb Inflection Production

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Introduction
Many individuals with agrammatic aphasia demonstrate impairments in production of functional categories (i.e. morpho-syntactic elements) such as verb tense and agreement (Benedet et al., 1998; Dickey et al., 2008; Lee et al., 2008). However, little is known about behavioral and/or neural patterns of functional category recovery. Thus, the goal of this research was to study the learning and generalization patterns associated with treatment of grammatical morphology and to examine associated pre and post-treatment neural patterns using fMRI.

Methods
An event-related fMRI design was used to examine verb inflection production in 14 healthy adults, and 5 patients with agrammatic aphasia who underwent functional category training. Production of verbs inflected for tense (V + -ed) and agreement (V + -s) was elicited using temporal adverbs (i.e. Yesterday, Nowadays), and the cue word "Say" was used to elicit production of verb stems. For example, the cue word 'yesterday' and the verb 'paint' were visually presented and the participants responded "painted". Both patients and normal controls performed overt and covert versions of the task.

Results
When activation of tense and agreement was contrasted with that of the stem condition normal participants recruited a widely distributed neural network involving the frontal (BA 44/47), temporal (BA 22) and parietal brain areas (BA 7 & 37). The exact pattern of activation varied with the demands of the production task. Although several regions in the anterior and posterior cortex were activated in both conditions, activation in the overt task extended more posteriorly into the right fusiform gyrus (BA 37), and bilaterally into the inferior and middle occipital regions (BAs 17, 18). Additionally, tense activated a greater number of brain areas than agreement, including inferior frontal (BA 47), cingulate (BA 24) and supra-marginal gyri (AB 40). For individuals with aphasia, the analysis revealed changes in brain activation coinciding with treatment effects. Patients who improved on the functional category inflection task showed a shift towards more posterior temporo-parietal areas (BAs 40/39 and 7) at post-treatment. The treatment related activation was also observed in the homologous right hemisphere language regions (BAs 40, 7, 44/45/46 and BA 6). One participant who failed to learn during treatment, showed no task related activation at post-treatment.

Conclusions
The results of this study indicate that in healthy adults inflecting verbs for grammatical morphology involves a distributed neural network in both right and left hemispheres. For agrammatic participants, results revealed changes in the neural activation associated with functional category treatment. However, the exact pattern of treatment related activation was contingent on the extent and the location of the lesion and reflected individual responses to the intervention.

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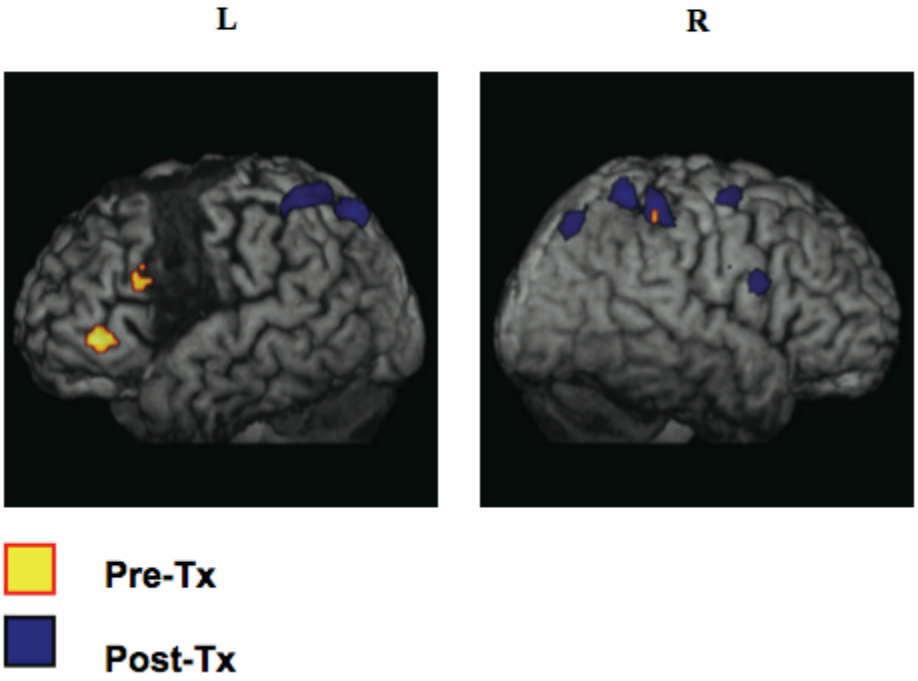
Figure 1. Pre and post-treatment fMRI activation patterns in an agrammatic participant.



Presented by: **Kielar, Aneta**

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88. Constrained Sentence Production in Semantic Dementia

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The speech of people with semantic dementia (SD) is usually described as fluent, well-articulated and syntactically correct, but empty and lacking in content words. Recently, closer scrutiny has suggested that syntactic processing may not be entirely normal in this disorder (Benedet et al., 2006; Patterson & MacDonald, 2006). This study examined syntactic production in SD using a constrained sentence production task which is designed to elicit specific syntactic structures (Caplan & Hanna, 1998).
The test comprises 20 items corresponding to 4 different sentence types: active, passive, dative, dative passive. For each sentence, subjects are shown a picture which illustrates the message to be conveyed and are provided orally with the verb; arrows indicate the people/things to be mentioned and a dot indicates which thing should be mentioned first. The measures used to assess each response include the adequacy of the thematic role assignment as well as the accuracy of the verb morphology. Verb morphology was scored as correct in 2 distinct ways: 1) with respect to the target syntactic structure and 2) with respect to the rules of the language.
This task was administered to 9 individuals with SD and 6 age- and education-matched control subjects. The performance of the control subjects was at or near the ceiling, as previously found by Caplan and Hanna. Individuals with SD were less accurate than controls at conveying thematic roles, but still managed to assign all of the roles correctly at least 80% of the time in all conditions. This group showed impaired performance on production of passive verb morphology in both the passive and dative passive conditions (see Table). Although subjects often failed to produce the target verb morphology required by the test, the vast majority of error responses were

syntactically correct. For example, the response “The dog is going to chase the cat” does not include the required passive verb morphology, but it is a correct English sentence.
These results confirm that syntactic production is disrupted in SD, in association with the semantic impairment. This group had difficulty with production of passive sentences, but still made few frank syntactic errors. The fact that the greatest difficulty was observed on the lower frequency sentence structures is in keeping with other studies demonstrating the pervasive effects of frequency on linguistic output in this syndrome. The findings are consistent with a view of the language system in which there is a high degree of interdependence between syntax and semantics.

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Table
Results from assessment of constrained sentence production for each of the 4 sentence types. Accuracy on production of thematic roles is reported as a proportion because the number of thematic roles differs across conditions (active, passive: agent, theme; dative, dative passive: agent, theme, goal).

	Active	Passive	Dative	Dative Passive
Subjects with semantic dementia				
Proportion correct on thematic roles	0.9	0.8	0.9	0.8
Mean number of times that verb morphology was correct for the target sentence structure (max=5)	4.7	2.8	4.4	1.9
Mean number of times that verb morphology was syntactically correct (max=5)	5.0	4.8	5.0	4.7
Control subjects				
Proportion correct on thematic roles	1.0	1.0	1.0	1.0
Mean number of times that verb morphology was correct for the target sentence structure (max=5)	5.0	4.8	5.0	4.8
Mean number of times that verb morphology was syntactically correct (max=5)	5.0	5.0	5.0	5.0

Presented by: **Rochon, Elizabeth**

89. Chance in Agrammatic Sentence Comprehension – What Does It Really Mean? Evidence from Eye Movements of German Agrammatic Aphasics

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Background
For various languages, it has been shown that aphasic individuals suffering from sentence comprehension disorders perform at chance level when confronted with non-canonical sentences (cf. Grodzinsky et al., 1999). The Trace Deletion Hypothesis (Grodzinsky, 1995, 2000) claims that chance performance is due to permanently impaired syntactic representations which force patients to rely on a guessing strategy when trying to comprehend non-canonical sentence structures. This assumption is incompatible with recent on-line investigations of sentence processing in aphasia (Caplan et al., 2007; Dickey et al., 2007) which revealed that patients' sentence processing routines do not always mirror aberrant strategies but exhibit divergences depending on whether comprehension has been successful or has failed; this points rather to a processing deficit explanation.

Method
We report an eye-movement study investigating controls' (n=8) and agrammatic aphasics' (n=7) on-line processing of German canonical (SVO) and non-canonical (OVS) sentences during a sentence-picture matching task. In addition to eye-movements, participants' accuracy and reaction times were measured. This enabled us to investigate on-line and off-line performance simultaneously, allowing for separate analysis of patients' correct and incorrect responses.

Results and Discussion
While patients' off-line pattern was compatible with the TDH (chance performance for non-canonical sentences and above chance performance for canonical ones), the on-line results constitute novel evidence against attributing aphasic individuals' chance performance with non-canonical structures to mere guessing. Instead, we found evidence for slow-down, intermittent sentence processing deficits and inefficient reanalysis abilities to be the underlying cause for aphasics' syntactic comprehension deficits.
In addition, we also demonstrate how linear mixed-effects models (Bates & Sarkar, 2007) can be used to characterize individual differences in the reaction times and eye-movements of aphasics and normals. We show that mixed-effects models allow us to treat patients as random factors (i.e., as samples from the population of aphasics) without giving up the assumption that each individual patient is likely to behave significantly differently from others.

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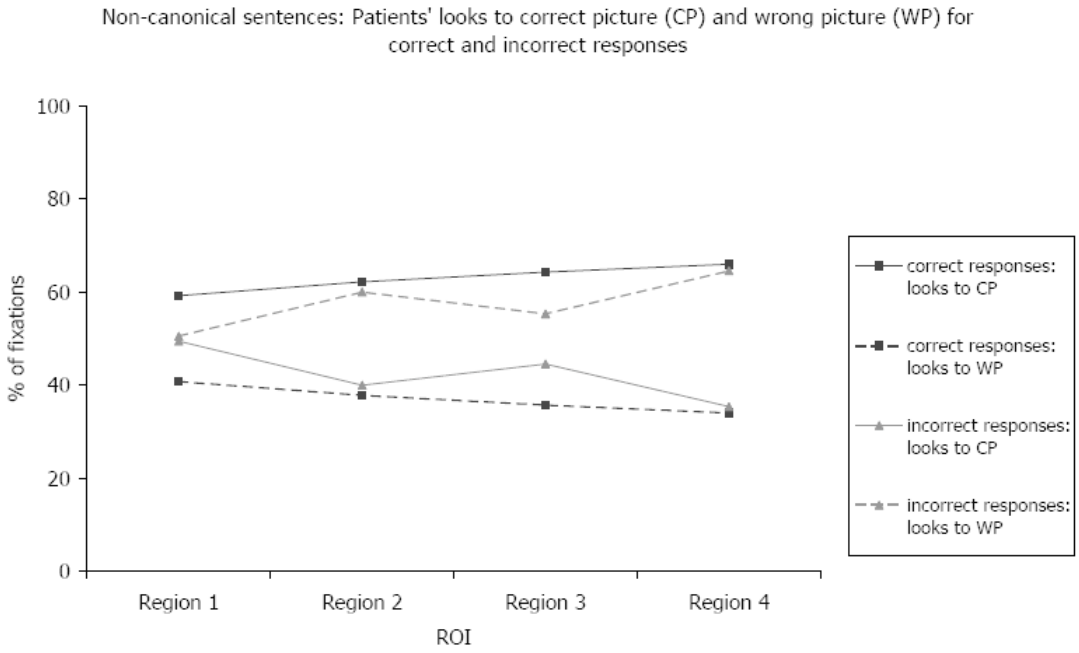

Presented by: **Hanne, Sandra**

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90. Rehabilitation of a Pruned Syntactic Tree of an Italian Aphasic Patient

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This study describes the case of an Italian-speaking 35y.o. man who suffered from concussion in the left temporal lobe. He showed a fluent (par)agrammatic speech with a specific deficit for verbal tense inflection and function words – complementizers, prepositions and clitic pronouns.

In the framework of Friedmann's (2002) Tree Pruning Hypothesis (TPH), we conjectured that the deficit pruned his syntactic tree at T(ense)P. According to the TPH, all nodes above TP are also not accessible. The TPH suggests beginning the therapy from the highest node of the tree, C(omplementizer)P, which hosts interrogative items and subordinating conjunctions. Once the CP is reactivated, the reactivation of all the projections below would follow.

In order to verify if rehabilitation from lower nodes was effective, the patient was asked to transform 36 active declarative sentences into passive. After 8 hours of therapy, he retrieved passive constructions, but could not produce Wh-questions yet. Wh-questions were transformed into yes/no questions by omitting the Wh-item. Rehabilitation of lower nodes did not reactivate the higher ones.

For two weeks, 1 hour per day, we tested the patient with an elicitation of Wh questions task and a completion task with Wh-items, consisting of 81 questions with present tense and 91 questions with past tense. The easier Wh-items were chi, che cosa, perché (who, what, why), while he found it difficult to produce come, quando, dove, con chi, a chi (how, where, when, with whom, to whom).

To test the results of therapy, we prepared elicitation and completion tasks with embedded sentences, clitic pronouns

and present/past verbs, in order to check whether both CP and TP were reactivated. He had to complete 30 sentences with complementizers che, se, di, (that, whether, to) and 22 with interrogative items (quando, come, che cosa, dove, perché, quale, when, how, what, where, why, which). The patient made only 6 errors. The greater difficulty was with interrogative complementizer se, while he had no problem with declarative complementizers di, che. In the completion task with clitic pronouns, he made only 9 errors in 83 sentences. The major difficulties were with locative ci (3 errors), masc. sing. dative gli (2 errors), 2° plural dative vi (3 errors) and masc.plur. object li (1 error). In the completion task with past verbs, he made 21 errors in 118 sentences: he found it difficult to produce plural persons (7 errors with they, 4 with plural you, 5 with we). In the elicitation task with a past tense, he made only 1 error in 13 sentences. In the description task he produced 14 past verbs, 12 of which were correct.

In conclusion, the method suggested by the TPH led the patient to a great improvement in verb inflection and function words production. Rehabilitation from the highest node reactivated all nodes below.

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Presented by: **Pivi, Margherita**

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91. Comprehension of Passive Sentences in a Bilingual Aphasic Speaker: Strategies Across the Language

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Introduction

The competition model (Bates and MacWhinney, 1989) claims that there are many ways in which the form and functions in languages map and that there are a variety of cues available within a language which helps with direct mapping. In English, word order provides a cue to thematic role assignment in active but not passive constructions. The non-canonical word order in English passives is associated with reduced aphasic performance on passives compared with active constructions. Hindi, on the other hand, allows free word order. In passive constructions in Hindi, the instrumental case –se or the post position –ke dvaaraa follow the logical subject irrespective of its position in the sentence and the passive auxiliary jaa carrying the tense and agreement morphology follows the perfective form of the verb making surface morphological cues available.
We predict that if cues across languages are of uneven weight, a bilingual speaker may perform differently in the two languages on the classic active/passive paradigm. Both word order in English and –se (or –dvaara) in Hindi are obligatory in their respective languages and possibly provide different cue strengths for the interpretation of a passive sentence and appropriate thematic role assignment. If instrumental case –se in Hindi is stronger in cue validity and lower in cue cost than the word order cue in English, then differences in performance may be seen across languages in a bilingual speaker.

Method and Results

These preliminary data are taken from a larger study on verb production in Hindi and English. Here we examine one bilingual patient with non-fluent aphasia following a stroke, looking at the Bilingual Aphasia Test (Paradis, 1987) which offers comparison between two languages on equivalent rather than translated items. NG‘s overall scores on the syntactic comprehension section showed a marked contrast in the two languages: Hindi (70/87) and English (37/87) even though she learnt both Hindi and English at roughly the same time and in a similar manner. The most striking contrast was observed in the passive constructions. Classically, sentence comprehension for active English sentences was better than for passives. However, NG could process passives as well as active Hindi sentences.

Conclusion

We suggest that the cue provided by the morphological marker in the Hindi grammar was facilitative. A similar

facilitative cue was not available in English passives and the lexical cue (the PP) was insufficient or too costly to override the non-canonical word order. The instrumental case marker in Hindi, additionally, may provide a stronger cue in negative sentences. We are currently collecting further data to test the strength of these proposals.

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Table 1: NG's scores for sentence comprehension on the BAT

Sentence types	English	Hindi
Passive affirmative	0/8	7/8
Passive negative	1/12	9/12
Standard affirmative	10/13	13/13
Standard negative	4/12	6/12

Presented by: **Edwards, Susan**

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92. Word and Sentence Production after Destruction of Broca and Wernicke Regions

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Introduction
Three cases of chronic nonfluent aphasia stemming from major stroke are described in which there was appreciable recovery of language production capabilities despite severe damage to both anterior and posterior language regions. We created new tools based on elicited production methodology (Crain & Thornton, 1998) with the aim of testing the limits of language competence. We asked: 1. Whether the elicited production method can reveal aspects of spared function not readily evidenced in spontaneous utterances or on standard aphasia tests? 2. Which language production abilities survive destruction of both Broca's region and Wernicke's region?

Materials & Methods
Targeted words and syntactic structures were elicited by sentence completion with supporting linguistic and non-linguistic context (see Crain, Ni, & Shankweiler, 2001). Targets were never modeled during the procedure. For verbs, visual and auditory contexts emphasized completed actions, targeting past tense forms. Standard aphasia tests were administered for comparison purposes. Lesion analysis is based on structural MRI scans.

Results
The three participants were agrammatic in production, but they differed in functional communication abilities. The elicitation method revealed more spared lexical and grammatical function than was evident in standard assessment procedures. Each participant showed partially spared ability to produce nouns, adjectives, and verb stems in context. Past tense inflections were frequently omitted; one participant produced none appropriately. Hence, stems and inflections were dissociable (see Kemmerer & Tranel, 2000). Concerning production of complex syntax, two participants showed partial success with the passive, but only one produced a full verbal passive that included a by-phrase. No participant produced a full relative clause, including the relative pronoun, but two individuals produced

reduced forms of subject relatives.

Conclusions
This application of elicited production methodology demonstrates possibilities of language production, lexical, morphological and syntactic, not evident in spontaneous production or by conventional aphasia tests. This was especially true for word retrieval by the most impaired participant. In all participants some grammatical capability survives destruction of Broca and Wernicke regions (see Indefrey et al., 2001), but there were large differences among them in residual function. To the extent that surviving lexical and grammatical functions are dependent on remaining left-hemisphere regions, they are mediated in these cases by surviving extrasylvian cortex.

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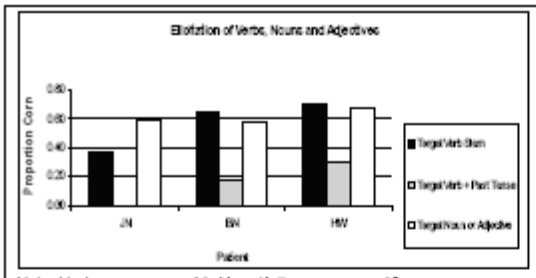
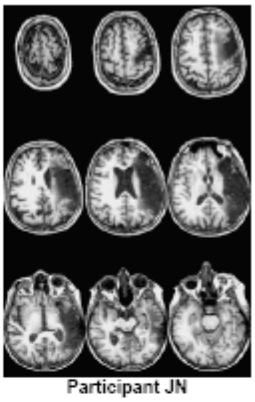
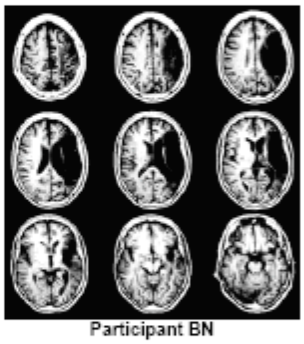


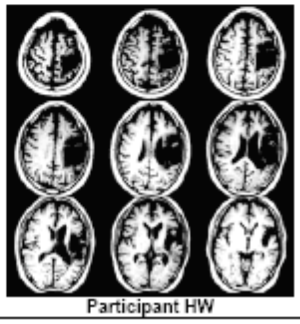
Note: Verb max score = 11, Noun/Adj max score = 12.

Elicitation of Passives and Relative Clause Sentences	JN	BN	HW
Relative Clause (8)			
Subject Relative (4)			
Full Relative	0	0	0
Reduced Relative	0	2	4
Object Relative (4)			
Full Relative	0	0	0
Reduced Relative	0	0	0
Substitute subject relative	0	1	1
Passive (9)			
Full passive w/auxiliary	0	0	0
Passive w/auxiliary omitted	0	1	1
Adjectival passive	1	2	2
Sentence Total	1	6	8

Grammatical Complexity Composite Score	JN	BN	HW
Verb Morphology Total			
Produce past tense inflection	1	2	4
Produce other inflection	3	3	1
Sentence Total			
Passive	1	3	3
Relative Clause	0	3	5
Grammatical Complexity Composite Score	5	11	13


Participant JN


Participant BN


Participant HW

Presented by: **Shankweiler, Donald**

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93. Predicting Outcomes for Linguistically-specific Sentence Treatment Protocols

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Introduction
Recent research focused on treatment of sentence-production deficits in aphasia has shown increasingly positive results. In particular, linguistically-motivated treatment protocols such as the Treatment of Underlying Forms (TUF: Thompson & Shapiro, 2005) have shown significant evidence of efficacy for agrammatic aphasic individuals. In a recent meta-analysis of existing aphasia treatment studies, TUF was shown to have the largest effect sizes of

existing sentence-production treatment protocols (Beeson & Robey, 2008). However, there is some variability in how successfully aphasic individuals treated using TUF acquire the sentences they are trained on, and in whether they will generalize to related but untrained forms. The current study analyzed existing treatment studies using TUF to examine what measures may be predictive of TUF treatment outcomes.

Method
The ANCDS Aphasia Treatment Evidence Tables (ANCDS, 2008) were surveyed to locate all published TUF treatment studies, a total of 14. These studies included language testing, treatment and generalization data from 30 unique individuals with aphasia. The magnitude of the treatment effect for each individual was estimated by comparing pre-treatment production accuracy for trained sentence types to post-treatment production accuracy for the same sentences. A treatment effect score was computed by subtracting the pre- from the post-treatment score. The generalization effect for each participant was estimated in a similar way, but targeting untrained structures, resulting in a generalization effect score.
Three different predictor measures were tested: aphasia severity scores (WAB AQ for all studies included), auditory comprehension scores (WAB auditory comprehension subtest), and complex sentence comprehension scores. Complex sentence comprehension scores were based on scores from assessments of comprehension of complex non-canonical sentences (object relative clauses, e.g.), either the Northwestern Sentence Comprehension Test or the Philadelphia Comprehension Battery for Aphasia.

Results
Correlation analyses examined which of the patient measures – severity, auditory comprehension, and complex sentence comprehension – were related to the treatment effect and generalization effect scores (see Figure 1). There was a modest-sized positive correlation between auditory comprehension scores and treatment-effect scores ($r[29]=.401$, $p<0.05$), but no evidence of a correlation between treatment effect size and either severity or complex sentence comprehension (both $p>0.05$). There was also no evidence of correlations between any of these measures and generalization effects (all $p>0.05$)..

Discussion
The current results suggest that neither overall aphasia severity nor performance with complex sentence stimuli is a strong predictor of TUF treatment outcomes. These findings are surprising, especially if comprehension performance for complex sentences is indicative of relatively preserved access to the grammatical structures involved. However, general auditory comprehension does appear to be related to improved sentence production following TUF treatment. This finding suggests that TUF treatment effects are mediated by more general language-processing capacities, in addition to grammatically-specific processing abilities.

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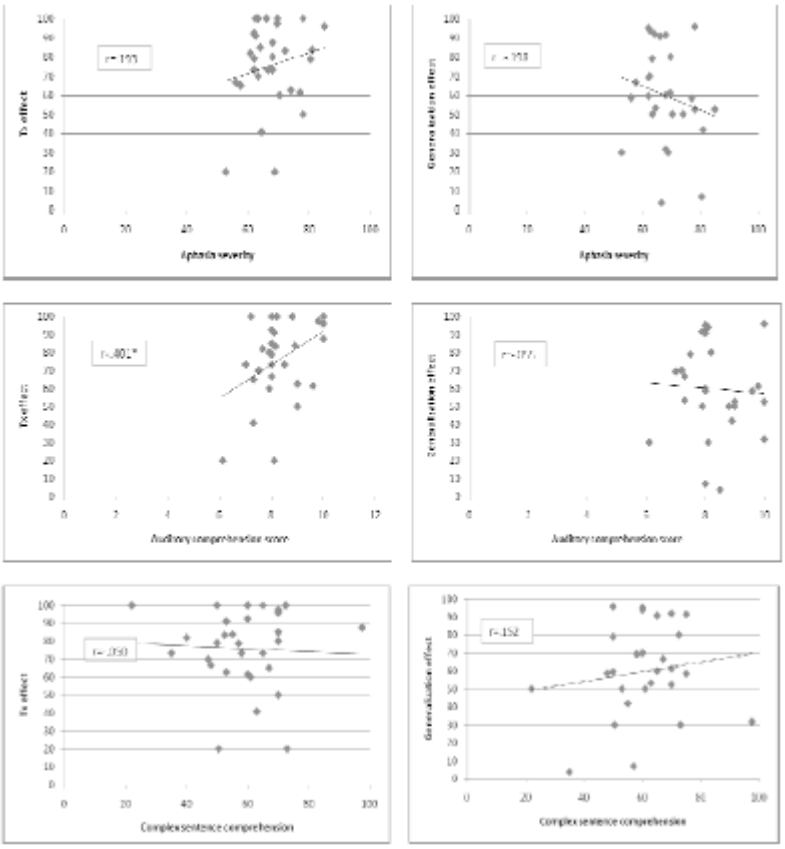
Figure 1. Relationship between patient measures and treatment effects (lefthand graphs), generalization effects (righthand graphs).



Presented by: **Dickey, Michael Walsh**

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94. The assignment of gender in Greek: Evidence from aphasic and unimpaired adults

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Background
Cross-linguistic studies on gender assignment in aphasia have shown contradicting results: a number of studies argue for relatively good performance (Luzzatti and De Bleser, 1996), while others observe severe difficulties (Hofmann et al., 2007). The present study investigates gender assignment in Greek adult native and aphasic speakers. According to Ralli (2002), gender in Greek is an inherent property of stems, which in certain cases can be predicted by semantics (sex) or morphology (inflectional class).

Method
Participants
Twenty adults, aged 19-57 years and four aphasic speakers, aged 37-74, were tested.

Materials
Two on-line tasks were employed. The first one consisted of 90 high-frequency nouns of the three gender values (masculine, feminine, neuter) and of all the inflectional classes. Each noun was presented in the nominative and in the accusative or genitive case. The other task included 60 pseudonouns with ambiguous or unambiguous suffixes, as far as gender marking, in the nominative case.

Procedure
Both tasks were timed. The nouns were presented orally one-by-one and the participants had to decide on the gender of the word they heard by pressing one of three buttons on the keyboard, which were pre-specified for each gender value.

Predictions
Within Ralli's approach, regarding words, lower accuracy rates and higher RTs are expected for aphasic than for unimpaired participants. Furthermore, both groups' accuracy or RTs on gender assignment will not depend on the case value of the noun. As for pseudonouns, the unimpaired subjects' responses will depend on the inflectional paradigm, as this is encoded on the inflectional suffix. On the other hand, if aphasic speakers have access to the lemma but not to the inflectional paradigm, they should provide mixed responses for all pseudonouns.

Results
We found that although the unimpaired adults had overall high accuracy, they were less accurate with masculine nouns marked for the accusative case than with those marked for nominative. Moreover, they had slower RTs with non-nominative cases than with the nominative case for all gender values. For pseudonouns, we found that gender assignment depended on the inflectional suffix for unambiguous cases, whereas for the ambiguous cases all possible gender values were yielded. For aphasic speakers, we found that they had similar patterns of responses for words compared to unimpaired speakers but lower accuracy rates. Moreover, higher RTs were observed. As for pseudonouns, we found that they did not rely on morphological cues to assign gender values.

Discussion
We argue that although aphasic speakers have access to the word lemma in their mental lexicon, given their relatively good performance on nouns, they seem to have severe difficulties with the morphological component of the lexicon since inflectional suffixes do not seem to guide them in the assignment of gender in pseudonouns. Given that the accuracy rate level for words is relatively high, but RTs are very slow, we claim that the deficit that aphasic speakers suffer from is not a deficit at the representational level but at the level of lexical access.

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Presented by: **Despoina, Papadopoulou**

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95. Grammatical Gender Information: Where is it Stored and When is it Accessed?

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Lexical-syntactic information – syntactic information stored in the lexicon, is an interface between lexical retrieval and sentence construction. In this study we focused on one type of lexical-syntactic information: grammatical

gender of nouns. Unlike natural gender of animate nouns, grammatical gender of inanimate nouns has no relation to their meaning, and is an idiosyncratic property of each noun.
We examined gender information for 14 Hebrew-speaking individuals with aphasia – 4 were diagnosed with agrammatism, and 10 with anomia: 2 had a lexical-semantic deficit, 3 a lexical-phonological deficit, and 5 a phonological output buffer deficit. The participants' grammatical gender knowledge was assessed using tasks of verb or noun completion in sentences, grammaticality judgment of phrases, and verb agreement in sentences produced to a given verb.

The main research questions we asked and their results were:
(a) Where in the lexical retrieval process is grammatical gender information stored?
We found preserved grammatical gender information for 3 participants with agrammatism, and for the 8 participants with a lexical-phonological and a phonological buffer deficits, indicating that gender information is encoded separately from sentence-level syntax, and separately from the phonological lexicon or the phonological buffer. Gender might be stored in the semantic lexicon, or in a separate syntactic lexicon, located prior, or in parallel, to the phonological lexicon.

(b) Can conceptual gender information be preserved when grammatical gender information is impaired?
For 3 participants, we found a dissociation between preserved conceptual gender information and impaired grammatical gender information, indicating that the semantics of animate nouns can assist when grammatical gender information is inaccessible.

(c) Is grammatical gender information always accessed or only at the sentence- or phrase level, when agreement is required?
Hebrew-speakers were found not to have gender information when failing to retrieve a word (Friedmann & Biran, 2003; Gollan & Silverberg, 2001), unlike many other languages in which speakers were found to have gender information about a word, even when their phonological information about it was incomplete (Kulke & Blanken, 2001, and many others). One explanation for this difference between languages might be that grammatical gender is only accessed when it is needed, i.e., in a syntactic context that includes an agreement of the noun, which is not necessary in bare noun retrieval in Hebrew. We examined gender information in the context of sentences, and found that grammatical gender information is accessed for subjects at the sentence-level even when it is not accessed at the single-word level.

The knowledge about grammatical gender information and about possible deficits in it can assist in diagnosis and treatment for each individual with aphasia, according to her deficit, and suggests new insights with respect to the theoretical model for the access of syntactic information in the lexicon.

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Presented by: **Biran, Michal**

96. Performance of Agrammatic and Non-aphasic Persons in Face-to-Face- versus Computer-Mediated Communication

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Introduction
Impairments associated with agrammatism are generally considered to result from problems with syntax and/or morphology, although the exact nature of the syntactic deficit remains unclear (e.g. Beretta, 2008). Agrammatism seems to vary both in linguistic structure and underlying mechanisms of phrase structure generation according to the time of occurrence during the course of aphasia (cf. Springer et al., 2000; Saur et al., 2006). Based on the fact that agrammatic utterances show variant symptoms, the research aim was to investigate which factors impact language usage. This study follows a media-specific hypothesis, which refers to the concept of adaptation. It claims that the variation in agrammatic symptoms doesn't directly mirror the basic syntactic disorder, while showing adaptation to different interactive and media-specific demands. Therefore, the present study compares the impact of interactivity and modality-specific conditions on formulation in persons with chronic agrammatism and non-aphasic speakers (Springer, 2006).

Methods
This experimental study sets Face-to-Face dialogues against Computer-Mediated-Communication and non-interactive oral and written tasks in eight German-speaking agrammatic and eight non-aphasic persons. An ANOVA for repeated measures was performed on MLU and mean percentage of different syntactical and lexical parameters (finite phrases, complete, subordinated sentences, pauses and repairs within phrases as well as percentage of closed class words, type-token-ratio for nouns TTR-N and verbs TTR-V) with interactivity (interactive versus mono-active), modality (oral versus written) and group (agrammatics versus non-aphasic participants) as factors.

Results
The results of the study show that both interactive and media-specific factors impact the language performance in agrammatics and normal speakers. As expected, the agrammatic group differs significantly from the non-aphasic persons for most of the syntactic parameters. However, both groups show similar adaptation patterns with respect to communicative and modality factors. Main features seem to be the interactivity with the interlocutor and the visible, permanent and simultaneously presented language signs in written texts, which support the working memory and allow for repeated processes of reformulation. Actually, with most of our subjects we found a significant difference between the complexity of phrase and sentence structures and lexical variability in the written reports compared to Computer-Talk and Face-to-Face-Dialogues.

Conclusion and Perspectives
The consequences for communication of agrammatic persons vary according to the media-specific practices, contexts and participants present in a setting, and according to how interlocutors handle the situation. Computer-Mediated-Communication (CMC) provides possibilities for remote communication, even for patients suffering problems of sentence production, and thus offers the chance of greater independence. To enable aphasics to meet others over physical distances while protecting their privacy in an insular virtual community, a web-based Chat-tool called SOCRATES was developed.

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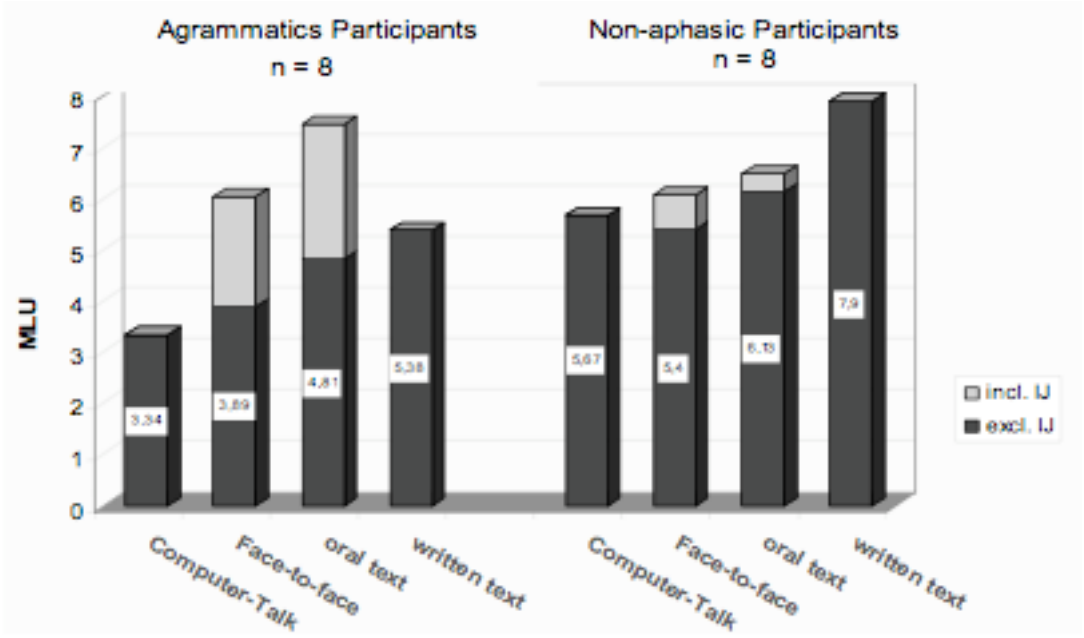

Grand Total of Phrases: Agrammatic participants: 1572 Phr. Non-aphasic Participants: 1946 Phr.
Significant Main Effect: - Interactivity (p = <001) - Group (p = <001)
Significant Interaction: - Media x Interactivity (p = 001) - Media x Group (p = < 001)

Presented by: **Springer, Luise**

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97. On Applying the Relational and Accessibility Hierarchy to Oral Sentence Production of Aphasic Clients

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Introduction
In language typology studies on universal grammar, the relational hierarchy (Perlmutter & Postal, in Pullum, 1977) and the accessibility hierarchy (Keenan & Comrie, 1977) have been
applied to characterize the order of occurrence of noun phrases, i.e. complements in the production of various syntactic constructions. The relational hierarchy is interpreted by
Perlmutter and Postal in the following way:

S < DO < IO < OO (= oblique objects)

where S (=subject) 'has precedence over' or 'outranks' the DO (=direct object) and so on. The accessibility hierarchy relates to the relative accessibility to relativization of noun phrase position in simple main clauses in universal grammar, whereby '>' means 'is more accessible than':

S > DO > IO > OBL (oblique) > GEN(genitive) > OCOMP(object of comparative)

Departing from these hierarchies, the aim of this explorative study is to determine whether they are adhered to in orally producing sentences by severely impaired aphasics of various types: Do the sentences produced by clients presenting with the various aphasia types reflect the order of occurrence expected by a version of this hierarchy, namely: S > DO > OOC (=other obligatory complements), where '>' means more accessible than?

Methods
Transcribed data from an oral sentence production task (n= 80 items) to picture stimuli from three non-fluent (AD, EK, FB) and three fluent aphasic clients (WG, EB, EH) were analyzed in terms of the presence of the obligatory complements and their ordering in relation to the verb (SVO) in main clauses.

Results and Discussion
With regard to the accessibility hierarchy, an analysis of the obligatory complements which were produced (+) and omitted (-) are presented in Table 1 for the possible structures.

Client	Aphasia Type (AAT)	S- * DO+	S+ * DO-	S+ * DO+ * OOC-	S+ * DO- * OOC-	S+ * DO+* Vinf.
AD (♂)	Broca's	1	3	2	1	5
EK (♀)	Broca's	2	7	3	2	16
FB (♂)	Global	2	6	-	1	9
WG (♂)	Conduction	-	2	5	-	-
EB (♂)	Wernicke's	1	14	-	1	1
EH (♂)	Anomic	-	13	3	3	-

Table 1: Omission of obligatory complements according to target sentence structure

The nonfluent aphasics' (EK and FB) most prevalent error type relates to the ordering of the verb in relation to the DO: SVO →SOV. This we assume to be due to impaired lexical retrieval and not to movement errors. Client AD produced fewer errors, however, he was less fluent than EK. The two Wernicke's clients show a similar pattern. The direct object is omitted most by these two clients. Client EK and FB also omitted the DO, but to a lesser extent.

Overall, even the utterances produced by severely impaired aphasic clients to picture stimuli appear to adhere to the relational and/or accessibility hierarchy. However, due to the severity of the oral sentence production impairment, it is often difficult to determine the target sentence. Those examples are not considered.

In summary, application of these hierarchies to aphasics' oral sentence production data is useful with respect to analyzing specific linguistic entities. They provide a framework for addressing the accessibility of subject, direct object and other complements. However, psycholinguistic counterparts such as conceptual accessibility (cf. Bock & Warren, 1985) should also be considered when assessing aphasic language production.

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Presented by: **Stark, Jacqueline Ann**

98. Verb-Form Regularity Facilitates Copula Verb Production in Spanish Agrammatism

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Introduction
Although numerous factors have been proposed to explain agrammatism and its cross-linguistic manifestation, none have been able to fully elucidate this disorder(see Menn & Obler, 1990). In a previous study (O'Connor et al., 2007)we reported that verb-form regularity predicted verb production in two Spanish-speakers with agrammatic aphasia, while word frequency did not. In the current study,we compared the effects of tense-aspect frequency,verb-form regularity and semantic obligatoriness on verb production in agrammatism. Again, we chose the Spanish dual-copula system because its two copula verbs: ser and estar (be in English), differ semantically, as well as in verb-form regularity.
We asked: Which factor best facilitates verb production in agrammatism: tense-aspect frequency, form-regularity or semantic obligatoriness?

Methodology
Six sentence types were created to compare these three factors:
1) High Tense-Aspect Frequency/Low Regularity (ser in present tense)
2) High Tense-Aspect Frequency/High Regularity (estar in present tense)
3) Low Tense-Aspect Frequency/Low Regularity (ser in imperfect past tense)
4) Low Tense-Aspect Frequency/High Regularity (estar in imperfect past tense)
5) High Tense-Aspect Frequency/High Semantics (sentences requiring either ser or estar in the present tense and result in a semantic change)
6) High Tense-Aspect Frequency/Low Semantics (sentences allowing a choice of either ser or estar in the present tense and do not result in a semantic change)
Participants were asked to complete 130 sentences with the correct verb-form.
E.g., “¿Donde _____ la pelota?” (está)- “Where is the ball?”

Participants
Four Spanish-speaking participants with agrammatism were tested. All had suffered left-frontal strokes at least two years prior to this study and were judged agrammatic based on the effortfulness of their spontaneous speech, short phrase-length, high substantive-word use, omission of functors, and relatively good comprehension. Twelve Spanish-speaking controls were matched for age and relative socio-economic status.

Results and Conclusions
Participants with agrammatism made markedly more errors on this task (60% accuracy) than control participants (95% accuracy), thus reinforcing the previous study’s finding that despite high frequency in daily usage, ser and estar are not resistant to agrammatism. Participants with agrammatism made significantly more errors on sentences that required the irregular ser (47% accuracy) than on those requiring the highly regular estar (79% accuracy). Furthermore, they chose estar more often (59% of the time), than ser (41%) when copula verb choice was allowed, contra the control participants (34% estar and 58% ser; p= .05). With respect to tense-aspect frequency, participants with agrammatism performed with higher accuracy on the frequent present tense (71% accuracy) than on the less-frequent imperfect past tense (56% accuracy) and had lowest accuracy on the ser verb in the past, as revealed by a significant tense by verb-type interaction in a binary randomized block design (p =.001). The results suggest that verb-form regularity facilitates copula verb production in agrammatism.

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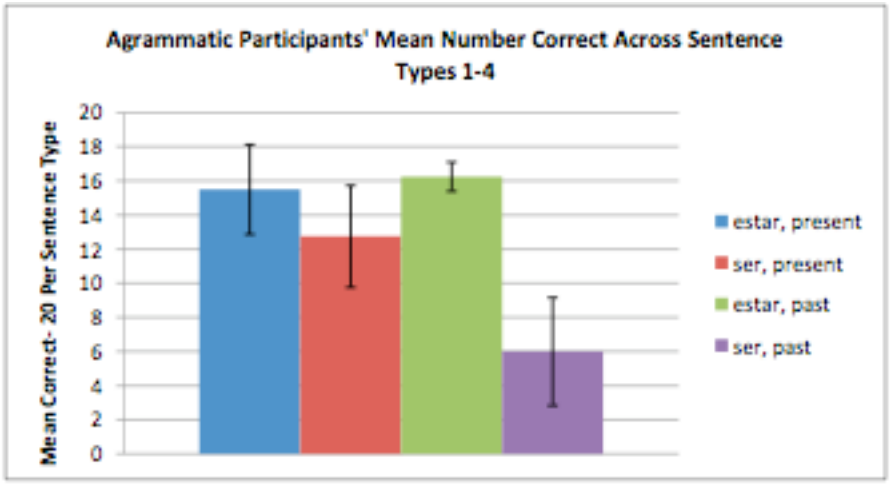

Presented by: **O'Connor Wells, Barbara**

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99. Double Dissociation between Tense and Agreement in an Arabic-Speaking Fluent Agrammatic Patient

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Statement of the Problem
Case studies in Hebrew and Arabic showed that tense inflection was harder than agreement inflection for agrammatic patients in oral production (Friedmann & Grodzinsky 1997; Friedmann 2001; Tissen et al. 2007). Recent studies revealed that this dissociation was found in both oral production and grammaticality judgment in German (Wenzlaff & Clahsen 2004), Moroccan Arabic (Diouny 2007), Dutch (Kok et al. 2007), and English (Clahsen & Ali 2009). We report results from an Arabic-speaking fluent aphasic whose performance on sentence completion and grammaticality judgment tasks displays impairment with verbal inflections. We found that the patient was more impaired in tense than agreement in production. The opposite pattern characterized his performance on grammaticality judgment.

Methods
Patient. MT is a 56 year-old male native speaker of Jordanian Arabic. He had a stroke that caused him an acute left parieto-occipital infarction. He was initially diagnosed as global aphasic with cognitive impairment. His speech was then non-fluent, and his naming and repetition impaired. His oral reading was good but showed paraphasias. Two months post-onset, MT's performance improved drastically.

Stimuli and Procedure. We used grammaticality judgment and sentence completion tasks to investigate tense/agreement dissociation. The grammaticality judgment task involved 192 sentences, 96 grammatical and 96 ungrammatical. Within each set, 48 tested tense and 48 involved agreement. The sentence completion task consisted of 66 sentences made of two clauses, the second of which lacked the verb that MT was asked to provide. In this task 36 sentences tested tense inflection and 30 targeted agreement inflection.

Results. The results obtained show that scores in grammaticality judgment were significantly lower for agreement

(57/96) than for tense (86/96), (Chi2=20, p =.0001). By contrast, in sentence completion, scores were significantly lower for tense (11/36) than they were for agreement (27/30) (Chi2=23, p = .0001).

Conclusion
The present findings strongly support the proposal that tense and agreement can be independently impaired, not only across agrammatic patients (Burchert et al. 2005), but also across tasks/modalities within a single patient. These findings also pose a serious challenge to any purely syntactic/structural account of agrammatism, such as Friedmann & Grodzinsky's Tree-Pruning model and Wenzlaff & Clahsen's Tense Underspecification Theory.

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Presented by: **Idrissi, Ali**

Poster Session 3: Phonology, Phonetics and Acoustics-2

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100. Influence of Word Stress in Patients with Apraxia of Speech

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Introduction
Several factors are known to influence the error pattern of patients with apraxia of speech (AOS), e.g., word position, syllable structure, and word length (e.g., Odell et al., 1990; Ziegler, 2005). Though rhythm-based treatment methods have proved successful (e.g., Wambaugh & Martinez, 2000), the impact of word stress on apraxic speech has been neglected so far.
In the present study, we investigated the influence of word stress on error production in German patients with AOS. We compared two-syllabic words with stress on the first syllable (trochaic words) with words stressed on the second syllable (iambic words).

Method
The materials consisted of 48 two-syllabic, low-frequency words with trochaic and iambic stress pattern. Besides words with simple CV and CVC structures (e.g., 'Puma, engl. Puma vs. Me'nü, engl. menu) we also included words with complex syllables in the stressed word position (e.g., 'Plastik, engl. plastic vs. Kon'takt, engl. contact).
Each word was produced twice in a repetition task. The words were analysed with respect to correct / incorrect productions. Errors were classified as segmental (i.e., phonetic distortions, phonemic errors) and prosodic (i.e.,

intersyllabic pauses, phoneme lengthening), respectively. Furthermore, we also evaluated segmental errors on the word-initial syllable.
In the context of a larger-scale investigation we examined 42 patients with AOS in different clinical institutions in Germany. Twenty patients have finally been included in the study.

Results
First we compared all trochaic and iambic words irrespective of their syllable structure. The patients produced significantly more segmental and prosodic errors on iambic than on trochaic words (Chi2 = 15.99; $p < .001$, for segmental errors; Chi2 = 29.93; $p < .001$, for prosodic errors; see also figure 1). Whereas the complex iambic words turned out to be the most error-prone items, trochaic words with a simple CV structure proved to be easiest.
A further analysis which included only the words with simple syllable structure revealed a higher error rate on the word initial syllable for the iambic words as compared to the trochees (Chi2 = 6.77; $p < .01$).

Discussion
The present study showed an influence of word stress on the error pattern of patients with AOS. Trochaic words were produced with less segmental and prosodic errors compared to iambic words. Furthermore, the patients seem to have particular problems to accurately produce the initial syllable of iambic words. It is assumed that the regular metrical pattern in German, the trochaic form, has a facilitating effect on word production abilities in patients with AOS.

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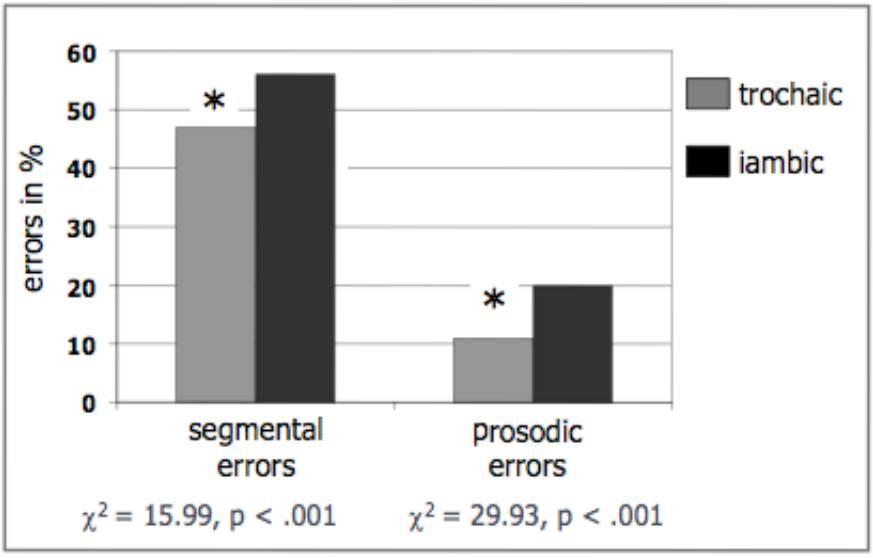

Figure 1: Influence of word stress: Percentage of segmental and prosodic errors

Presented by: **Aichert, Ingrid**

101. Phrase-Level Reduction in Apraxia of Speech

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Background
The occurrence of phrase-level reductions such as segmental deletions and assimilations is a characteristic property of fluent connected speech (Kohler, 2001). The transformations contribute to a reduction of articulatory-motor effort and constitute an important aspect of speech naturalness (Lindblom, 1990). Up to now, these phenomena have not been subject to clinical investigations in patients with apraxia of speech (AOS). Since the disorder is considered a phonetic encoding deficit, this condition might interfere with the mechanisms involved in phrase-level reduction. The present single-case study is an attempt to examine the types and frequencies of reduction phenomena in spontaneously produced connected speech in AOS.

Methods
We investigated phrase-level reduction phenomena in two extensive samples of spontaneous speech (> 1000 syllables each) in a German individual with pure AOS. A first speech probe (T1) was recorded one month, a second (T2) seven months post onset. At T2, the patient showed clearly improved speech-motor skills as expressed by a decreased error rate and an increased speech rate. The results were compared with normative data from two neurologically healthy control speakers of German. The speech data were analysed perceptually and evaluated for categorically perceived segmental deletions, assimilations and geminate reductions. A reliability measure revealed very high inter-rater agreement (Cohen's Kappa, $\kappa = 0.849$).

Main contributions
At T1, 1.6% of the syllables produced by RK exhibited phrase-level changes. With a proportion of 3.5% a significant increase was observed at T2 (Pearson $\chi 2 = 9.1$; $p < .01$). By comparison, 14.5% and 14.8% of the syllables produced by the control persons showed phrase-level changes. A qualitative analysis of the connected speech processes revealed different patterns in RK and the control persons: While the controls predominantly produced vowel deletions, the majority of the patient's phrase-level reductions were consonant deletions and geminate reductions. In RK, phrase-level reductions almost exclusively resulted in simplifications of the syllable structure, i.e. reductions of consonant clusters. By contrast, in the healthy controls new clusters emerged substantially more often than existing clusters were reduced.

Discussion
We assume that the remarkably low number and the qualitatively different pattern of phrase-level reductions reflected the patient's speech-motor impairment. However, the exact nature of this relationship is still to be clarified. Against the background of theories dealing with phrase-level reduction phenomena two fundamentally different accounts can be offered: (A) a primary deficit in reorganising canonical forms, directly resulting from the apraxic pathomechanism, (B) a secondary adaptation to impaired speech-motor skills.

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Presented by: **Staiger, Anja**

102. Bilingual Advantage in Lateralized Attention: Evidence from a Dichotic Listening Task

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Introduction
It has been suggested that the management of two or more languages in a single brain can have beneficial effects on prefrontally mediated executive functioning. In particular, positive effects of bilingualism have been found for executive tasks requiring inhibition of interfering irrelevant information (Bialystok, Martin & Viswanathan, 2005). We investigated the possible effects of bilingualism on dichotic listening (DL) using the forced-attention paradigm and syllabic stimuli (Hugdahl & Andersson, 1986). Besides the standard non-forced (NF) condition that typically yields right ear advantage indicating left-hemispheric language dominance, the paradigm includes forced-right (FR) and forced-left (FL) attention instructions that call for directed (lateralized) focus of attention to either the right or the left ear stimulus and ignoring information coming to the other ear. The FL condition is particularly demanding, since the instruction is to work against the perceptual asymmetry that creates the right-ear asymmetry effect. If bilinguals have better executive cognitive skills, they should show better performance for the FR and in particular the FL condition than monolinguals.

Methods
Finnish monolinguals and early simultaneous Finnish-Swedish bilinguals from two age groups served as subjects. The younger group (30-50-year-olds) consisted of 18 monolinguals and 17 bilinguals and the older group (60-80-year-olds) of 14 monolinguals and 16 bilinguals. In the DL task, consonant-vowel (CV) syllables (36 syllable pairs per condition) were dichotically presented. While listening to the syllables, participants directed their attention either to the right (the FR condition) or to the left ear stimulus input (the FL condition), according to task instructions. In the non-forced (NF) condition the subjects were asked to listen to the syllables presented and then report which syllable they could hear more clearly, without any explicit instructions about direction of attention.

Results and Discussion
Overall, the bilinguals had more correct responses, although both groups exhibited a similar right-ear advantage in the NF condition (Fig.1). More importantly, the results yielded a significant group (bilinguals, monolinguals) x condition (NF, FL, FR) x ear (left, right) interaction. This stemmed from the bilinguals showing an advantage for the attended ear in the FL and FR conditions. In line with the hypothesis, the bilinguals had an advantage in the FR and FL conditions that allowed them to direct attention and ignore task-irrelevant stimuli. This suggests a bilingual advantage in a language-related cognitive executive task.

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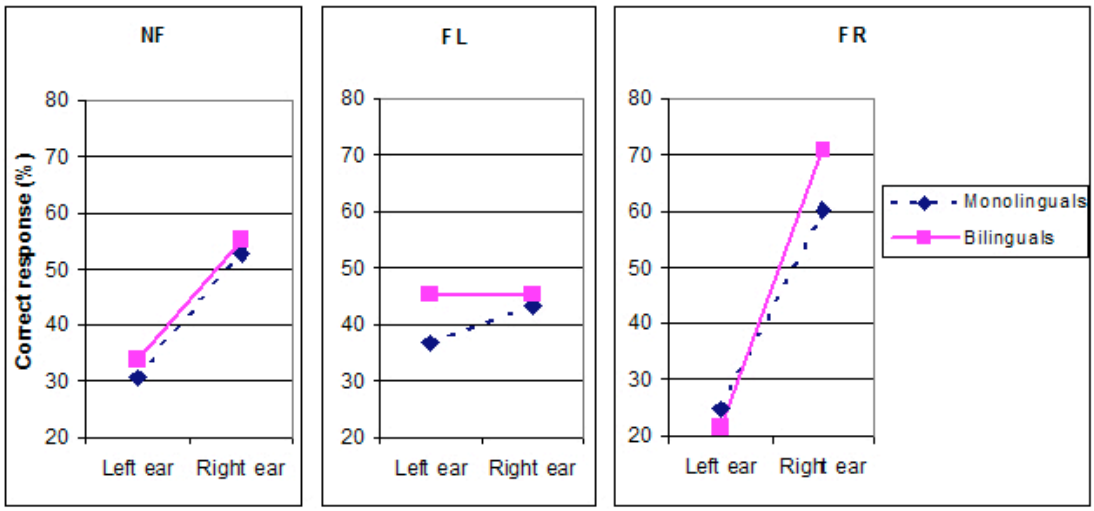

Figure 1. Average percentage of correctly reported syllables per ear in bilinguals and monolinguals (age groups collapsed), in the three attention conditions.

Presented by: **Laine, Matti**

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103. The Neural Bases of Phonological Competition: Evidence from Aphasia

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Statistical properties of words affect how readily a listener or speaker accesses them. For example, high density words similar in sound structure to many other words exhibit slower reaction times in a lexical decision task than low density words with fewer phonological 'neighbors' (Luce & Pisoni, 1998). Behavioral and fMRI experiments with brain-injured and normal subjects have implicated the left parietal region as a neural structure sensitive to phonological competition in word production and recognition (Apfelbaum et al., 2007; Prabhakaran et al., 2006). This ongoing study utilized an eyetracking paradigm to examine the role of frequency and density during the time course of lexical access in three Broca's aphasics with left frontal lesions and four patients with left parietal lesions (two Wernicke's aphasics, two Conduction aphasics). Control subjects included 21 young normals and eight age-matched controls. In each trial, participants viewed four pictures on a touch-sensitive monitor, listened for a word, and touched the corresponding picture while an SMI Eyelink I tracker monitored their eye movements. Trials contained items from different frequency/density categories; for example, a high frequency/high density target (e.g., brain) appeared with a high frequency/low density, low frequency/high density, and low frequency/low density foil (e.g., church, log, and fox). All groups were predicted to show a frequency effect with a higher proportion of looks to high versus low frequency targets. It was hypothesized that control participants and patients with frontal lesions would show a normal density effect while patients with parietal lesions would show no such effect.

All subject groups showed a greater proportion of looks to high than low frequency targets; patient frequency results are displayed in the top row of Fig. 1. Control participants also showed significantly higher proportions of looks toward low rather than high density items, demonstrating the competitive effects of phonological neighbors. As hypothesized, parietal patients failed to show a density effect. In contrast to the hypothesis, Broca's aphasics also demonstrated no density effects, as displayed in the bottom row of Fig. 1. These findings raise the hypothesis that phonological competition modulates access to the conceptual representations of words, supporting the view that frontal structures are recruited in selecting among competing semantic alternatives (Thompson-Schill et al., 1997).

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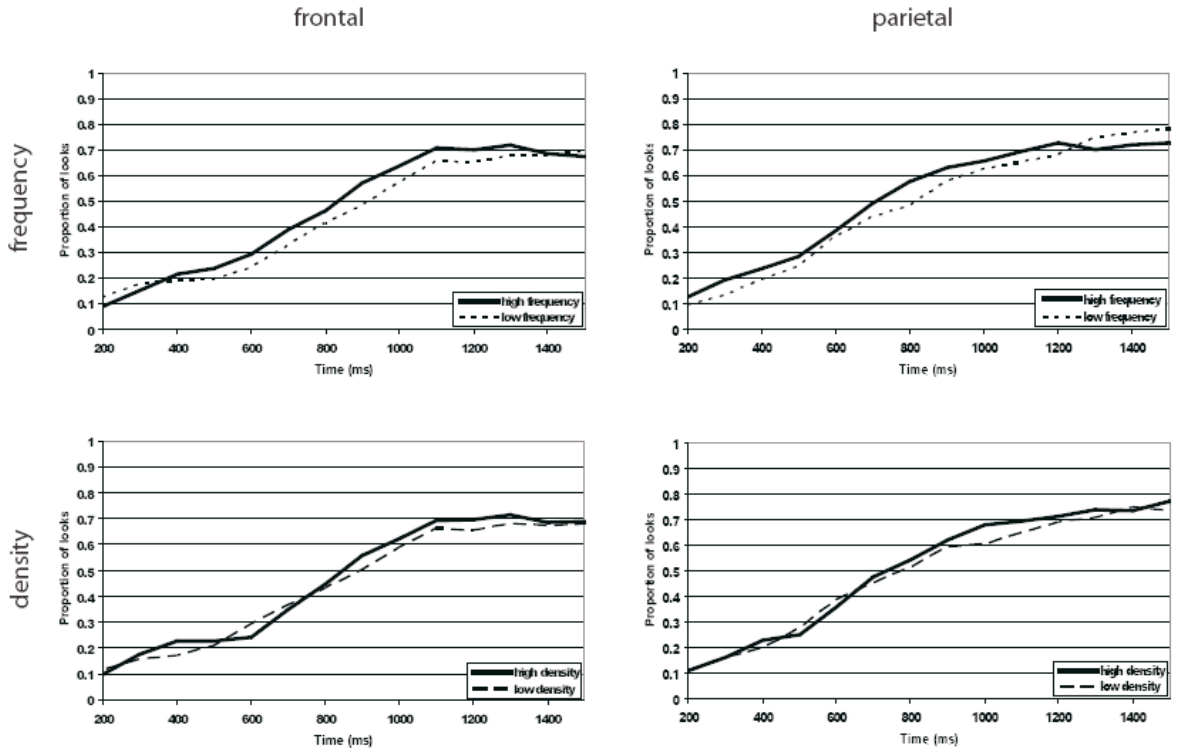

Presented by: **Sweeney, Carol**

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104. Lexical and Post-Lexical Deficits in Bilingual Anomia

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Introduction
Traditional cognitive models of spoken word production distinguish among three major stages in the process of word retrieval: semantic stage, lexical stage and phonological stage (Levelt, Roelofs, & Meyer, 1999). Consequently, word retrieval deficits appear in different forms, depending on which stage of word retrieval is

damaged, and three types of anomia are distinguished: semantic anomia, lexical or pure anomia, and phonological anomia (Laine & Martin, 2006).
In this study we report on the oral production of an early, and highly proficient, Basque-Spanish bilingual (AF) with lexical and phonological anomia attributable to aphasia. Her good performance across several tasks suggests target-like linguistic comprehension and perception at lexical and post-lexical levels. However, several target-deviant features of her spontaneous oral production reveal some deficit at lexical and post-lexical phonological levels. The goal of this presentation is to analyse the lexical and post-lexical deficits in order to provide new evidence regarding the levels of representation of phonological information.

Method and Results
Spontaneous production data and data obtained experimentally through a picture naming task, both point in the same direction: the bilingual participant performs better in Spanish, the more frequently used language, than in Basque, although both languages were acquired at an early age. First, lower frequency of filler words in her spontaneous speech, as well as shorter reaction times and lower frequency of lexical errors in the picture naming task reveal more efficient lexical access in Spanish than in Basque. Second, fewer phonological paraphasias are attested in the spontaneous and elicited linguistic production in Spanish, which indicates better performance than in Basque also at the phonological level.
Furthermore, detailed analyses were carried out in order to detect the variables which have an effect on lexical and post-lexical deficits. In both languages lexical deficit appears to be sensitive to lexical frequency (low frequency names correlate with longer RTs and higher rate of lexical errors), but not to neighbourhood density. In contrast to this, phonological deficit is sensitive to phonological factors such as featural information (75% of the substitutions differ in a single phonological feature), typological markedness (tendency for unmarked characteristics to predominate) and syllable constituency (90% of the paraphasias contain target-like metrical properties).

Conclusion
All these results provide new evidence about the separation of lexical and post-lexical phonological information in word retrieval processes (Goldrick & Rapp, 2007). Moreover, the fact that Spanish, the more frequently used language, appears to be less affected as compared to Basque poses new questions about the representation of lexical and phonological systems in the bilingual brain (Paradis, 2004).

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Presented by: **Munarriz, Amaia**

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105. On the Role of Rapid Temporal Processing in Pure Word Deafness

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Pure word deafness (PWD) is characterized by severely impaired speech perception despite good hearing ability and preserved functioning in other language domains (e.g., reading, writing and speaking). Despite its rarity, PWD has attracted considerable attention because of its specificity to speech sounds. ‘Pure’ cases of PWD show dissociations not only between speech perception and other types of linguistic processing but also between perception of speech stimuli and other complex auditory stimuli. The case reported here shows exactly this pattern: severely impaired speech perception despite relatively preserved reading, writing and speaking ability, as well as preserved perception of complex environmental sounds (Bozeat et al., 2000) and musical pitch.

Although PWD typically results from bilateral damage to the posterior superior temporal lobes, or more rarely from damage to the left superior temporal lobe combined with damage to inter-hemispheric connections, this patient has only unilateral left temporal and parietal lobe damage, including superior temporal gyrus, supramarginal gyrus, and angular gyrus. Not only does he have an intact right hemisphere, but he also has preserved white matter tracts connecting the two hemispheres as shown by diffusion tensor imaging. This pattern suggests a crucial role played by the left superior temporal regions in speech perception, perhaps reflecting a specialization for the processing of rapid temporal aspects of the speech signal (cf. Stefanatos, Gershkoff, & Madigan, 2005).

To test this account, this patient's ability to discriminate between stimuli differing in rapid temporal vs. spectral dimensions was assessed with synthesized stimuli (modeled on Joanisse & Gati, 2003). Temporal discrimination ability was assessed with both synthesized consonants (speech condition) and closely matched sinewave sweeps (non-speech condition), with fast (20 ms), normal (40 ms), or slowed (60 ms) formant transitions. Spectral discrimination ability was assessed with synthesized vowels (speech condition) and sinewaves matched to the vowel formant pitch differences (non-speech condition). As predicted, the patient showed worse processing of rapid temporal than spectral stimuli in both speech and non-speech stimuli, especially for the fastest transitions. However, he also showed considerably worse processing of speech than non-speech stimuli. These data partially support theories of a rapid temporal processing deficit in PWD, but also suggest a specialized role for left-hemisphere processing of non-temporal aspects of speech complexity.

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Presented by: **Slevc, L. Robert**

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106. Acoustic and Linguistic Influences on Auditory Extinction

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Extinction occurs when the presence of one stimulus results in the perceptual loss of another stimulus presented closely in time. The phenomenon has been shown within several sensory modalities, but extinction of verbal information is well reported amongst brain-damaged individuals (Sparks, et al. 1970). While normal listeners typically show a right ear advantage for linguistic stimuli, brain-damaged individuals sometimes exhibit contralesional ear extinction in dichotic listening. Here, we report two experiments to examine whether degree of extinction is sensitive to acoustic and linguistic structure of input, as well as acoustic similarity between inputs from the two ears.

Experiment 1 included two brain-damaged individuals with receptive language deficits. DMN and JCE had left superior temporal infarcts extending from Heschl's Gyrus to the temporo-parietal junction in DMN's case, and further into the parietal lobe in JCE's case. FMRI indicated abnormal or absent auditory input to the left hemispheres.

In this experiment, DMN and JCE were instructed to direct attention to their right ears and report the number word heard in that ear by selecting from five numbers displayed. On each trial, a target digit was presented to the attended right ear and a distractor stimulus to the to-be-ignored left ear. Distractors included female-voiced linguistic stimuli (monosyllabic words, digits, letters) and nonlinguistic stimuli of varying acoustic complexity (noise, tones, sinewave

tones with noise, spectral ripples with syllabic envelopes). Target digits were spoken by a female speaker in one administration and a male speaker in another. Results (Table 1) indicated that linguistic distractors produced increased extinction relative to nonlinguistic distractors. This effect was compounded by acoustic similarity (as manipulated by speaker gender) between the target and the distracter.

Experiment 2 was designed to test whether the linguistic effect on extinction in Experiment 1 was due to linguistic influence or the greater acoustic complexity of the linguistic distractors. This experiment used sine wave speech (SWS) tokens (sine wave approximations of the first three formants from eight words). On first listen, these sound like nonlinguistic chirps, but with familiarization, they sound like the words they were generated from. The procedure was: (1) measure degree of extinction generated by SWS tokens, (2) familiarize participants with these tokens until they were easily recognized as words, and (3) measure degree of extinction with familiarized and nonfamiliarized SWS. The prediction is that if the effect is linguistic rather than acoustic, there will be greater extinction for familiarized vs. non-familiarized SWS distracters. A similar task as in Experiment 1 was used and (to date) JCE participated in the experiment. The results indicated that, while the words from which the SWS were constructed produced extinction, SWS did not, regardless of familiarization.

Taken together, the two experiments suggest that auditory extinction of language was most driven by acoustic complexity and similarity, rather than linguistic factors. These results will be further discussed with respect to mechanisms of extinction, and types of damage responsible for extinction in language-impaired individuals.

R. Sparks, H. Goodglass, B. Nickel, in Cortex. (1970), vol. 6, pp. 249-60.

	female target		male target	
	JCE	DMN	JCE	DMN
linguistic distracter	55.0%	68.3%	93.3%	88.3%
nonlinguistic distracter	98.8%	90.0%	97.5%	98.8%

Table 1. Percent correct for right ear target identification from Experiment 1. In all manipulations, the target voice was female. It should be noted that control participants, as well as DMN and JCE when attending to their left ears, were almost exclusively at ceiling performance across all tasks reported here.

Presented by: **Wolmetz, Michael**

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107. Neuro-Cognitive Processing of Pitch and Speech Rate Cues to Emotion: Evidence from Brain-Damaged Patients

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There has been a long standing debate on the cerebral mechanisms involved in the processing of emotional information from the vocal cues or speech prosody. As summarized by Schirmer & Kotz (2006), decoding emotional prosody involves a multistep process that requires bilateral contributions (Schirmer & Kotz, 2006). Therefore, to extend our understanding about the role of the two hemispheres in processing emotion information from prosody, this study examined the effects of right and left hemisphere damage at the stage of acoustic processing to infer emotional meaning from prosody. The current study employed a discrimination task to analyze the ability of the left hemisphere damaged (LHD) and the right hemisphere damaged (RHD) patients to infer differences in the emotional meaning from the two utterances that have been manipulated using the two most critical acoustic cues for emotion perception - pitch and speech rate. The two cues were systematically manipulated in such a manner that the participants had to attend to the changes in the acoustic cues to arrive at the emotion judgments.

Nine LHD, eight RHD and 10 age-matched healthy control (HC) participants were administered discrimination task

using pseudo-utterances spoken in three emotion contexts – happy, fear and sad. Participants were presented a pair of utterance in three cue contexts: pitch, speech rate and no change conditions. For pitch and speech rate condition, the two utterances in a pair differed by the corresponding acoustic cue only, therefore, to perceive the distinction between the two utterances it was required to detect the difference in the acoustic properties of the two utterances. For example, in pitch condition, the pitch of one of the utterances in the pair was manipulated such that either it was higher or lower than the other. Both the utterances were same in the no change condition. The discrimination task entailed the participants to listen to two utterances that would differ only in acoustic manifestation of the utterance and the listener had to specify which utterance was a better exemplar of a pre-defined emotion category. In addition, participants were required to do an emotion categorization task for emotional prosody, emotional verbal scenarios and facial expressions.

For the discrimination task, there was a highly significant interaction of acoustic cue by participant group. Both RHD and LHD participants were not able to take advantage of the manipulated pitch and speech rate cues relatively in a similar manner as the HC participants, who performed better in pitch as compared to the speech rate condition. Moreover, the RHD group performed worse than the HC group in the no change condition. Interestingly, in other categorization tasks, both patient groups performed well except in recognizing emotions from prosodic cues relative to the HC group. Thus, these findings implicate that vocal emotion processing extends beyond the right hemisphere and both the hemispheres seem to contribute in decoding emotion information from pitch and speech rate cues.

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Presented by: **Dara, Chinar**

Poster Session 3: Lexical Access

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108. Neural Correlates of Improved Picture Naming in Aphasia

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Introduction
Recent brain imaging results indicate that contributions of both hemispheres to recovery of aphasic word processing deficits are complementary (Zahn et al., 2006). The left hemisphere appears to be more essential in patients with better/faster recovery, the right hemisphere in patients with slow/limited recovery. Lesion site and extension appear to be important factors restricting the degree of recovery. More research is required to further illuminate which patient and treatment variables determine outcomes and associated brain reorganization patterns (e.g., Crosson et al., 2007). Here we present our first results on the neural correlates of improved naming after cueing-therapy in a single case with functional magnetic resonance imaging (fMRI).

Methods
BB (female, 49 years old) presented with a chronic transcortical-sensory aphasia after rupture of an MCA aneurysm resulting in an extensive infarct. She was administered two pre-tests (T1, T2) requiring overt naming of 132 pictures, in order to select items with low baseline performance which were attributed to carefully balanced sets representing untrained items (CONTROL; N=30) and trained items (TRAINED; N=2x30). In the subsequent 4-week therapy, BB's attempts to name pictures were assisted by oral cues with increasing semantic or phonological target information. A post-test (T3) was performed the week after training. T2 and T3 were performed inside the scanner

(3T). fMRI data were analysed with SPM5. We present the following contrasts:
(1) All>Rest_T2;
(2) (TRAINED > CONTROL at T2) > (TRAINED > CONTROL at T3);
(3) (TRAINED > CONTROL at T3) > (TRAINED > CONTROL at T2).
All contrasts were thresholded at uncorrected p<.001 (≥ five voxels).

Results and Conclusion
Before therapy (T2), BB only produced 20 of the 90 eventually selected items correctly, yielding perilesional and contralateral brain activations for naming in general (see Fig. 1A). After therapy, there were significant improvements for TRAINED (McNemar Test, one-tailed, p<.05) but not for CONTROL items (p>.05). Regarding activations specific to training-induced changes, activation maxima before treatment included bilateral cerebellum, left SMA, precentral, superior temporal, middle occipital, and fusiform gyrus (Fig. 1B). After treatment, right inferior parietal (BA 40), right middle temporal, and left postcentral gyrus were involved (Fig. 1C).
To conclude, items difficult for BB elicited brain areas related to planning and execution of word production and visual(-semantic) regions. After effective training, these items yielded right hemisphere areas related to lexical processing. Therefore, training-induced improvements in case of BB strongly relied on right hemisphere compensation.

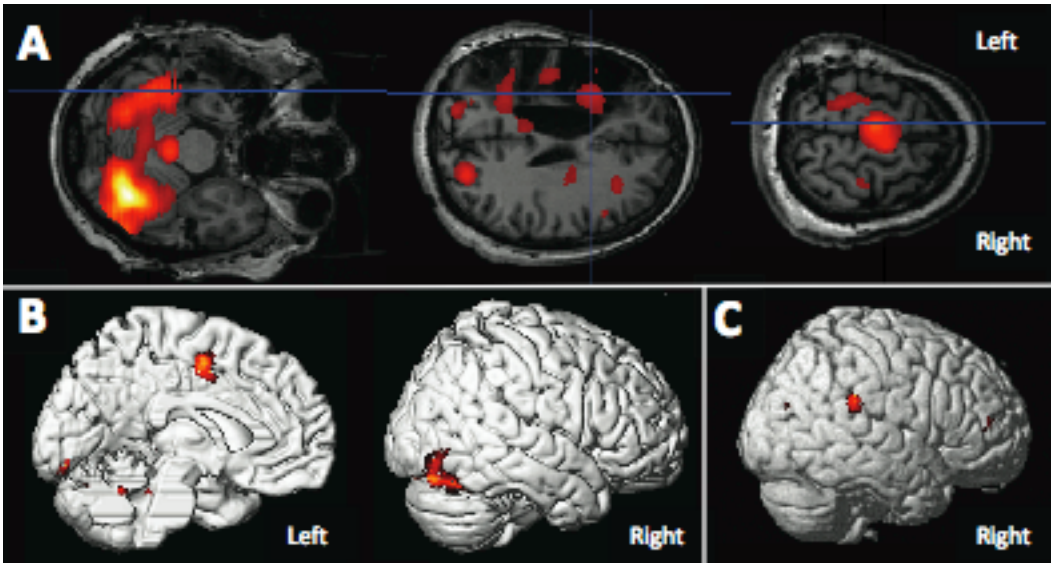

Fig. 1: Increased activations for naming in general (A; contrast 1) rendered onto BB's brain, and specific to TRAINED items before treatment (B; contrast 2) versus after treatment (C; contrast 3) rendered onto a standard brain (all uncorr., p<.001)

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Presented by: **Abel, Stefanie**

109. Contrasting Word Retrieval Treatments for Semantic Anomia

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Errorless naming treatment for aphasia (ENT, Fillingham et al., 2005) encourages verbal production of target words through maximal support provided in a repetition/oral reading format. Gestural (GES) facilitation of naming pairs verbal and gestural modalities to enhance verbal production (Raymer et al., 2006). Neither treatment has been carefully evaluated for effects in semantic anomia where treatment response tends to be more limited than in phonologic anomia. The purpose of this study was to compare the effects of modified versions of ENT and GES for semantic anomia.

Participants
We investigated two right handed women with aphasia subsequent to left hemisphere stroke (P802: 67 yrs, 16 mos post stroke; P804: 78 years, 6 months post stroke). In standardized and experimental testing both had Broca's aphasia, severe limb apraxia, and pronounced comprehension and naming impairments indicative of semantic anomia.

Treatment Design and Methods
In a single-participant crossover design, we probed picture naming and gesture production for three matched sets of 24 nouns used for ENT, GES, and untrained pictures. Following baseline sessions, participants were randomly assigned to receive ENT followed by GES over 20 treatment sessions. Results were graphed and effect sizes (d) were calculated if possible. An effect size >5.8 was considered large (Beeson & Robey, 2006). Standardized tests and a communication rating scale were repeated after each training phase.

Results
Improvements in picture naming for both participants were greater during ENT than GES (Table 1). Much of the effect of Phase 1 ENT declined during Phase 2 GES, however. Both participants demonstrated large increases in gesture use following GES; P802 generalized gesture production to untrained pictures as well.

Standardized testing at the completion of training indicated improvement beyond the standard error of measurement on the Western Aphasia Battery for P802 (+13.5) and P804 (+5.7), largely due to increases in auditory comprehension and naming. Increases were also noted for P802 on a communication scale (Lomas et al., 1989).

Discussion
In these individuals with severe semantic anomia, contrasting patterns of improvement were evident in the two word retrieval treatments. ENT led to improvements in picture naming while GES led to large gains in gesture production. GES nonetheless led to notable improvements in communication abilities in standardized testing and on a communication rating scale.

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Table 1: Mean % correct, standard deviations, and effect sizes (d) across treatment phases (*estimated; bold = large effect sizes).

	P802		P804	
Baseline	Mean	S.D.	Mean	S.D.
ENT Set - Naming	8.4	5.9	27.5	9.6
GES Set - Naming	2.1	2.4	25.8	13.0
Control Set - Naming	0	0	25.0	15.6
ENT Set - Gesture	0		0	
GES Set - Gesture	1.1	2.1	0	
Control Set - Gesture	0		0	
Errorless Training Phase 1	Mean	d	Mean	d
ENT Set - Naming (trained)	50.0	7.19	62.5	3.65
GES Set - Naming (untrained)	10.5	3.57	35.4	.74
Control Set - Naming (untrained)	0	0	20.9	-.26
ENT Set - Gesture (trained)	0		0	
GES Set - Gesture (untrained)	0	-.52	0	
Control Set - Gesture (untrained)	0		0	
Gesture Training Phase 2	Mean	d	Mean	d
ENT Set - Naming (maintenance)	31.3	-3.19	41.7	-3.53
GES Set - Naming (trained)	12.5	.23	25.0	-.50
Control Set - Naming (untrained)	0		29.2	1.41
ENT Set - Gesture (untrained)	52.1	24.81*	72.9	34.7*
GES Set - Gesture (trained)	100	47.62	0	0
Control Set - Gesture (untrained)	70.9	33.76*	0	0

Presented by: **Raymer, Anastasia**

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110. Double Dissociation of Word and Number Processing in Auditory and Written Modalities: A Case Study

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Past research has identified various cognitive/neural aspects where number and word might be processed differently, such as conceptual processing (Butterworth et al., 2001; Cappelletti et al., 2008) and oral production (Marangolo et al., 2005).

Here we report an individual who shows reverse patterns of dissociations between number and word processing in two modalities (auditory recognition and written production). ZY suffered from large left-hemispheres lesion due to a car accident. A series of experiments was carried out to assess his word and number processing functions across the three modalities: auditory recognition, visual recognition, and written production (see Figure 1 for details about the tasks). Oral production assessment was not included due to his severe impairment. We carefully matched the simple words and number stimuli on a range of psychological variables including frequency, length, and visual complexity (e.g., stroke numbers). The same tests were given to five age- and education-level matched healthy controls.

The results were summarized in Figure 1. We evaluated whether ZY's performances were significantly impaired in

comparison to controls and whether there were significant dissociation between words and numbers (Crawford & Garthwaite, 2005.) In visual recognition, he was comparable with controls, and no word-number dissociation was observed. In auditory recognition, his performance in all word tests was comparable with controls, and in all number tests he was significantly worse than controls. The dissociation between numbers and words were significant. In written production, he was perfect in writing Arabic numbers and number words when no auditory input is involved (in writing-to-cues) whereas his word writing ability was significantly worse than controls. The dissociation between words and number writing was significant.

To sum up, ZY shows double dissociation between word and number processing in two modalities: he is better at words than numbers in auditory recognition and better at numbers than words in written production. This case profile adds further evidence to the functional/neural segregated number and word processing systems. In combination with his lesion characteristics, it might be speculated that the functional lateralization of information being processed (numbers vs. words) interacts with the processing modality.

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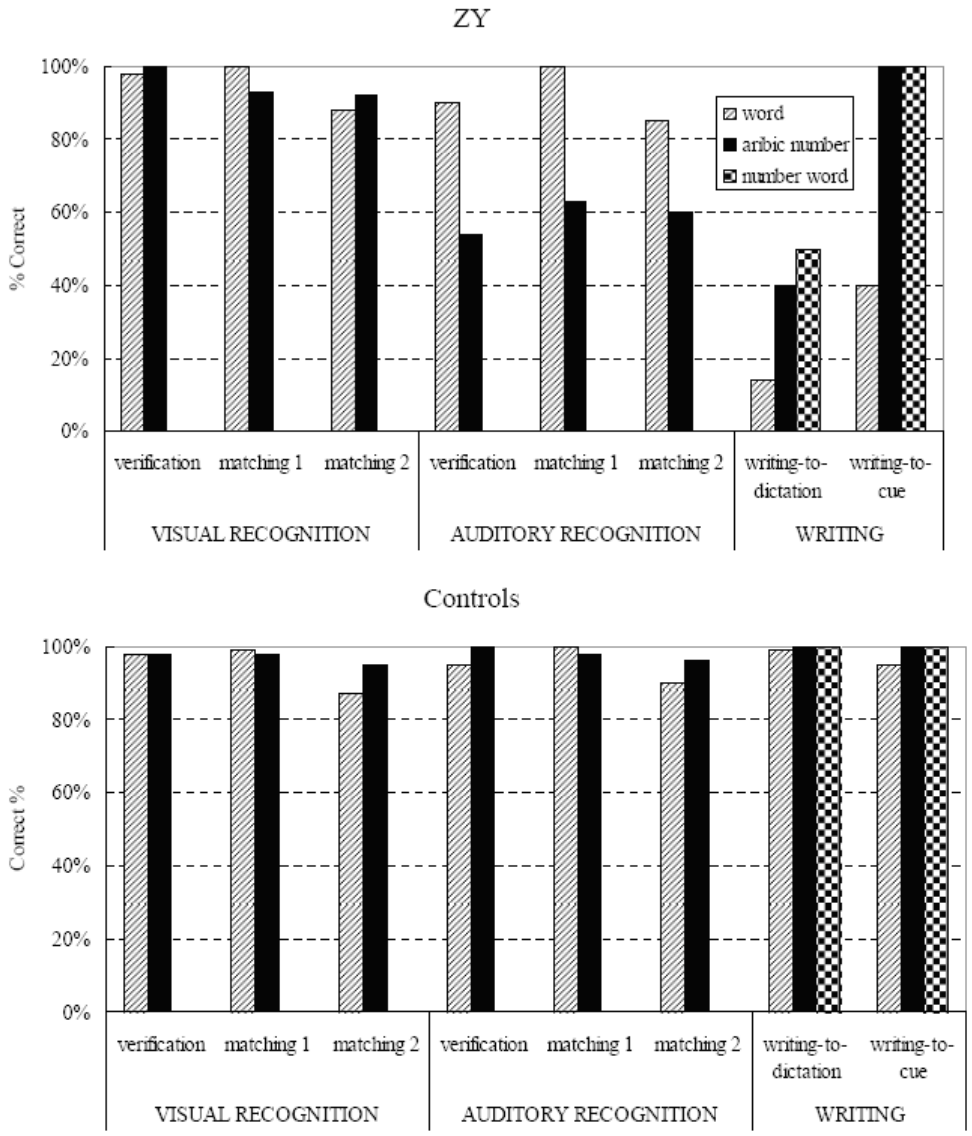

Figure 1. Performances of ZY and controls on various word and number processing tasks. Visual/Auditory comprehension: 1) Verification: verify whether the visual word or Arabic number matches the object picture or the value of a cash picture (with the number clipped out); 2) Matching 1 & 2: judge which of the two bottom items that is more closely associated with the top item, in meaning (word), or in value (number). Writing: 1) writing to dictation: write down the word or number (Arabic or number words) upon dictation; 2) writing-to-cues: for words, the subject hears a compound word ("tea-pot") and is given the first written character ("tea") followed by a blank, he needs to write in the blank the second character ("pot"); for numbers, a written number (Arabic or number word) is presented and the subject writes down the following number in the other format (number word or Arabic).

Presented by: **Bi, Yanchao**

111. Re-Assessment of Semantic Control Deficits in Stroke Patients using Blocked-Cyclic Naming and Comprehension Tasks

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A recent theory of conceptual representation (e.g., Jefferies et al. 2007) proposes two cognitive and neurological origins for semantic impairments following brain damage: the disruption of a semantic knowledge "hub" in the anterior temporal lobes (semantic dementia) and an inability to select appropriate semantic information from multiple sources, described as a deficit in a semantic control network distributed across multiple brain regions (stroke aphasia).

Support for this proposal comes from blocked-cyclic naming and comprehension tasks. In blocked-cyclic naming (Schnur et al., 2006), subjects repeatedly name blocks of semantically related or unrelated pictures. In the comprehension variant, the task is to repeatedly match a word to one of several pictures. Jefferies et al. (2007) observed that stroke patients with semantic deficits showed "refractory effects" in both tasks in either errors or response times (e.g., decreasing performance across repetitions and/or an increasing effect of semantic relatedness with repetition). The authors concluded that such effects are indicators of poor semantic control. However, patient performance was not compared to controls and controls demonstrate some effects in response times (e.g. Schnur et al., 2006; Biegler et al., 2008). Therefore it is unclear whether the stroke cases behave differently from controls, and thus if the same mechanism underlies the semantic impairments in production and comprehension.

In the present study, we assessed performance of four stroke patients with distributed lesion patterns and various levels of semantic performance and one semantic dementia patient on the naming and comprehension tasks relative to that of matched controls (N=6). To avoid the influence of picture naming in the comprehension task, we opted for an associative matching variant (see Biegler et al, 2008), where the task was to choose one out of several pictures that was most closely associated with the target word. Regarding the "refractory" effects in naming, all patients showed a significantly larger increase in semantic blocking across cycles compared to controls. In associative matching, none of the patients showed a significantly different cycle-by-blocking interaction effect from controls. Across both tasks the effect of cycle was mixed.

The lack of difference between our stroke patients and controls in the comprehension task challenge the assumptions that semantic impairments in stroke patients are a consequence of an impaired semantic control function and cyclic naming and comprehension paradigms are sensitive tasks for assessing semantic control. Either the patterns of results from these tests do not reveal semantic control deficits, or semantic impairments in stroke patients are not necessarily due to a disruption of semantic control.

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Presented by: **Bi, Yanchao**

112. Phonological Impairment as a Decay-Based Impairment: New Evidence from a Single Case Study

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Introduction
Computational models of language processing such as the Martin and Saffran (1992) model assume two properties underlying language processing: decay rate of activated representations and strength of activation spread between phonological, lexical and semantic levels of representation. Despite the theoretical and epistemological advantages of these models, as opposed to box-and-arrow type models, empirical evidence for these models is currently based on a very limited number of case studies (e.g., patient NC, Martin & Saffran, 1992; patient CO, Majerus et al., 2001). We present here a new single case study providing further support for the existence of decay rate impairments as an underlying cause of language impairment. Following Martin and Saffran (1992), an abnormally increased decay rate of activated representations should lead, in receptive single word processing tasks, to a reduced impact of phonological variables, as opposed to semantic variables; earlier activated phonological representations will suffer to a greater extent from the severe decay rate, relative to later activated semantic representations.

Methods
We tested these predictions in MF, an aphasic patient with a left hemisphere ischemic lesion and subtle speech comprehension impairments. MF was administered nonword and word repetition tasks, auditory lexical decision tasks with target words being preceded either by phonologically or semantically related primes, and a synonym judgment task for high and low imageability word pairs. If a decay impairment is leading to a reduced effect of phonological variables, then a semantic priming but not a phonological priming effect should be observed in lexical decision tasks. Furthermore, single word repetition and synonym judgment performance should be affected by semantic variables. Finally, speech perception abilities were assessed via a minimal pair discrimination tasks with half of the pairs being temporally slowed; in the case of a decay rate impairment, slowed stimuli should lead to even greater impairment than natural stimuli.

Results
In lexical decision, MF showed a severely reduced phonological priming effect while the semantic priming effect was in the normal range (see Table 1). In the synonym judgment task, MF also showed a normal advantage for judging high imageability word pairs. Word repetition performance for high imageability words was perfect, but a mild impairment was observed for low imageability word repetition. The most severe impairment was observed for nonword repetition. Minimal pair discrimination performance was most impaired for the temporally slowed speech stimuli.

Table 1.

		MF	Control ranger (N=15)
Auditory lexical decision			
	Size of phonological priming effect	23 ms *	104 ms - 283 ms
	Size of semantic priming effect	88 ms	79 ms - 124 ms
Judgement of synonyms			
	Size of imageability effect	374 ms	301 ms - 425 ms
Single word repetition			
	High imageability (accuracy)	98%	98,8 % - 100 %
	Low imageability (accuracy)	94%	98,8 % - 100 %
Single nonword repetition			
	Accuracy	62%	92,3 % - 97,6 %
Minimal pair discrimination			
	Consonant oppositions	99 %	96,9 % - 100 %
	Vowel oppositions	91,8 %	91,3 % - 100 %
Minimal pair discrimination (Accelerated speech rates)			
	Consonant oppositions	64,3 % *	79,7 % - 92,8 %
	Vowel oppositions	78,6 % *	82,9 % - 91,1 %

** : indicates performance significantly different from controls according to the modified t-test by Crawford & Garthwaite, 2005*

]

Conclusion
MF illustrates the conceptual parcimony of computational accounts of language processing, a single decay rate impairment accounting for a conjunction of language processing deficits, where box-and-arrow models such as the logogen model would need to posit the simultaneous existence of multiple deficits at the level of speech perception, phonological processing and lexical-semantic access.

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Presented by: **Martinez Perez, Trecy**

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113. Longitudinal Naming Performance in a Bilingual Patient with Primary Progressive Aphasia

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Introduction
How language is represented in the brains of bilinguals remains an open question. Research related to this question typically employs neuroscience techniques (fMRI, ERP) with neurologically-intact bilinguals or behavioral studies involving bilingual patients with aphasia. Reports of bilingual patients with Primary Progressive Aphasia (PPA), a degenerative language disorder, are rare (e.g. Filley et al. 2006), yet may offer a unique learning opportunity through longitudinal analysis. Here we examine the progressive decline of naming in the two languages spoken by a

bilingual patient with PPA, and the effects of treatment in one language on naming performance in the other language.

Case Report
AND, a 61-year-old woman, was diagnosed in April, 2006 with PPA. A PET scan with CT fusion showed asymmetric decrease in metabolic activity of the left parietotemporal cortex. AND was born in Norway where she lived until the age of 21. Her first language was Norwegian. Her second languge, English, was learned in grade school. She completed college in Norway and obtained a graduate degree after moving permanently to the US in the 1960s. She worked as an elementary school teacher until 2000, then as an office manager for a medical practice. Although English has been her primary language for the past 40 years, she has continued speaking Norwegian regularly. AND has multiple weekly phone conversations, in Norwegian, with her sisters, and spends one month every year in Norway speaking only Norwegian. Thus she is an ideal person in whom to study the decline of naming in two languages, both of which she uses constantly and in both of which she is highly skilled.

Method
Two picture exemplars of each of one hundred fifty-six objects were presented for naming. All pictures had high name agreement from 56 English-speaking control subjects. The Norwegian word for each of these objects was provided by author CBE, an American who is a professional Norwegian/English translator in Norway.
AND named each picture in English and Norwegian on separate days. Two matched subsets of the pictures named correctly in both languages (Baseline) were chosen: one for training in English only and the other as an untrained control. Training consisted of naming and transcribing the name of each picture. Training continued at home and in the clinic for 12 months.

Results and Conclusion
One year later, naming accuracy in both languages was at 72% for the untrained items, but at 92% in both languages for the trained items. Of the six untrained items missed in each language, one was missed in both languages; five items were missed in English but not Norwegian, and five were missed in Norwegian but not English. These results, and the 18-month results (to be obtained in October) will be discussed in terms of current notions of the representation of language(s) in the bilingual brain.

Filley, C.M., Ramsberger, G., Menn, L., Wu, J., Reid, B.Y., & Reid, A.L. (2006). Primary progressive aphasia in a bilingual woman. Neurocase, 12, 296-299.

	Trained (in English)		Untrained	
	Baseline	One year post	Baseline	One year post
ENGLISH	25	23	22	16
NORWEGIAN	25	23	22	16

Number of items named correctly

Presented by: **Friedman, Rhonda**

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114. ERP Correlates of New Word Learning in Two Aphasic Patients

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Introduction
Although the majority of the words in the adult speaker's lexicon have been learned many years earlier, even an adult still acquires new lexical entries during everyday life. Most neuroimaging studies analyzing new word learning

with healthy subjects (McCandliss et al., 1997; Raboyeau et al., 2004; Grönholm et al., 2005) indicate that newly learned words activate a cortical network similar to the one implied in producing words that have been in our lexicon for a while. The question we seek to analyze here is whether the processes underlying word production are the same for real words and for newly-learned words in patients with left hemisphere lesion who recovered from severe anomia.

Method
Two well-recovered chronic aphasic subjects (P1 and P2) and a control group of 10 healthy subjects undertook the new-word-learning task. Pseudo-words were associated to abstract drawings, which minimizes the semantic processes and maximizes learning a new phonological form. High density EEG was recorded during picture naming at the beginning of the learning phase and after successful learning as well as during real (familiar) picture naming. Epochs from 0 to 600ms relative to picture onset were averaged for each subject.

Results
At the last session the patients reached respectively 63% and 79% of correct production of the newly learned pseudo-words.
The ERPs were subjected to waveform and to topographic analyses. The first (unsuccessful) and the last (successful) recording sessions were compared and the successful pseudo-word production was compared to real picture naming. Results revealed differences in amplitudes and topographic maps (see Figure 1) between the first and the last recording in both patients starting at about 300 ms after picture onset.

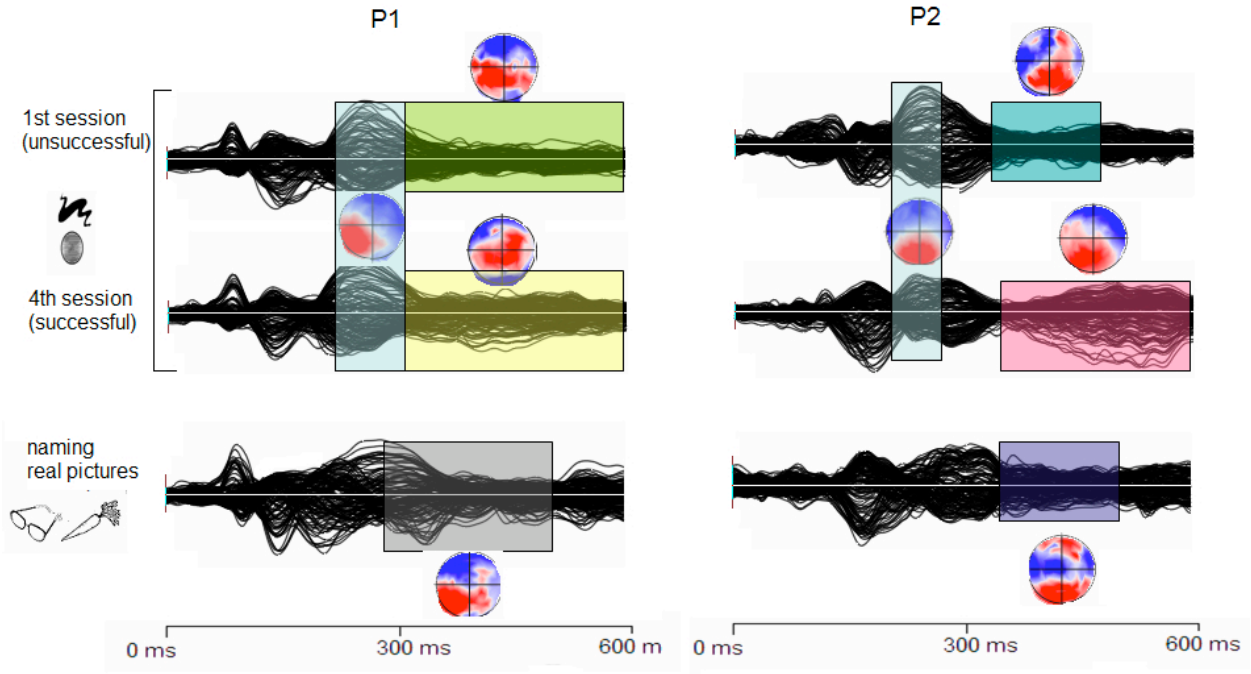

Figure 1. Grand average ERPs (128 electrodes) and topographic maps diverging between the 3 recording data.

In comparison with real word naming, a different topographic map appeared in approximately the same time-window in both patients, as well as an earlier difference (from about 230 to 300 ms) with the two pseudo-word recording sessions.

Discussion
A map substitution in the successful new-word production relative to the pre-learning recording session was also observed in the control group. However, differently from the patients, in the comparison with real word production the control group displayed the same topographic map as in the successful new-word production data. By contrast, a different topography was observed in the 350-600 ms time-windows in the two patients, suggesting that different processes underlie the production of newly learned pseudo-words and of (real) words after stroke.

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Presented by: **Laganaro, Marina**

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115. Lexical Competition Effects in Nonfluent Aphasia: Converging Evidence from Three Different Tasks.

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In some individuals with nonfluent aphasia, word production may be powerfully influenced by contextual factors. For example, when a series of pictures is repeatedly presented, their naming accuracy may drop dramatically across repetitions, particularly when the pictures are semantically related (e.g., Schnur et al., 2006). Such effects suggest an abnormal susceptibility to lexical competition. However, other, task-specific factors may also play a role. In this study, we tested two Broca's aphasics (JHM and BY) on three very different word production tasks, all designed to induce competition during lexical selection.

Method
Participants were patients JHM and BY, and a group of older controls. JHM and BY both exhibited a similar profile, characterised by: a) fragmented and effortful spontaneous speech; b) mildly impaired picture naming; and c) normal to borderline performance on lexical-semantic comprehension tasks.
There were three picture naming tasks. In the paced cyclic naming task, (Cyclic task), sets of six pictures were presented repeatedly; each set was cycled through four times in varying order (e.g., cat, dog, sheep, pig, goat, horse, sheep, dog...). Picture sets were either semantically blocked or unrelated. In the picture-word interference task (PWI task) pictures were accompanied by an auditory distractor word, which was semantically related, phonologically related or unrelated to the picture name. Distractors were presented at four different onsets -200 ms (distractor before picture), 0 ms, +200 ms or +400 ms. In the picture pair naming task (Pairs task), two pictures had to be named using a single phrase (e.g. "nose and mouth"). Pairs were semantically related, phonologically related or unrelated.

Results
Results are summarised in Table 1. In the Cyclic task, patients' naming accuracy was significantly and disproportionately affected by semantic blocking, particularly on later cycles through the picture set. A similar detrimental effect was observed in naming latencies.

Task/Measure	Patient JHM	Patient BY	Controls
Cyclic Task:			
Effect of semantic blocking on naming accuracy[a]			
Cycle 1	2.86	3.0	-2.6
Cycles 2-4	12.43	8.83	1.42
Effect of semantic blocking on naming latency[b]			
Cycle 1	2.59	-11.95	-0.43
Cycles 2-4	16.50	13.44	3.77
PWI Task:			
Semantic relatedness effect[b]			
Early Presentation onsets (-200 to 0ms)	-12.39	-15.77	-8.03
Late presentation onsets (+200 to +400 ms)	-13.18	-8.82	-1.98
Phonological relatedness effect[b]			
Early Presentation onsets (-200 to 0ms)	-13.12	-21.81	1.01
Late presentation onsets (+200 to +400 ms)	-12.83	10.65	-0.60
Pairs task:			
Semantic Relatedness effect[b]	19.49	17.15	-0.55
Phonological Relatedness effect[b]	-2.87	1.21	0.69

Note a. Percentage decrease in naming scores
Note b. Percentage increase in naming latencies

Table 1

Performance on JHM, BY and controls on the experimental tasks. For each task, percentage change scores are reported for the semantically and/or phonological related conditions relative to unrelated conditions (a positive score indicates interference, negative indicates facilitation).

In the PWI task, patients' naming accuracy remained high throughout, but naming latencies were abnormally affected by the presence of semantically related distractors across all presentation onsets. Phonological distractors also had an inhibitory effect at early presentation onsets, an effect that was never observed in controls. At later onsets, JHM still showed phonological interference, but BY showed significant facilitation.

In the Pairs task, both patients again performed accurately, but their naming latencies revealed significant negative semantic similarity effects. These effects were not observed in controls. There was no significant phonological relatedness effect.

Discussion

Across three very different tasks, manipulations of semantic relatedness had abnormally detrimental effects on JHM's and BY's naming performance. In some tasks, phonological manipulations acted in a similar way. These results suggest strongly that such individuals may have a specific difficulty resolving lexical competition. We are currently extending our patient cohort in order to identify the specific patient characteristics associated with this pattern.

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Schnur, T. T., Schwartz, M. F., Brecher, A., Hodgson, C. (2006). Semantic interference during blocked-cyclic naming: evidence from aphasia. Journal of Memory and Language, 54, 199–227.

Presented by: **Wilshire, Carolyn**

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116. The Functional Locus of Word-finding Difficulties in Alzheimer's Disease: Insights from the Picture-word Interference Task.

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Introduction
Many patients with Alzheimer's disease (ADs) exhibit word-finding difficulties, as evidenced by their poor performance on picture naming tasks. The functional origin of these difficulties remains a topic of debate (see e.g., Astell & Harley, 1998). One task that may shed light on this issue is the auditory picture-word interference task (PWIT), which involves naming a picture while ignoring an auditory distractor word. The distractors may be unrelated, semantically related (e.g., banjo-'guitar') or phonologically related (e.g., banjo-'bandit'). In healthy participants, semantically related distractors typically slow naming times (relative to unrelated ones), particularly when presented just before the picture. This effect has been said to reflect competition occurring at the lexical selection stage (Bloem, van den Boogaard & La Heij, 2004). Conversely, phonologically related distractors typically reduce naming times, particularly when presented just after the picture, suggesting they operate at a later stage of processing. Crucially, these effects may be used as time-specific "markers" of different word production processes, which can be compared across normal and AD populations.

Methods
Participants were: a) eleven healthy controls; and b) four participants with mild to moderate AD all of whom scored outside normal limits on the Boston Naming Test, but were at least 80% accurate on the pictures used in our task. Our PWIT contained 50 pictures with low-frequency names. They were accompanied by three different distractor types (phonological, semantic and unrelated), presented at four stimulus onset asynchronies (SOAs): 200 ms before the picture (-200ms), simultaneously (0ms), or 200 ms or 400 ms after the picture.

Results
Figure 1 shows the percentage change in naming latencies as a function of distractor type. Results for controls replicated previous studies, with a semantic interference effect peaking at -200ms and a significant phonological facilitation effect at all SOAs except -200ms. The AD group showed a reliable semantic interference effect overall ($p < .01$), which did not interact with SOA. There was a trend towards phonological facilitation – particularly at +400ms - but this failed to reach significance. Combined analysis of AD and control data revealed a significant interaction between distractor type (semantic vs. unrelated) and participant group (ADs vs. controls), $p < .01$. The trend towards reduced and delayed phonological facilitation in ADs was not statistically reliable.

Discussion
In this task, our group of AD participants were found to be abnormally sensitive to interference from semantic distractors. Under the hypothesis that semantic interference in this task reflects competition at the lexical selection stage, this finding is consistent with a lexical selection impairment. In the future, comparison between ADs and patients with more central semantic deficits (e.g., Semantic Dementia) may shed further light on this issue.

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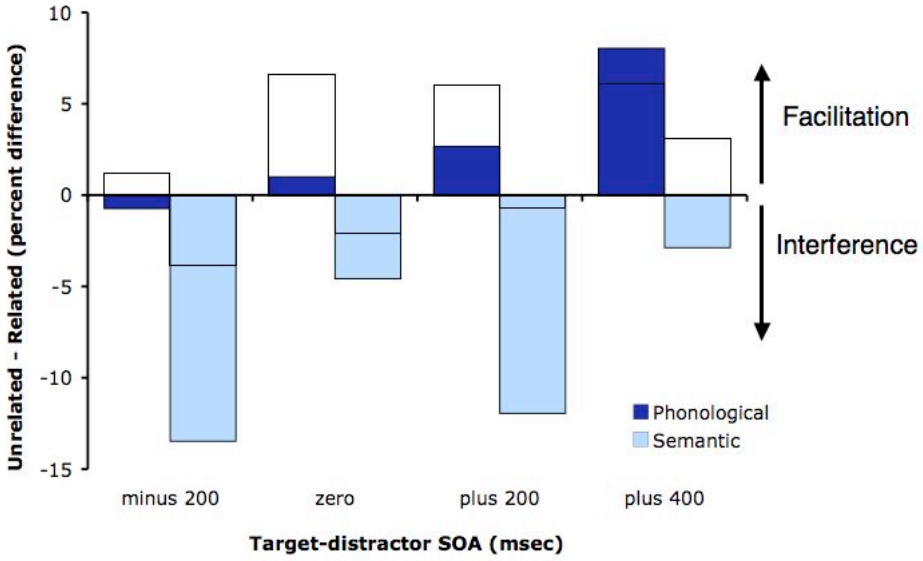

Figure 1

Percentage change in naming latency for semantic and phonological distractor conditions, relative to the unrelated distractor condition. Filled bars denote AD patients' data; unfilled bars show controls' data.

Presented by: **Wilshire, Carolyn**

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117. Impaired Number Word Production: A Bilingual Chinese-English Case Study

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We report the performance of a bilingual Chinese-English speaker (RC) who makes selective errors on number words in both languages only when the task involved processing the number word phonologically, either in the input modality or in the output modality. RC sustained a mid-cerebral artery occlusion resulting in non-fluent aphasia. Several experimental tasks were used to tap RC's ability to access numbers in both languages under different contexts. The purpose of these tasks was to examine the patterns of number word production problems in this patient and to functionally locate the deficit within current models of language production.

Summary of Experimental Tasks
The results of all experimental tasks are summarized in the Table below.

RC's Performance on Number word Tasks and Numerical Tasks

Reading Aloud	Accuracy
Arabic Numbers Aloud (English)	70%
Number words alphabetic (English)	85%
Chinese Numbers	60%
Matching Printed Numbers	
Arabic numbers to Chinese numbers in print	100%
Matching Arabic numbers to English number words	100%
Matching spoken English numbers to English number words	75%
Matching spoken Chinese numbers to Chinese numbers	65%
Automatic Naming	
Counting to 20 English	100%
Counting to 20 Chinese	100%
Days of the week English	100%
Days of the week Chinese	100%
Writing Numbers to Dictation (English)	50%
Writing Numbers to Dictation (Chinese)	75%
Numerical Tasks	
Single digit addition (written)	100%
Single digit subtraction (written)	100%
Single digit multiplication (written)	80%
Single digit division (written)	70%

Numerical Tasks: RC's knowledge of numerical concepts and arithmetic is intact in both languages, as evidenced by her performance on simple arithmetic (addition and subtraction) where she made no errors. RC, however, was less proficient in more cognitively taxing operations (division and multiplication).

Number Word Processing Tasks: RC was administered tasks requiring her to produce number words in both written and spoken modalities, in response to stimuli presented in written and spoken format. RC was 100% accurate in matching Arabic numbers to numbers in the Suzhou Chinese format. This contrasts with RC's performance on tasks that required producing number words. As can be seen in the Table, RC's performance on number production tasks ranged from 60% - 70% accuracy, depending on the script and the language. RC's errors in both languages were lexical errors, where number words were replaced by number words with the correct syntax (e.g., 5 --> "two", 11 --> fourteen). This indicates an intact syntactic frame for number words ("Number Lemma"). RC was also impaired in matching a spoken number word presented in either English or Chinese to its written representation (65% - 75% accuracy). Additional tasks (not reported in the Table) such as reading the clock (both analog and digital) revealed severely impaired performance, with qualitatively similar error patterns in both languages.

Discussion

To locate RC's deficit functionally, we adopt a model of language production (e.g., Levelt, Roelofs, & Meyer 1999, i.a.) that distinguishes between the selection of an abstract grammatical representation of a word (Lemma) and its phonological form (Lexeme). RC's error patterns (preservation of number word syntax) and her ability to correctly match numerals in Arabic and Chinese formats is evidence that the Lemma representation is intact in both languages. Her naming deficit occurs at the level of phonological encoding of the lexically selected number word. This study adds to the body of studies that indicate that number word production may differ qualitatively from the production of other words in the mental lexicon, and may be selectively impaired or preserved (e.g., Cohen, Verstichel, & Dehaene, 1997). Because this bilingual patient was able to match written numbers across different scripts (Arabic, Chinese) this study adds new data that may help elucidate the relationship between abstract representations for number words (number Lemmas) and their phonological encoding (number Lexemes).

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Presented by: **Bencini, Giulia**

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118. Aged-Related Changes in Neurofunctional Networks for Verbal Fluency as a Function of Production Time

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Introduction
Optimal cognitive functioning in older adults has often been linked with changes in patterns of brain activations (Cabeza, 2002). However, most of those studies have relied on the sole identification of isolated activated brain regions (general linear model), which may not be integrated in a neurofunctional network. Furthermore, few studies have investigated the neurofunctional changes underlying expressive language abilities such as verbal fluency, which tends to get harder over time within a given criteria (Crowe, 1998). The goal of this study was to use functional Magnetic Resonance Imaging (fMRI) and a functional connectivity approach called NEDICA (Network Detection Using Independent Component Analysis) (Perlbarg et al., 2008) in order to assess the effect of aging and time of production on the neurofunctional networks associated with a verbal fluency task.

Methods
12 younger (aged 20 to 31) and 12 older (aged 60 to 73) healthy, highly-educated, right-handed French speaking adults performed a verbal fluency task in a 3T fMRI scanner. They were asked to say as many words as possible given 4 orthographic and 4 semantic criteria, within a limited amount of time (90 s/criteria). The reference task consisted of repeating months of the years. The fMRI acquisitions were made within a mixed design consisting of a single functional run (1600 s, TR = 2) and were blocked a posteriori according to production time and criteria (0-40 s, 50-90 s).

Results
At the behavioral level, only the main effect of time was significant; both groups produced more words between 0 to 40 s than 50 to 90 s. At the neurofunctional level, age and time-related differences were found with regards to some of the functional networks identified. For instance, fewer functional networks were identified in older adults and some of them showed spatial age and time-related differences.

Conclusion
Although both age groups performed similarly at the behavioral level, age and time-related differences were found at the neurofunctional level. Such results contribute to the characterization of the impact of aging and time of production on a verbal fluency task and the underlying neurofunctional networks involved.

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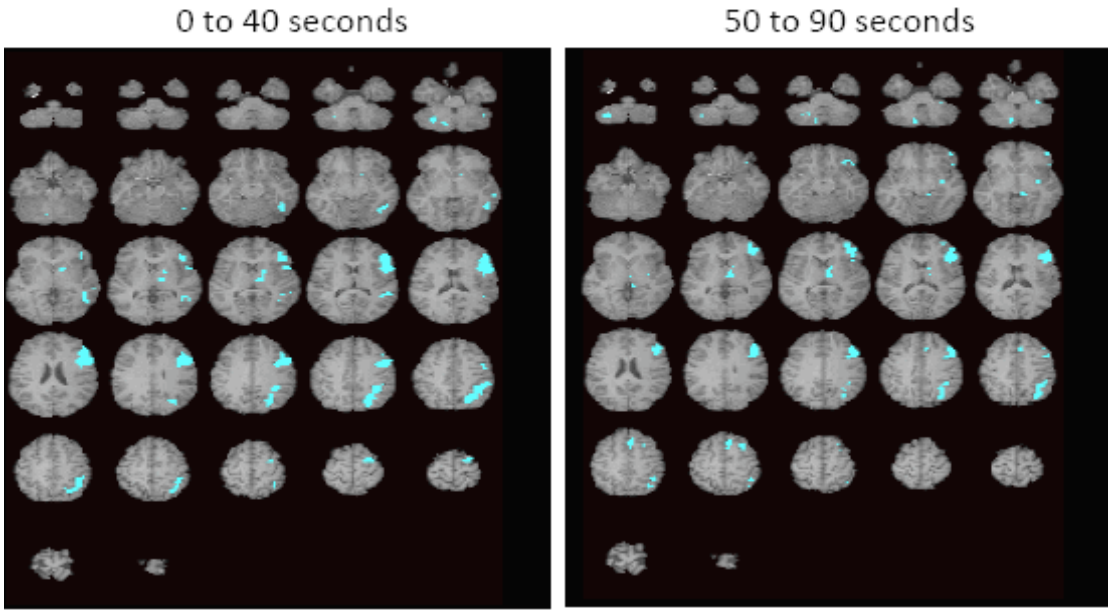
Figure 1. Temporal evolution of a neurofunctional network associated with a verbal fluency task in young adults using the NEDICA approach (n = 12)



Note: Both figures show 28 axial slices of the brain in a radiological convention (left = right)

Presented by: **Marsolais, Yannick**

Symposium 2: Lexical Retrieval and Aging: Implications for Aphasia

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119. Lexical Retrieval and Aging: Implications for Aphasia

Obler L. [1], Goral M. [2], Rogalski Y. [3], Kavé G. [4], Neumann Y. [5], Crosson B. [3]
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Word finding difficulties characterize the language production of virtually every person with aphasia. They are also common language problems reported in healthy aging. For older individuals who experience aphasia, it is important to determine whether 1) their word finding difficulties differ from those found in typical aging and 2) the processes that facilitate word production in older age can facilitate word production in aphasia.

The four primary presentations in this proposed symposium explore stimulus variables and neurolinguistic processing associated with naming difficulties in older adults.

Rogalski and colleagues examine aspects of stimulus presentation that affect successful picture naming. The authors varied physical features of the mid-range Boston Naming Test items, adding color or priming with a slide depicting the context for the item. They compared the performance of younger and older participants and showed that while context facilitated naming in younger adults, it delayed it in older adults.

Additional stimulus variables are examined in Kave's presentation. She assessed the relations between two types of word characteristics -- word frequency and word concreteness -- and successful naming in a group of 136 participants ranging in age from 20 to 85. Kave finds a negative correlation between age and word frequency, that is, older participant produced less frequent words than younger ones. By contrast, there was a positive correlation between concreteness and production, with older adults successfully naming more concrete than abstract words.

The third presentation focuses on the contribution of timing variables to word production. Neumann and her colleagues report ERP correlates of younger and older individuals during a Go/Nogo task that requires implicit naming of picture stimuli. They found that their older participants were slower than the younger group in processing phonological information, particularly syllabic information of the target words. Their results support theories of word finding deficits that place the origin of naming failure at the phonological stage of word retrieval.

In the fourth presentation, Crosson and colleagues examine right frontal activity during word production. They found increased right frontal activity for old vs. young adults during picture naming and category member generation. Decreased right frontal activity in young persons contributed to differences. During category member generation, massive intercorrelations between activated areas for the oldest subjects suggested cortical de-differentiation. Right frontal activity during lexical retrieval in old persons suggests caution in interpreting such activity in aphasia studies, and cortical de-differentiation has implications for aphasia rehabilitation.

Presented by: **Obler, Loraine**

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120. Effects of Surface Detail and Environmental Context on Lexical Access in Visual Confrontation Naming in Aging

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Lexical retrieval problems are common in aging. It remains unclear whether lexical problems are language-based or due to more global attentional and perceptual processes. One common belief is that changes in frontal lobe function compromise speed of processing during healthy aging (Salthouse, 1996), which can be exacerbated by cognitive tasks that are more processing intensive. From the standpoint of communication, it is critical to understand and compensate for the effects of perceptual and attentional load on the efficiency of lexical access. Recent work has demonstrated that younger adults, for example, show benefits of added color and surface texture on speed and accuracy of confrontation naming relative to black-and-white line drawings (Rossion & Portois, 2004). However, it is unclear whether the same benefits extend to lexical retrieval in healthy older adults. One possibility is that adding perceptual and contextual detail to sparse line drawings will enhance visual object recognition and improve confrontation naming accuracy. An alternative possibility is that the addition of detail will tax limited processing resources and produce interference. Here we evaluated these potential outcomes.

Method
We analyzed speeded response latencies and naming accuracies of 23 older adults (mean age=68) and 23 younger adults (mean age=21) for the high and mid-frequency items of the 60-item Boston Naming Test (Kaplan et al., 1983). All participants scored greater than 25 of 30 on the Montreal Cognitive Assessment (Nasreddine et al., 2005). Participants named target stimuli as quickly and accurately as possible under three different conditions: 1)

BLACK+WHITE: unmodified BNT black-and-white line drawings; 2) COLORIZED: colorized-texturized BNT pictures; 3) COLOR+CONTEXT: colorized-texturized BNT pictures preceded 1000ms by an image of background context (e.g., “kitchen” preceded “asparagus”). We recorded response latencies (RTs) via microphone relay and scored accuracy offline.

Results
We eliminated RTs for incorrect responses, outliers ($z>\pm2$), and low frequency BNT items due to low accuracy (< 50%). We found a significant interaction between age group and perceptual condition [$F(2,88)=3.96$, $p=.02$]. Older adults showed a mild interference effect when targets were preceded by environmental context on the magnitude of 970.06 ms relative to BNT unmodified line drawings (951.32 ms) and colorized drawings (943.97 ms). In contrast, younger adults showed the opposite trend (i.e., priming) and were faster to name target items preceded by context (kitchen primed asparagus) ($p<.01$).

Discussion
Older adults showed mild interference effects when naming pictures primed by their environmental context, whereas younger adults showed facilitation. These results suggest that the addition of contextual detail may impede rather than facilitate naming in older adults. This finding is consistent with hypotheses about lengthier processing times, declining inhibitory control, and deleterious effects of competing stimuli on efficiency of naming in older adults.

Presented by: **Rogalski, Yvonne**

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121. Frequency and Concreteness Effects in Spontaneous Noun Production

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Background and hypotheses: Difficulties in word retrieval are common in normal aging. While the negative effects of aging on single-word production have been replicated across tasks, languages, and populations, findings regarding connected speech are less consistent. Based on results from structured tests, it is predicted that older adults will resort to retrieving frequent and/or concrete nouns in connected speech. However, the increase in vocabulary associated with age can lead to retrieval of more infrequent and/or more abstract words. The research presented here examines whether age-associated retrieval difficulties are affected by the frequency and concreteness of nouns.

Procedures: Participants (n = 136, age range 20-85) completed a picture-naming test, a semantic fluency task, and a picture description task. Each noun in the picture descriptions was analyzed for its lexical frequency and concreteness. Frequency was analyzed through published word counts, subjective ratings by 40 young and 40 old adults, expert rating through a 4-point scale, and cumulative occurrence across all descriptions (see Kavé, Samuel-Enoch, & Adiv, 2009). Concreteness was rated on a 4-point scale, with concrete nouns referring to objects that could be seen/touched (e.g., stool), and abstract nouns referring to concepts that denote no specific time/place and may evoke numerous scenarios (e.g., disaster).

Results: Results show a decrease in total scores on structured single-word production tests with the increase in age. All frequency analyses converged in showing an association between the age of the participant and the selection of more infrequent words. There was a significant albeit not perfect correlation between ratings of frequency and concreteness for the 240 nouns selected on all picture descriptions, so that more frequent words were also rated as more concrete. However, the association between age and the concreteness of nouns selected for production was in the opposite direction to the effect of frequency, so that the older the participant retrieving the nouns, the more concrete those nouns were.

Conclusions: Instead of selecting the most frequent nouns and thus avoiding age-associated retrieval difficulties, older speakers produced more infrequent nouns. Yet, when concreteness was examined, older adults resorted to the less abstract words. It is suggested that the large vocabulary of older adults helps them retrieve infrequent nouns. In

addition, the bilateral activation observed during word retrieval in old age (Wierenga et al., 2008) might account for the seeming paradox between the frequency and concreteness effects reported here. Thus, right hemisphere involvement might lead to the activation of a broader semantic field, including distant and unusual meanings (Jung-Beeman, 2005), yet these meanings might still be quite concrete. Implications for word retrieval in aphasia will be discussed.

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Presented by: **Kavé, Gitit**

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122. Early Phonological Problems for Lexical Retrieval in the Elderly

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Introduction
The psycholinguistic literature is in general agreement that lexical access for speech production involves retrieval of three different types of information, namely, conceptual-semantic, syntactic, and phonological information, in at least two distinct processing stages (Dell and O'Seaghdha, 1992; Levelt, 2001). The function of the first stage is to select an abstract representation of the target lexical item containing only semantic and syntactic information, and the function of the second stage is to phonologically encode the chosen lexical item in preparation for articulation. Research on language production in older adults with unimpaired cognitive abilities suggests that naming problems associated with advanced age generally arise in, or just before, the second stage of phonological processing (see Burke et al., 1991, Transmission Deficit Hypothesis (TDH)). However, as this processing stage involves various substages, e.g. segment retrieval, syllable encoding, etc. (Levelt, 2001), which occur at very fast rates, the specific nature of the problem has not yet been identified.
The dynamic real-time measure of event related potentials (ERPs) permits investigating distinct processing stages in speech production (van Turennout et al., 1997; Schmitt et al., 2001). However, substages of phonological retrieval in older adults have not yet been examined. Thus, it is unknown whether older, as compared to younger, adults would have greater difficulty in accessing segmental or syllabic information. The results of this study provided this information. The motivation for this study arose from research investigating tip-of-the-tongue (TOT) states in non-clinical populations (Burke et al., 1991) and from the aphasia literature exploring lexical access problems in post-stroke populations (Dell, Schwartz and Martin, 1997; Wambaugh, Linebaugh, and Doyle, 2001).

Methods and Results
The study utilized the ERP component N200, reflecting response inhibition, in a GO/NOGO paradigm. Two experimental implicit naming tasks required participants to make a decision about the final phoneme of the picture name, e.g. GO if the picture name ends with a /n/ but NOGO if the picture name ends with a /r/, and the target-word syllabic length, e.g. if one syllable, GO, if two syllables, NOGO.
Results support the TDH of age effects at the phonological level, as N200 latencies on each of the phonological tasks were later (100 ms, $p = 0.005$) in the older, as compared to the younger, group. In particular, within the older group, as compared to the younger group, syllabic retrieval was significantly later (50 ms, $p = 0.020$) than segmental retrieval. These findings further suggest that the phonological breakdown is greater at the syllabic than at the segmental level.

Conclusion
Implications of the study are that aging affects lexical retrieval at very early phonological stages in an implicit naming task, even when older adults correctly name pictures. Since many people with aphasia today are older adults, these findings suggest that their anomic difficulties consequent to brain damage will be compounded by the normal changes associated with healthy aging. Remediation of their anomic difficulties, thus, may require work at early phonological stages (phonemic and syllabic) in addition to the more common semantic methods.

Presented by: **Neumann, Yael**

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123. HAROLD and Lexical Retrieval: What is the Role of the Right Frontal Lobe?

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HAROLD (Hemispheric Asymmetry Reduction in OLD adults) is a phenomenon in which old adults show increased nondominant hemisphere activity relative to young adults, especially in frontal cortices. A common interpretation is that the nondominant hemisphere is a cognitive reserve for an older, less capable dominant hemisphere. A majority of the work on verbal functions shows increased right frontal activity during working memory for old vs. young adults. However, we recently did three studies imaging lexical retrieval activity with fMRI and a study of sequential finger movements relevant to HAROLD. Wierenga et al. (2008) showed increased right frontal activity for old vs. young adults during picture naming. Subsequently, Meinzer et al. (in press) showed increased right frontal activity for old vs. young adults in category member generation. Yet, the explanation for increased right frontal activity is not clear. One conundrum is that older right-handed adults with right frontal lesions do not normally demonstrate significant anomias. A study of learned, unilateral sequential finger movements (McGregor et al., unpublished data) showed a normal, positive blood oxygenation level dependent (BOLD) response in contralateral motor cortex of young participants, but a negative BOLD response in ipsilateral motor cortex. Old subjects, by comparison, showed a positive BOLD response in ipsilateral motor cortex. This phenomenon may represent loss of interhemispheric inhibition in old adults. Given these findings, we asked whether similar phenomena could be seen during lexical retrieval. In re-assessing Wierenga's findings, old participants showed a normal positive BOLD response in right frontal regions (12+ second positive BOLD phase followed by negative BOLD phase of lesser amplitude). After a shortened positive BOLD phase (8+ seconds), young participants showed a negative BOLD phase of greater amplitude and duration than their positive BOLD phase. Can these findings represent a loss of interhemispheric inhibition similar to that from sequential finger movements? In a final study by Cohen et al. (unpublished data), old and young adults generated category members. Old adults were divided into young-old (mean age=66.4) and old-old (mean age=76.2) groups. Correlations between 16 activated areas across participants showed few intercorrelated areas for young-old participants, but old-old participants showed significant correlations between most of the activated regions. This finding suggested de-differentiation of function in the old-old adults, which could reflect a massive loss of intercortical inhibition. The presence of right frontal activity during lexical retrieval in normal old adults represents an interpretive challenge for right frontal activity in aphasia patients during lexical retrieval. Further, a breakdown in intercortical inhibition may have implications for aphasia treatment.

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Presented by: **Crosson, Bruce**

Poster Session 4: Laterality

124. A Dissociation of Laterality for Language Production and Comprehension in a Subcortical Aphasic Patient, Assessed with MEG and fMRI.

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NIDCD, NIH

When perisylvian regions are damaged in stroke, their linguistic functions may be taken over by other areas, supporting recovery from aphasia. Our laboratory is studying this plasticity using MEG and fMRI with two tasks, picture naming (production) and sentence picture-matching (comprehension). When appropriate control conditions are subtracted, both tasks elicit robust left-lateralized frontal activation in healthy control subjects. In aphasic patients, both perilesional and contralesional activations are commonly observed, with much variability across individuals. While the adaptive significance of contralesional activation is hotly debated, comprehension and production processes have seldom been assessed within the same individuals. We present here contrasting findings from two patients, demonstrating that comprehension and production activations can jointly relocalize to the right hemisphere, or instead become partially dissociated between hemispheres.

Patient 1 (47F) suffered a large cortical stroke destroying almost all of the classical left perisylvian language areas, resulting in severe aphasia that had resolved to mild anomia after two years, with a lasting deficit for comprehension of syntactically complex sentences. Both picture naming and sentence picture-matching tasks resulted in strong activations in the right-hemisphere homologs of the left-hemisphere areas that are activated in healthy controls, suggesting that this patient's recovery is supported by right-hemispheric takeover of language functions.

Patient 2 (48F) suffered a left frontal subcortical stroke, resulting in transcortical motor aphasia, also with a persistent deficit for syntactic comprehension. DTI indicated damage to the extreme capsule and arcuate language pathways, with cortical gray matter generally spared. This patient was assessed four times throughout the first year post-stroke and exhibited marked improvement in language function, although right-sided limb function remained poor due to destruction of the pyramidal tract. FMRI studies of picture naming (four sessions) in this patient consistently revealed normal selective activation of left frontal cortex for naming real pictures, compared with saying "fake" in response to scrambled pictures. Increases in activation across the four sessions were observed in more posterior regions, possibly contributing to recovery, but the left frontal activation was relatively invariable.

The comprehension task yielded quite different results in patient 2, as assessed with fMRI and MEG one time each, approximately one year after stroke. Bilateral activations were observed, but more strongly in the right hemisphere. Detailed analysis of the timecourses of BOLD and MEG activity suggested that working memory for sentence content, as opposed to online comprehension, was particularly lateralized to the right hemisphere in this patient, as opposed to healthy controls in which all stages of the task evoke left-lateralized activity. Further studies in this individual are planned to assess comprehension and production across the levels of single words, sentences, and discourse.

The dissociation in laterality seen in patient 2 suggests that when connections to left frontal cortex are disrupted, some of its functions but not all may be reorganized to the contralateral hemisphere, depending on the specific pattern of spared gray and white matter.

Presented by: **Meltzer, Jed**

125. Automatic Activation of Affective Words in the Cerebral Hemispheres

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Theories of affect and emotion suggest that the affective value of words are evaluated quickly and automatically and may influence subsequent processes. Thus, in a priming paradigm, the valence of a first word or prime affects the processing of a second word or target. This effect has been repeatedly reported for short stimulus onset asynchrony (SOA), a result which supports the idea that the process is fast and occurs without awareness (e.g. Fazio, Sanbonmatsu, Powell, & Kardes, 1986). On the other hand, and despite the fact that past research has been inconsistent with regard to the possible lateralization of the effects of words with affective meaning, a special capacity for the right hemisphere in affective processes has been suggested. While recent divided visual field (DVF) priming studies in the domain of lexico-semantic research has indicated that automatic priming is larger in the left than in the right hemisphere (e.g., Koivisto, 1997), the automatic nature of affective word processing and the role of the left hemisphere in this regard may account for inconsistent results in this area. In the present study, using a DVF priming paradigm, we investigated the time course of affective meaning activation in the left and right hemispheres through within-hemisphere presentation of affective words to the cerebral hemispheres across four different SOAs of 0 ms, 150 ms, 300 ms, and 750 ms.

Twenty-six right-handed students with normal or corrected to normal vision who spoke English as their first language participated in the study. A set of 192 prime-target pairs with the same valence (e.g., "thrill-rescue", "deceit-agony") or opposite valence (e.g., "treat-riot", "victim-fun") were presented in four blocks, under the four SOAs of 0, 150, 300, and 750 ms, to the right visual field (RVF) and the left visual field (LVF) and reaction times to valence decision for the target words were measured. The design of the experiment was a 2 (visual field: RVF-RVF, LVF-LVF) X 4 (SOA: 0 ms, 150 ms, 300 ms, and 750 ms) repeated measures ANOVA.
Data analysis revealed evidence of priming of affective words in the LVF at an SOA of 0 ms that shifts to the RVF at an SOA of 150 ms. This effect diminishes quickly in a way that priming effects are absent at longer SOAs of 300 ms and 750 ms (Hermans, De Houwer, & Eelen, 2001).

The results seem to suggest that the two hemispheres have different and possibly complementary roles in the automatic processing of affective words.

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Presented by: **Abbassi, Ensie**

126. The Lateralization of Math and Language: Agraphia and Acalculia in a Left-handed Patient with a Right Hemisphere Lesion.

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Summary
Patient FL, left-handed, developed agraphia and acalculia after a deep right parietal lesion. The analysis of error patterns in writing and calculation leads one to conclude that F.L.'s performance results from a disturbance similar to what is found after left rather than right parietal lesions in right-handers. This finding is interesting insofar as it shows that, when language is processed in the right hemisphere, so is calculation. This was demonstrated by Semenza et al. (2006) in a case series study of right hemisphere acalculia. However, Pinel and Dehaene (in press) recently investigated via fMRI whether normal variations in the degree of left hemispheric asymmetry that characterize the brain organization for language are mirrored in the asymmetry of areas involved in number processing. They came to the conclusion that "co-lateralization" of language and math is more complex than expected. Thus it becomes important to document independently which arithmetical function exactly co-lateralizes with which language functions.

Case Report
FL displayed a Gerstmann's syndrome without aphasia, memory disorder, intellectual impairment or visual neglect. Finger agnosia, agraphia, right–left disorientation and dyscalculia were investigated in detail. As previously reported for Gerstmann's syndrome, FL's agraphia seemed to result from a deficit in accessing grapho-motor patterns for handwriting: he produced incomplete and poorly formed letters and letter substitutions. Oral spelling, assembling block letters and immediate copy of letters and words were well preserved. No signs of spatial agraphia were detected. The patient performed well in number transcoding and had good comprehension of Arabic and written verbal numerals. His knowledge of arithmetical facts and rules was intact. Multi-digit calculation for additions, subtractions and multiplications was instead clearly impaired. The errors reflected a systematic failure in factor selections: he always proceeded from the leftmost digit rightwards.

Discussion
FL showed "bug" errors for arithmetical procedures, described so far as resulting from left hemisphere lesions. His agraphia had none of the characteristics that distinguish agraphia after right hemisphere lesions. Moreover FL showed a full Gerstmann syndrome, a sign of left hemisphere lesion in right-handers. These findings seem to indicate that left hemisphere arithmetical procedures shift to the right hemisphere if writing does.

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Presented by: **Chiarelli, Valentina**

127. Hemispheric Roles in Perception and Production of Famous Proper Nouns

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Background
Proper nouns differ from common nouns in being phonologically complex, having low text frequency, and denoting a unique entity. Although lexical processing is associated with left-hemisphere function, clinical observations and experimental studies support a right hemisphere involvement in proper noun recognition. However, controversy remains about the extent of right hemisphere involvement (Schweinberger, Landgrebe, Mohr, & Kaufmann, 2002), and it appears that the left hemisphere supports production of proper nouns (Semenza, 2006).

Purpose of study
The goal of this study was to further investigate hemispheric specialization for proper and common nouns by examining the ability of individuals with left hemisphere damage (LHD) to perceive and verbally reproduce famous names and matched common names compared with the performance of matched normal control (NC) subjects.

Method & Procedures
Ten individuals with LHD due to stroke and 16 age- and education-matched NC subjects completed identification and production tasks of famous proper and common nouns. Two hundred stimuli were utilized for three response conditions: A manual condition, yes/no verbal condition, and verbal production. All tasks were designed as split-visual field experiments, modeled after Ohnesorge & Van Lancker (2001).

Results
Famous proper nouns were recognized more often than common nouns in both visual fields for NC, consistent with previous findings. An ANOVA revealed that NC identified stimuli in the left hemisphere more often than in the right hemisphere [$F(1,15) = 7.089$; $p = .005$]. Whereas significantly decreased performance in identifying common nouns was found in participants with LHD, these subjects correctly identified proper nouns at a level similar to NC. These findings confirmed that proper nouns are processed differently from common nouns, and that the right hemisphere contributes to processing of proper nouns. For the verbal production task, NC exhibited significantly better performance in producing proper nouns and common nouns presented to the right visual field/left hemisphere compared to the left hemisphere/right hemisphere ($p < .05$). Significantly decreased performance in producing both proper and common nouns was found in LHD, indicating a left hemisphere role in production of proper nouns, in agreement with lesion and brain imaging studies.

Conclusion
These results contribute to a better understanding of hemispheric roles in perception and production of famous proper nouns, suggesting that (1) both hemispheres can recognize famous proper nouns, possibly due to a right hemisphere role in personal relevance (Van Lancker, 1991) and (2) production of proper nouns as well as common nouns is associated with the left hemisphere.

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Presented by: **Yang, Seung-yun**

128. A Dual Task Investigation of Hemispheric Semantic Processing Following RH Release from Inhibition in Participants with LH Lesions

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Dual task investigations of language processing in young healthy participants suggest that the semantic processing abilities of the right hemisphere (RH) can be improved under conditions that release it from left hemisphere (LH) inhibition (Querne, Eustache & Faure, 2000). The dual task paradigm is designed to overload a hemisphere's processing resources, in order to reduce interhemispheric suppression. LH lesions are suggested to release the RH from interhemispheric inhibition for language tasks (Landis & Regard, 1988). However, it may be argued that the lesioned LH can exhibit residual control over the RH, or can regain control over recovery. The current investigation aimed to examine RH semantic processing for participants with LH lesions, with and without additional LH processing load, in order to explore the potential for enhanced RH processing following the release from LH suppression.

Method
Participants with unilateral LH lesions (LHD) (n=9) and matched healthy controls (n=14), were asked to simultaneously perform a divided visual field semantic priming task and a verbal memory task. Three verbal memory load conditions were included, zero-word baseline, two-word memory load and six-word memory load. At each memory load condition the semantic priming task employed a stimulus onset asynchrony of 250ms and compared the activation of stimuli related by association only, association and category membership, and category membership only. Data analysis was carried out on reaction time (RT) and accuracy data for real word targets, using linear mixed model analysis. Analysis was carried out on data from each memory condition separately. Planned contrasts were used to explore hemispheric priming patterns.

Results and Discussion
The LHD group revealed differences in RT priming between the baseline and memory load conditions for targets presented to the LVF/RH. In the baseline condition the LHD group revealed LVF/RH priming for the associated category membership and the association only conditions, while RVF/LH priming was observed for all three related conditions. The LHD group's priming of RVF/LH targets did not change between baseline and memory load conditions. However, the LVF/RH priming improved under both memory load conditions, to include all three related conditions. The control group's priming performance did not differ between baseline and memory load conditions, with significant bilateral priming revealed for all of the related conditions. Accuracy data analysis revealed a similar pattern of priming to the RT data. Both groups revealed an overall LH advantage for accuracy at baseline. The addition of memory load served to remove this LH advantage for the LHD group. The current findings indicate that following a LH lesion, the RH's contribution to semantic processing can be enhanced under conditions designed to overload the LH.

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Presented by: **Smith, Erin**

Poster Session 4: Treatment Methods and Impacts

129. A Language Teacher in the Labyrinth of Aphasia: A Kurdish-Persian Case

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As a consequence of the increasing number of bilinguals in the world population, the study of bilingual aphasia has been of significance to researchers of language impairment and a considerable amount of work has been carried out during the past few decades. In addition, in order to supplement the research on bilingual aphasia , it is important to reflect on it in different contexts (Fabbro, 2001; Abutalebi & Green, 2007). Due to the scarcity of aphasia-related studies in Iran, the present study aims: (1) to shed light on impaired language skills; (2) to identify the recovery pattern of languages; and (3) to provide the main variables affecting the recovery pattern of languages in a bilingual Kurdish-Persian aphasic speaker.
The bilingual case was a 40-year-old right-handed individual with Broca's aphasia following a cerebral hemorrhage. An interesting point to note is that the patient used to teach Persian language and literature for about 18 years. To assess the patient's language skills, taking into account pre-morbid language proficiency and history of bilingualism, we administered the standardized and equivalent versions of the Bilingual Aphasia Test (BAT) (Paradis, 1987) in Kurdish (Paradis & Maniyi, 1989) and Persian (Paradis, Paribakht, Nilipour, 1987) were administered, respectively. Then, the performances were described and compared qualitatively and quantitatively in detail.
The overall findings revealed preserved comprehension but reduced non-fluent speech in both languages. The final recovery pattern was non-parallel recovery with L2 (Persian) better recovered and less impaired than L1 (Kurdish). The non-parallel recovery of languages was associated with several variables including type of aphasic syndrome, pre-morbid language proficiency, language-specific features, plus age, context, and manner of language learning. Besides, the experience of teaching L2 was incorporated in this respect.
On the whole, the study revealed that a combination of "Critical Variables" (Paradis, 2001) may explain the deficits and the way to determine the recovery patterns in bilingual aphasic speakers. Additionally, it was concluded that teaching a language as an explicit automatic process (Kainz,1983; Paradis, 2000) affects the recovery pattern of languages post-stroke, and the consciously learned and taught language is better recovered and less impaired in bilingual aphasic speakers.

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Presented by: **Akbari, Mohsen**

130. Factors Underlying Successful Use of a Computer-assisted Alternative Communication Program by People with Severe Aphasia

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Background
Some individuals with severe non-fluent aphasia do not respond in a functional way to any form of communication therapy but others show improved communication with treatment focused on compensatory alternative communication modalities. This study investigated whether individuals with severely restricted verbal output could significantly improve their functional communication skills by using an alternative communication computer program called C-Speak Aphasia (Nicholas & Elliott, 1998). We explored various factors to determine how they related to individual patients' ability to communicate expressively using C-Speak Aphasia. These factors included semantic processing ability and executive system functions.
Using C-Speak Aphasia, individuals select icons and put them together to create novel messages that are then spoken by the computer's speech synthesizer. Research on the efficacy of C-Speak Aphasia as a means to improve communication has been ongoing for several years. Preliminary results from the first series of single-subject studies indicated that people with severe aphasia but with relatively preserved executive functions of cognitive flexibility and self-monitoring learned to use C-Speak Aphasia better than those who had severe aphasia plus executive system deficits, (Nicholas, Sinotte, Helm-Estabrooks, 2005). Other researchers (e.g. van de Kandt-Sonderman and colleagues, 2007) have stressed the importance of intact semantic abilities to use of a different computer alternative communication system known as TouchSpeak. Thus, we were motivated to explore the relative importance of both these domains of cognition (executive functioning and semantic knowledge) for effectively communicating with a computer device with additional subjects trained to use C- Speak Aphasia.

Methods and Procedures
Participants were ten individuals with severe aphasia who received at least six months of training to learn C-Speak Aphasia. Communication skills on untrained communication tasks (answering autobiographical questions, describing pictures, making telephone calls, describing a short video, and two writing tasks) were repeatedly probed to assess carryover of treatment effects. Response to treatment was examined with respect to baseline measures of language (auditory comprehension and semantic abilities), and non-linguistic executive function skills.

Results
Using C-Speak Aphasia, four participants communicated significantly more information (see Figure 1) on selected probe tasks using the computer than they did without the computer. Further analyses indicated that executive function skills were significantly correlated with treatment response ($r = .81$, $p < .05$) while semantic knowledge and auditory comprehension scores did not correlate with treatment response.
Conclusions: Individuals with the more intact executive function skill of cognitive flexibility responded better to treatment with C-Speak Aphasia than subjects with relatively greater impairment in this domain, suggesting that impairments in nonverbal executive functions may at least partially underlie poor response to treatment to improve functional use of alternative modes of communication.

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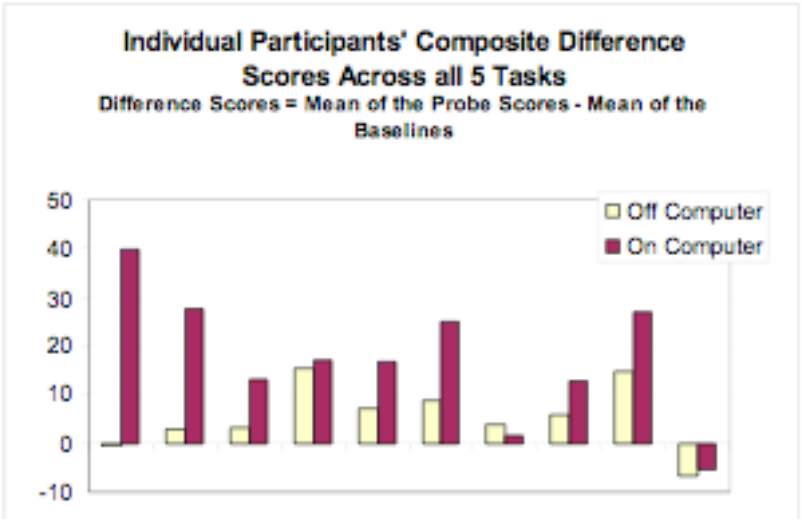
Figure 1. Communication difference scores (changes from baseline) using *C-Speak Aphasia* (red bars) compared to off-computer scores (yellow bars) for each participant.



Presented by: **Nicholas, Marjorie**

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131. Treatment Induced Language Recovery in Chronic Aphasia: The Role of Non-domain Specific Brain Areas

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Background
Intense speech and language therapy is currently considered the treatment of choice for chronic aphasia and improvement of language functions and concomitant brain plasticity after intensive treatment has recently been demonstrated in several studies (for review Meinzer & Breitenstein, 2008). Still, so far only short-term treatment effects were assessed even though long-term consolidation of novel language information may require different brain areas than the ones participating in initial learning. For example, in healthy subjects brain structures involved in general learning (e.g., the hippocampus, HC), mediate the initial acquisition of lexical or semantic knowledge. Later on, secondary associative cortices may be functionally required (e.g., Breitenstein et al., 2004). Thus, we aimed to differentiate brain regions mediating short-term and long-term language learning success in chronic aphasia by using functional magnetic resonance imaging (fMRI). We also assessed whether the structural integrity of the HC and its surrounding fibers predicts the degree of treatment success.

Methods
During fMRI language functions were evaluated by a picture naming task in 8 patients with chronic aphasia prior to, immediately after and 8 months after an intensive naming treatment based on associative learning principles. In 10 patients we assessed the structural integrity of the HC by a volumetric analysis. Fiber integrity in white matter tracts surrounding the HC was assessed by Diffusion Tensor Imaging (DTI).

Results & Conclusions
Short-term treatment success was predicted by increased activity bilaterally in the hippocampal formation, the right precuneus, and the fusiform gyri. Long-term training success was predicted by activity increases in the right-sided Wernicke's homologue and in perilesional temporal areas. Thus, brain regions involved in memory encoding,

attention, and multimodal integration were predictive of short-term treatment success. Long-term treatment success was mediated by activity increases in classical language regions. The volume of the left compared to the right HC was substantially reduced (9-16%) in 6/10 patients. Fiber integrity in the adjacent white matter in the ipsilesional hemisphere was reduced in all patients (21-50%). The degree of volume and fiber integrity reductions strongly predicted both immediate and long-term training success. No correlations were found for a parallel set of untrained language material, attesting the specificity of our results. The present findings demonstrate that (a) different brain regions may mediate short- and long-term language training outcome and (b) the structural integrity of the task-dominant hippocampus and its surrounding fiber tracts – i.e., non-domain specific brain structures - may be a prerequisite for successful training outcome in chronic aphasia.

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Presented by: **Meinzer, Marcus**

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132. Functional Reorganization after Constraint-Induced Language Therapy in a Case of Wernicke's Aphasia

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Introduction

Recent investigations utilizing functional neuroimaging have shed light on mechanisms underlying recovery in poststroke aphasia. Still, knowledge of the precise relationship between therapy and recovery, and how treatment-induced changes are instantiated in the brain remains elusive. The current longitudinal study examined changes in fMRI BOLD activation in an individual with Wernicke's aphasia who underwent intensive constraint-induced language treatment (CILT; Pulvermuller et al., 2001) followed by extended practice. Patterns of activation correlated with maintained improvements in naming were investigated.

Method

At study onset, ACL, a 55 y.o. right-handed male, was three years post-left MCA stroke resulting in a large temporoparietal lesion. He demonstrated impairments in auditory comprehension (9th percentile); repetition (30th percentile); and confrontation naming (9/60) on the BDAE and BNT. He was trained to name 48 black-and-white line drawings of objects and actions from the International Picture Naming Project (Szekely et al., 2005). Shortly after two weeks of intensive CILT therapy, he began a six-week period of extended practice on half of the trained pictures to promote maintenance.

Functional MRI images were acquired (Siemens 1.5T) at three timepoints (S1:pre-treatment; S2:post-treatment; and S3:6 months post-treatment), while ACL overtly named blocks of trained (CILT), untrained (UNTR), and consistently correct from baseline (CORR) pictures. He was trained to say "pass" if unable to name a picture, and during control trials (viewing nonsense shapes/lines). To record overt speech, sparse acquisition was employed (TR=3.0s; effective TR=7.0s).

Results

There were no statistically significant differences in accuracy in the scanner (2% vs. 4% correct) or BOLD signal between to-be-trained (CILT) and untrained (UNTR) conditions pre-treatment. Post-CILT, naming improved on CILT but not UNTR pictures (46% vs. 8%). Six months post-CILT, accuracy was 33% vs. 6%. Practiced CILT pictures remained 46% accurate compared to trained-but-unpracticed pictures (21%).

Post-CILT, in contrasts examining experimental vs. control tasks, significant activation (cluster FWE-corrected, $p<0.05$) was focused in L middle frontal cortex (LMFC; BA 8/9), with increased spatial extent and degree of

activation correlated with less successful naming. Six months later, a similar pattern prevailed. Both trained (CILT) and untrained (UNTR) conditions elicited expanded left frontal activation, including LMFC (BA 6;8), LIFC (BA 44;47), and LmedFC (SMA; BA 6). Practiced CILT pictures, named more accurately than unpracticed, activated a bilateral network that approached significance, including right posterior temporal cortex (Fig. 1).

Conclusion

Treatment-related functional reorganization was observed in a longitudinal study of an individual with chronic moderately severe Wernicke's aphasia following CILT. Improved naming was correlated with patterns of activation resembling consistently correctly named pictures. Increased effort and decreased accuracy were correlated with greater spatial extent and degree of activation including LIFC, a pattern maintained six months post-treatment. This longitudinal case study complements a small, growing literature documenting neuronal reorganization following treatment-induced improvements in, and maintenance of, naming in poststroke aphasia.

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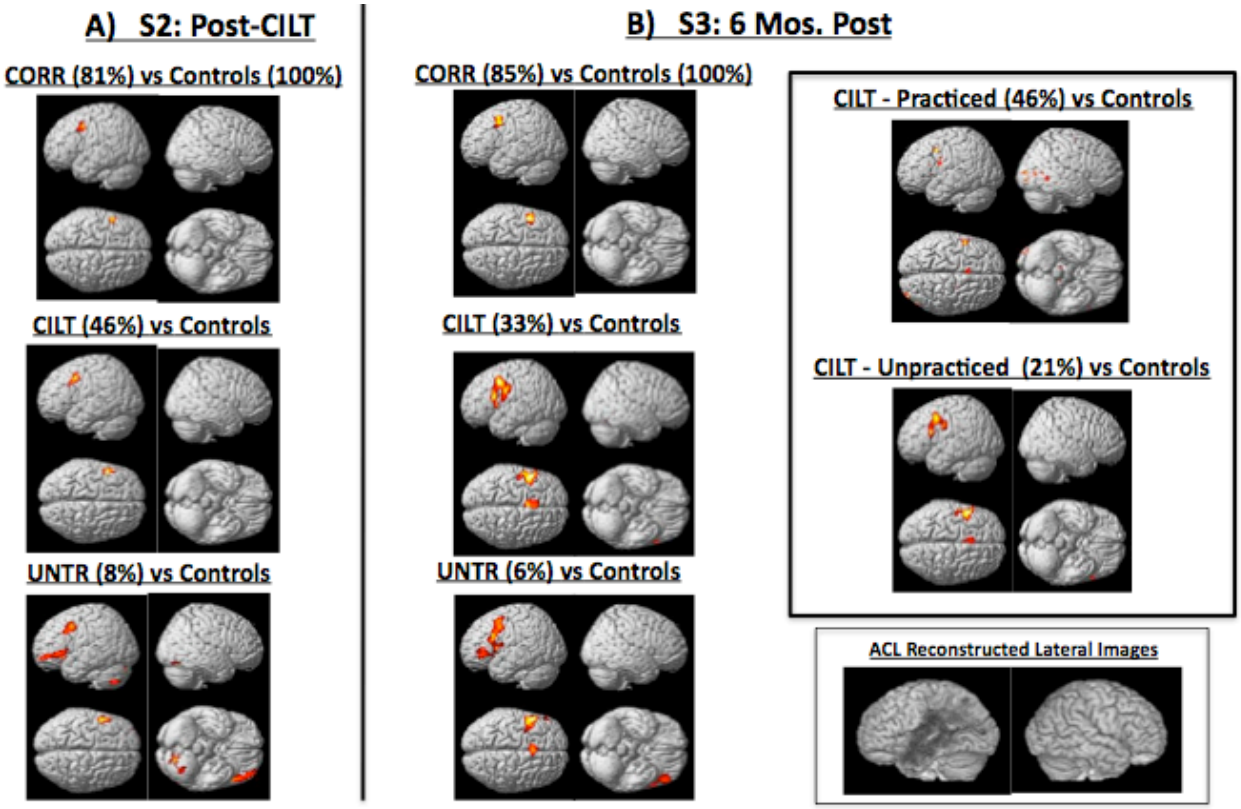

Figure 1. BOLD signal increases observed during naming of consistently correct (CORR), trained (CILT) and untrained (UNTR) pictures vs. the control task (saying "PASS" when viewing shape and line patterns) at two time points: A) post-CILT therapy; and B) six months post-therapy. Note difference between practiced and unpracticed CILT pictures vs. controls (inset). Significant regions of activation (shown here at $p < 0.001$ uncorrected for display purposes) were rendered onto a standard 3D anatomical template; ACL's reconstructed lateral 3D images shown in lower right corner. *Numbers in parentheses* indicate accuracy on the task in the scanner.

Presented by: **Kurland, Jacquie**

133. Photography as a Means of Expression: Performance as Related to Aphasia Severity and Nonverbal Cognitive Status

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Introduction
Drawing is used to help people with aphasia (PWA) circumvent verbal communication problems and painting as way for PWA to convey emotions. Reports of photography with PWA are rare although Levin, et al. (2007) demonstrated its effectiveness. In this paper we describe photo workshops conducted with 15 PWA and report findings regarding relationships between the quality of photographs produced by participants and their aphasia severity and nonlinguistic cognitive status.

The Study
Participants (see Table):
• 15 PWA, ages 46 to 82 (M=69 years), 7 months to 13 years post onset (M=5.5 years)
• Aphasia severity (Aphasia Diagnostic Profiles) ranged from 9th to 95th (M=43rd)
• Nonlinguistic cognition scores (Cognitive Linguistic Quick Test : Symbol Cancellation, Symbol Trails, Design Memory, Mazes, and Design Generation) ranged from 4 to 43 (M=26.5 of 49 points)

Two Photography Workshops:
• 10 sessions (average rate = 2 per week)
• Instructor: Photographer/college professor
• Assistants: SLPs and university students
• Equipment: Digital cameras

Weekly Topics:
• "Reading" photographs
• Camera operation/strategies
• Light/tone/color
• Compositional tools/design concepts
• Difficult lighting situations
• Exposure Controls, Depth of Field, Focus

Primary homework assignments:
• Close-ups
• Light/tone/color
• Portraits/self-portraits
• Indoor/outdoor photos

Instructor downloaded participants' photos from camera memory cards and selected best images for group analysis/discussion.

Photo Image Scoring Procedure:
• Instructor chose three photos from each participant that she judged "weak", "moderate", "good" (three in each category)
• Images presented in random, blind order to five college students of photography for rating
• 5-point Likert Scale: Fully Agree (1)]to Fully Disagree (5) used to rate seven aspects of photographs
— Image objects easy to name
— Critical elements in focus
— Textures clear
— Image well composed
— Image conveys emotions
— Intent of photographer clear

— Overall, image good
— Summary Rating: Sum of aspect ratings (low scores = better photographs)

Analyses and Results
Student summary ratings scores for photographs were in keeping with the “weak”, “moderate”, “good” judgments of the instructor. Neither aphasia severity nor non-linguistic cognitive scores correlated significantly with summary ratings. Aphasia severity did correlate with photographers’ ability to convey emotions ($r_s(13) = -.594$, $p=.02$). A strong correlation ($r_s(13) = -.629$, $p=.01$) was found between aphasia severity score and variability in photo image quality (as measured by standard deviations of the nine photo summary ratings.)

Discussion
Aphasia severity correlated significantly only with ability of photographers to express emotions and variability of the quality of their images. No relation was found between nonlinguistic cognitive scores and performance. All-in-all, photography workshops appear to be a viable activity for PWA.

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Presented by: **Helm-Estabrooks, Nancy**

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134. Comprehension, Maintenance, and Generalization after Treatment for Anomia in Semantic Dementia

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Semantic dementia (SD) is the fluent subtype of primary progressive aphasia. The earliest and most devastating feature of SD is a loss of word meaning that is reflected in poor auditory word comprehension and anomia. Recent investigations addressed the effectiveness of interventions for naming deficits focusing largely on post-treatment expressive abilities. This study evaluated the effect of therapy on comprehension of treated words, maintenance and generalization, in addition to improvements in naming.

A technique that has attracted recent interest in language rehabilitation is errorless learning, wherein individuals are prevented from making errors when learning information. We have recently reported on the benefits to naming of combining errorless and effortful (self-generated) processing in SD. Here, we explored the benefits of four treatment methods on improving comprehension in patients with SD, and evaluated maintenance and generalization of post-treatment gains. The four methods used in word re-training were
(1) Errorless-Experimenter Provided: cues and words are provided by the experimenter in an error-free learning environment;
(2) Errorless-Subject Generated: participants generate cues and words in an error-free learning environment;
(3) Errorful-Experimenter Provided: cues and words (both with errors) are provided by the experimenter;
(4) Errorful-Subject Generated: participants generate cues and are allowed to make naming errors.

Methods
Seven individuals with SD participated. Four balanced lists of 30 words each were randomly assigned to the four different training methods. Learning of picture names occurred during six hourly sessions per list, spread over 2-3 weeks. Naming and comprehension of treated words were tested immediately after the treatment stopped, followed by additional naming probes at 1 and 3 months later. Measures of post–treatment generalization addressed naming, comprehension and state of semantic knowledge.

Results
Naming: The Errorless Self-Generated approach was previously reported as significantly better than all other approaches ($p<.001$, Friedman's ANOVA).
Comprehension: The four methods were equally beneficial in retraining semantic features necessary for a successful recognition of treated words ($p>.5$, Friedman's ANOVA).
Maintenance: Naming gains were maintained at significant levels at 1 month and 3 months post-treatment ($p<.05$ for all methods, McNemar Change Test).
Generalization: Positive changes were observed on measures of naming and comprehension after treatment ($p<.05$, McNemar Change Test), but not on general semantic knowledge.

Conclusion
This study confirmed that improvements in word retrieval are possible in SD, despite a steady language decline. It also demonstrated that working on semantic features while addressing naming skills can improve comprehension of treated words. The combined effects of improved naming and comprehension were associated with post-treatment generalization measures. This study has the potential to identify mechanisms underpinning successful language therapy in SD and to fine tune therapeutic interventions for patients with progressive language disorders.

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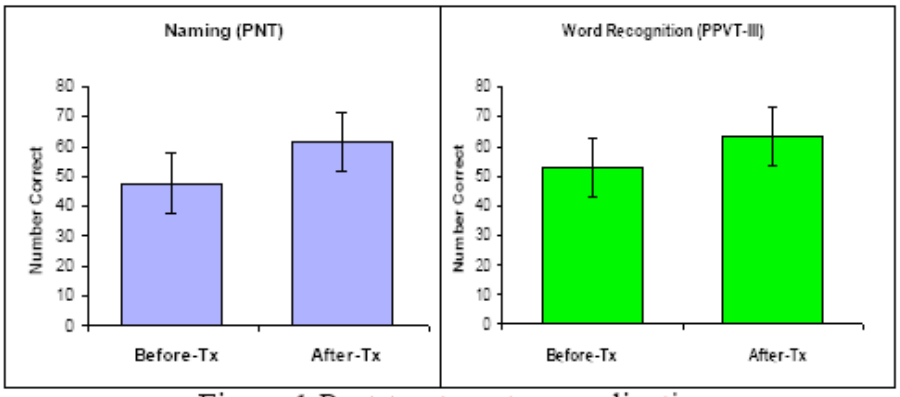

Figure 1 Post-treatment generalization

Presented by: **Jokel, Regina**

135. Issues in the Management of Subjects with Aphasia in India: A Survey

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Introduction
The prevalence of aphasia in India is estimated to be about 39 million (http://stanford.wellsphere.com/brain-health-article/statistics-by-country-for-aphasia/242274). However, there have not been any attempts to explore the issues in the management of subjects with aphasia in India. In this context, an online survey was designed to target the SLPs working with aphasic subjects in India.

Method
A custom-made brief survey was developed (www.kwiksurveys.com) and electronically mailed to a group of 540 SLPs. The e-mail addresses of the participants were retrieved from the Indian Speech and Hearing Association official directory (http://ishaindia.org.in/directory.html). The responses were collected for a period of one month.

Results
Among the 540 emails sent, 103 failed to deliver. During the survey period, 56/437 (12.81%) participated in the survey. Forty nine (87.5%) respondents were directly involved in the management of subjects with aphasia. Twenty six (46.42%) had less than five years of experience whereas 33.92% (19) had 5-10 years of experience and 11 (19.64%) had more than 10 years of experience in the management of subjects with aphasia. The majority of them (26/56; 46.42%) worked in institutional settings; 19 (33.92%) worked in hospital settings, 7 (12.5%) in university settings and 8 (14.28%) participants worked privately. Most (71.42%) had a Master's degree; 16.07% had a doctoral degree and 12.5% had Bachelor's degree.

Forty eight (85.71%) SLPs experienced problems in the management of aphasia. Most of them (91.07%) experienced client-related problems such as financial (52.14%), acute stage of the disorder (50%), proximity of the clinics (47.82%), poor motivation (43.47%), poor family support and associated problems (e.g., hemiplegia) (39.13% each). Sixteen (28.57%) participants reported of clinician-related problems; the major issues included the lack of 'time-tested treatment techniques' and all except one reported 'lack of adequate time for extensive training.' Two participants reported that their did not prefer a profession involving the management subjects with aphasia. Among the 56 participants, 43 (76.78%) reported that subjects with aphasia are often discharged from the hospital immediately after the acute medical management, without considering their post-morbid life as the individuals in the society, whereas 13 (23.21%) did not report this. Furthermore, 50 (89.28%) participants felt that the concerned authorities should set up rehabilitation centres for subjects with aphasia whereas six participants did not agree with it. When asked who the concerned authorities were, 31 participants (55.35%) answered it as government, 37 (66%) identified hospitals and 45.65% suggested that it could be non-governmental organizations (NGOs). The participants were given an opportunity to select more than one option, if relevant.

Discussion
The survey revealed several potential issues in the management of subjects with aphasia in India. It is expected to draw more attention to the management as well as to potentially contribute to the policy-making for subjects with aphasia. In addition, the survey is also expected to increase the awareness about the issues in management of subjects with aphasia in India at the international level.

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Presented by: **Krishnan, Gopee**

136. Functional Impact of CILT in Early Aphasia Rehabilitation: A Case Study

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Introduction
Constraint induced language therapy (CILT) studies have demonstrated positive outcomes on various language tests for chronic aphasia, but have only to some degree investigated the impact on everyday communication (Pulvermüller & Berthier, 2008). Recently, Pulvermüller & Berthier (2008) focused on the communicative relevance of the picture material for meaningful activation of speech, interaction and generalization to every day living. While most outcomes from CILT have dealt with chronic aphasia, we reported a positive outcome using CILT in early aphasia rehabilitation (Kirmess & Maher, 2008). This study aims to further explore the impact on functional communication outcome of CILT in early aphasia for two additional cases.

Methods
A pre-posttest intervention study was carried out with two Norwegians (LL, 78 & MX, 51) with aphasia and AoS following first time left MCA CVA. Treatment (TX) began five (LL) and thirteen (MX) weeks post onset and was delivered approximately 3 hours a day for 10 days. TX involved card games using pictures of items with communicative relevance for daily living and requiring spoken interaction in either 1-to-1 interactions with an SLP or in a small group setting. A standardized language battery (The Norwegian Basic Aphasia Assessment (NGA), TROG-2, VAST, PALPA, CILT baseline measures, Cookie theft, NGA-interview) and the CETI (Lomas et al., 1989) were administered pre and post TX.

Results
Preliminary analysis indicated an average improvement of 15% (LL) and 21% (MX) for all verbal speech production tests but not in auditory comprehension (Table 1). Communicative effectiveness (CETI) was rated by a close family member, yielding changes of the average CETI score of 16 points for LL. Lomas et al. (1989) suggested a 12 point cut-off for a significant change on the CETI, indicating a reliable increase for communication effectiveness for LL. MX`s rating was at ceiling pre-TX, which persisted post TX; however, personal comments from MX`s significant other indicated a more communicative attitude and larger vocabulary than before the CILT intervention.

Discussion
Results suggest that both subjects improved after CILT TX. Furthermore, improvement may also be seen in functional communication as measured by the CETI. However LL`s increased results in reading comprehension and writing could not be solely explained by the CILT treatment, suggesting that influence of natural recovery on the results must be considered. Results of this study support the applicability of CILT to early rehabilitation and its impact on functional communication.

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Table 1 Pre-post test results for CILT intervention in percentage correct answers, Case LL & MX

	LL		MX	
Assessment	Pre test	Post test	Pre test	Post test
Verbal speech production tests in percentage correct				
CILT baseline measure	25	81	63	87
NGA* -repetition	92.5	97.5	65	90
NGA* -naming	88	90	89	100
NGA* -reading aloud	65	65	81	96
PALPA (54 - naming frequency)	57.5	72.5	85	100
VAST (VOST) - sentence construction	75	85	60	95
Implicit/written tests in percentage correct				
TROG -2	60	61	91	96
NGA* -comprehension	83	82	97	100
NGA* -reading comprehension	48	72	100	100
NGA* -writing	10	30	70	80
Commutative effectiveness index in points				
CETI	60	76	100	100

Note: PALPA, VAST, TROG-2 and CETI are standardized Norwegian editions of the original tests.
* NGA = Norwegian Basic Aphasia Assessment

Presented by: **Kirmess, Melanie**

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137. Adaptive Interaction: Communicating with People with Very Advanced Dementia Using Imitation

Ellis M., Astell A.
University of St. Andrews

Adaptive Interaction is a new approach to interacting with people who have very advanced dementia and can no longer speak. Adaptive Interaction is based on Intensive Interaction (II), an approach using imitation to communicate with people born with severe and profound intellectual disabilities We present data on the use of imitation with five people with very advanced dementia which illustrate the promise of Adaptive Interaction for promoting and supporting communication between people with advanced dementia and those who care for them.

Introduction
Intensive Interaction (II; Hewett, 1996; Nind, 1999) is a communication technique focusing on non-verbal and subvocal exchanges with little or no involvement of speech. Caregivers attend to and imitate their partner's nonverbal behaviour and join in with their rhythms, sounds and vocalisations. By responding in ways that are familiar to the person with severe communication difficulties, it is possible to "learn their language" and build relationships without speech (Caldwell, 2005).
Adaptive Interaction is an attempt to learn the language of people with very advanced dementia who experience communication barriers from progressive loss of speech coupled with severe cognitive problems. Investigation with a single individual with advanced dementia suggested that imitation has promise as a communication technique in dementia (Ellis & Astell, 2005). The present study extends the exploration of the communicative function of imitation to a group of nonverbal people with very advanced dementia.

Method
Using a small 'n' multiple baseline design, five people with very advanced dementia participated in a total of six sessions each with a communication partner (i.e. total study sessions = 30). This included a minimum of 2 AI sessions per person giving a total of 15 baseline and 15 AI sessions across the 5 participants. Instances of communicative imitation by the people with dementia and the communication partner were recorded.

Results and Discussion
Comparison across all participants with dementia between the baseline and AI sessions revealed significant increases in communicative imitation by the people with dementia in the AI sessions (Table 1. p

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Nind, M. (1999). Intensive interaction and autism: a useful approach. British Journal of Special Education, 26(2), 96-102.

Table 1. Mean (SD) amount of imitation of communicative bids by people with dementia and communication partner

	Baseline	Adaptive Interaction
People with dementia	0.1(0.3)	1.7 (2.3)
Communication partner	1.9 (3.1)	24 (8.9)

Presented by: **Ellis, Maggie**

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138. Effects of Intensive Aphasia Therapy on the N400: Evidence from Chronic Aphasics

Newman A. [1], O'Rourke H. [2], Wozniak L. [3], Kosotpoulos E. [3], D'Arcy R. [4], Marchand Y. [4]
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We investigated the effects of a 4-week intensive aphasia therapy program (InteRACT) on patterns of brain activation measured with event-related brain potentials (ERPs) in nonfluent, chronic aphasics. Our goal was to characterize the effects of intensive therapy on the N400, an ERP effect associated with lexical processing. Evidence suggests that intensive therapy can lead to significant improvements in language ability even in chronic aphasics. Since patients undergo a clearly defined and consistent therapeutic regimen, and clinically significant gains may be realized over a relatively short timespan, this presents an ideal opportunity for investigating the neural bases of recovery from aphasia.

We recorded brain activity using ERP while aphasics (n = 5) performed a picture-name matching task, both before and after 4 weeks of intensive (approx. 25 hours/week) therapy. As well, neurologically intact, age matched controls (n = 11) and aphasics (n = 4) in standard-of-care (non-intensive, 1-2 hours/week) speech-language therapy participated, tested twice with a 4 week interval in between. On each trial in this task, a picture of a common object was presented followed 1 sec later by a spoken label that either matched or did not match the object displayed. Participants indicated whether the picture and label were a match or not via button press.

ERP results showed that in neurologically intact controls, an N400 was elicited for picture-label mismatch trials relative to match trials. The amplitude, timing, and distribution of the N400 was highly stable across the two testing

sessions 4 weeks apart. In contrast, the N400 was highly variable between aphasic participants, with generally delayed latency and reduced amplitude. The N400 was quite stable across testing sessions for individual aphasics in standard-of-care therapy. In contrast, aphasics in the intensive therapy program who showed clinically significant gains on standardized tests, also showed changes in the N400. Specifically, the latency of the N400 was reduced (suggesting faster processing), and the amplitude was, in most patients, increased.

Presented by: **Newman, Aaron**

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139. Investigating Speech as a Source of Biomarkers for Changes in Cognition, Executive Function and Mood

Pénard N., Counihan S., D'Arcy S., Rapcan V., Reilly R., Robertson I.
Trinity College Dublin

Depression, dementia, and mild cognitive impairments are the most common pathologies that may prevent the elderly from remaining independent. These diseases gradually impair executive function in the elderly, making it hard to detect without thorough testing. Complete neuropsychological assessments are cumbersome, expensive and time consuming. It would be greatly beneficial to find non-invasive and automated ways to constantly monitor memory, mood and executive function without face-to-face testing. Speech is a potential candidate for providing biological markers for changing cognitive functions.

In a longitudinal study, we assessed 30 elderly participants first in a clinic setting, and then in 7 consecutive home-based phone interviews at one-month intervals. For each of these interviews, we recorded the participants' performance in a Word List recall task (Immediate and Delayed), a category fluency task (alternatively: animals, vegetables and fruits) and a Mood test (short version of the PANAS). The participants also read a short narrative passage and performed a verbal description task requiring executive function. During this last task, the participants had to describe pictures without using a set of keywords. These keywords were important elements in the pictures that were difficult not to use in a verbal description. These two tasks were digitally recorded on a computer. Using automated algorithms, we extracted a set of physical features of speech for these two recordings (e.g., number of pauses, mean pause durations, etc.).

Using correlational and multivariate techniques, we investigated whether the speech parameters predicted the score results from the neuropsychological tests. We also compared variability indices within and between participants for the different assessments.

The results are discussed as possible ways of using these speech parameters to estimate the state of memory, executive function and mood of the elderly living at home. Accurate predictions of cognitive and mood states could lead to the design of devices and procedures allowing for a painless and timely diagnostic of abnormal aging.

Presented by: **Pénard, Nils**

Poster Session 4: Syntactic Representations and Processes-2

140. Syntactic and Memory-Based Effects in Aphasic Agreement

Slevc L., Banneyer K., Martin R.
Rice University

Speakers sometimes erroneously produce plural agreement for a singular subject when another noun in the sentence is grammatically plural (e.g., "The box near the windows _were_ open"). The little work investigating these attraction effects in agrammatic aphasic patients has yielded mixed results: some evidence suggests only syntactic factors influence agreement errors (Hartsuiker, Kolk, & Huinck, 1999) while other work shows influences of both syntactic and semantic factors (e.g., Vigliocco & Zilli, 1999). Because the left inferior frontal damage implicated in Broca's aphasia is also implicated in semantic short-term memory (STM) deficits (Martin & Romani, 1994), these previous data may confound STM deficits and agrammatism. Thus, the present study elicited agreement errors in three patients with severe semantic STM deficits and varying degrees of agrammatism to investigate the role of syntactic and semantic factors in agreement production.

Patients and controls repeated sentence preambles and continued with a verb (is/are) and a visually-presented adjective. Critical preambles contained singular matrix nouns and manipulated the grammatical number and semantic plausibility (compare (1) and (2) below) of intervening nouns.

(1) The box near the window(s)... (OPEN)
(2) The box near the table(s)... (OPEN)

Because patients with semantic STM deficits accurately detect noun-verb number agreement errors even across intervening material (Martin & He, 2004; Martin & Romani, 1994), we predicted these patients to show relatively normal effects of grammatical attraction. However, as these patients have deficits in semantic STM, they were predicted to show stronger than normal effects of semantic plausibility (either because of rapid decay of the controlling noun or excessive interference between possible controllers).

Contrary to our prediction, all three patients showed substantially greater syntactic attraction effects than did controls; however, the size of this effect was not correlated with the degree of agrammatism. Two of three patients also showed greater semantic plausibility effects than controls. These findings suggest that producing an agreeing verb involves a search in STM for an appropriate controlling noun, which may be confused with other elements in memory that have similar properties, especially when the interfering noun is semantically consistent with to-be-produced material (cf. Badecker & Kumiak, 2007). Current work is testing a further prediction of this account: that these patients will be impaired at detecting agreement errors in sentences including potential controllers with mismatching features.

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Presented by: **Slevc, L. Robert**

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141. Neural Correlates of Storage and Computational Costs in Sentence Comprehension

Woodbury R. [1]*, Caplan D.* [2]
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Introduction
Processing syntactic structure involves both memory and computational operations. In the present study, we examined the neural basis of memory and computational costs in parsing and sentence interpretation using fMRI. We explored memory costs by adapting stimuli from Chen (2004) that have shown behavioral effects of Gibson's (1998, 2000) "storage" costs, which vary the number of thematic roles predicted by a verb without introducing additional differences in the type of predicted element or the word order of the sentence. We explored computational costs by varying the number of thematic roles that have to be assigned when a verb is encountered. This study differs from previous studies in that it focuses on two aspects of verb arguments: the expectations set up by the number of arguments of a verb, and the costs incurred because of the need to satisfy each of the arguments of a verb.

Stimulus Materials
Storage Costs
Obligatory Transitive: Mary published a book which had impressed some critics and a young child
Optional Ditransitive: Mary read a book which had impressed some critics to a young child.
Obligatory Ditransitive: Mary gave a book which had impressed some critics to a young child.

In the storage cost sentences, the obligatorily transitive and optionally ditransitive sentences require the prediction of one noun phrase to complete the sentence grammatically, while the obligatorily ditransitive sentences require the prediction of two noun phrases.

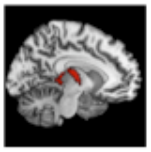
Computational Costs
Transitive: The conductor realized that the train was ready to board.
Intransitive: The conductor realized that the train was ready to leave.

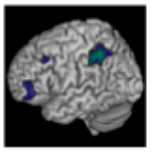
In the computational cost sentences, the transitive sentences require two thematic roles to be integrated at the verb, while the intransitive sentences only require one thematic role to be integrated.

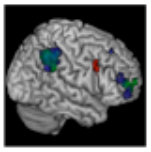
Experimental Methods
12 right-handed native speakers of English read plausible and implausible sentences in a rapid-presentation event-related (RPER) fMRI paradigm and made plausibility judgments of these sentences. Only responses to plausible sentences were considered when constructing the contrasts and statistical activation maps for the fMRI experiment to eliminate potential responses arising from the detection of implausible or impossible scenarios. Structural and BOLD-sensitive functional MRI images were obtained with a 3T Siemens Trio scanner (Siemens Medical Solutions USA Inc., Malvern, PA, USA). All preprocessing and statistical analysis of the fMRI data was performed using the SPM5 software package.

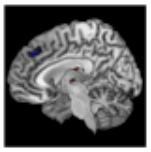
Results

	Region	BA	p cluster	cluster size (in voxels)
Computation: transitive – intransitive				
1. L Thalamus (Pulvinar)			0.032	71
2. L Thalamus (Medial Dorsal Nucleus)			0.001	198
3. R Middle Frontal/Precentral Gyrus		9, 6	0.018	89
Storage: obligatorily ditransitive – optionally ditransitive				
1. R Inferior Parietal Lobule/Supramarginal Gyrus		40	<0.001	901
2. L Inferior Parietal Lobule		40	<0.001	623
3. L Middle Frontal Gyrus		10	<0.001	221
4. R Anterior Cingulate, Middle/Superior Frontal Gyrus		10	0.003	99
5. R Middle Frontal/Superior Frontal Gyrus		10, 9	0.004	88
6. L Middle Frontal Gyrus		8	0.006	77
7. R Cingulate/Medial Frontal Gyrus		32, 8	0.001	120
Storage: obligatorily ditransitive – obligatorily transitive				
1. L Inferior Parietal Lobule		40	<0.001	304
2. R Inferior Parietal Lobule		40	<0.001	465
3. R Middle Frontal Gyrus		10	0.014	65
4. R Middle Frontal/Superior Frontal Gyrus		10	0.012	68









Conclusions

Neural correlates of computational and storage costs are individually demonstrable and spatially distinct.

Neural correlates of the two separate storage cost contrasts overlap in four common regions, indicating that similar processes are taking place in these two related contrasts.

Results are consistent with behavioral results using similar stimuli, which indicate that transitive sentences have higher processing costs than intransitive sentences, and obligatorily ditransitive sentences have higher processing costs than optionally ditransitive and obligatorily transitive sentences, with no cost difference between optionally ditransitive and obligatorily transitive sentences.

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Acknowledgments

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Presented by: **Caplan, David**

142. Treating Written Verb and Written Sentence Production in an Individual with Aphasia: A Clinical Study

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University of Reading

Background
Written language is an important communication modality for some people with aphasia. Although there has been some important work in this area, e.g. Mitchum, Haendiges and Berndt (1993), the efficacy of treatments for written verbs and sentences is less well explored in comparison to treatments for spoken verb and sentence production deficits. We document the efficacy of a treatment to improve written production of verbs and sentences in an individual with aphasia. Specifically, (a.) to improve the production of written subject-verb sentences (involving intransitive verbs) and (b.) to improve the production of written subject-verb-object sentences (involving transitive verbs). This treatment enabled us to compare acquisition of intransitive and transitive verbs in the written modality.

Method
The participant, LW, was a 63 year old right-handed female aphasic speaker, following an infarct at the age of 56 (left middle cerebral artery). She had a marked language comprehension deficit, moderate apraxia of speech, relatively good spelling abilities and no hemiplegia. A multiple-baseline single-subject experimental design was adopted. Two pre-treatment baseline measures were taken before the beginning of treatment (a week apart) and these were followed by ten weekly treatment sessions, each lasting about an hour. One maintenance measurement was taken three weeks after the end of treatment. The stimuli involved 12 intransitive verbs and consequently subject-verb (SV) active sentences and 15 transitive verbs permitting subject-verb-object (SVO) active non-reversible sentences. A control task, letter spelling to dictation was used to evaluate the specificity of the intervention. The treatment was undertaken in the context of UK clinical practice and was guided by a psycholinguistic model of spoken sentence production (Bock & Levelt, 1994).

Results and Discussion
Statistical improvements were noted for the trained sets of sentences. LW's performance during treatment is shown in figure 1. At baselines (B1, B2), stability of performance was demonstrated. During treatment (T1 - T10) performance began to improve. At post-treatment (M) there was evidence of a decline for sentences with transitive verbs whereas performance on sentences with intransitive verbs was maintained. This trend is concordant with Thompson's (2003) argument structure complexity hypothesis, positing that the greater the number of arguments associated with a verb the poorer the performance. Other clinically significant quantitative and qualitative improvements were also noted in LW's ability to retrieve other verbs and construct written sentences although treatment did not generalise to letter spelling to dictation, spoken sentence comprehension nor written discourse production.

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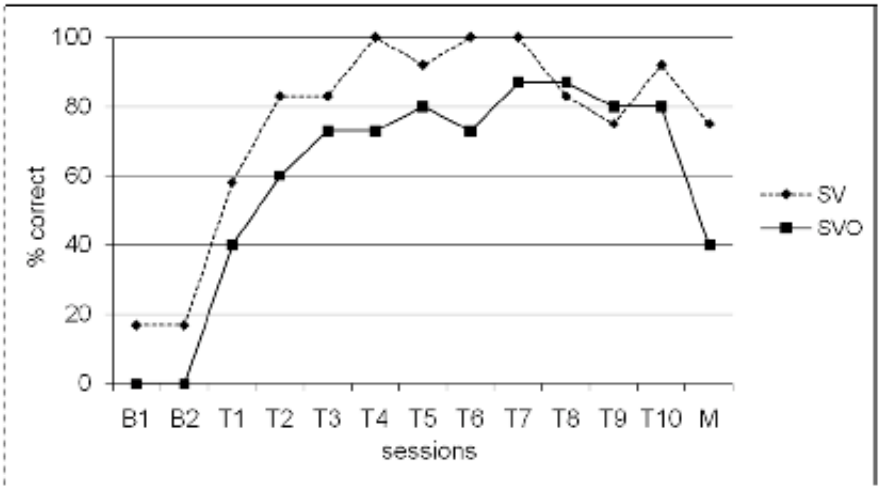
Figure 1 Transitive and intransitive sentences



Presented by: **Salis, Christos**

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143. Neuroplasticity and Recovery from Aphasia: Treatment-Induced Recovery of Verbs and Sentence Production

Riley E., Den Ouden D., Lukic S., Thompson C.
Northwestern University

Introduction
Many agrammatic aphasic speakers show greater difficulty producing verbs compared to nouns, with the greatest difficulty associated with argument structure density (Thompson et al., 1997). Verb production deficits are also associated with sentence production deficits, and improved verb retrieval has been linked to improved sentence production (Schneider & Thompson, 2003). The Complexity Account of Treatment Efficacy (CATE; Thompson et al., 2003) suggests that treatment proceeding from more to less complex verbs might result in the greatest treatment effects. Further, recent studies examining the neural correlates of recovery from aphasia suggest that such training will influence the neural substrates of verb production.

The purpose of the current study was to examine generalization effects of training verbs with complex argument structure on retrieval and use of verbs with less complex argument structure, while examining the neural mechanisms of recovery. It was hypothesized that training three-argument verbs would result in generalization to less complex verb types for both verb naming and sentence production, and that behavioral changes would be associated with observable shifts in brain activation patterns from pre- to post-treatment.

Methods
Using a single-subject multiple baseline design across participants and behaviors, six agrammatic aphasic speakers were trained using three-argument verbs and generalization was examined to transitive and intransitive verbs. Training occurred in simple active sentence contexts and involved verb naming and thematic role activities using pictures and written sentence constituent cards. Verb naming and argument production accuracy were measured with daily sentence production probes administered before each training session. Performance was evaluated based on the proportion of (a) sentences produced with the correct verb (regardless of argument structure), and (b) sentences with correct verbs also produced with correct argument structure. Before and after training, each participant named intransitive and transitive verbs from action videos in an event-related functional MRI (fMRI) task.

Results & Discussion

All but one participant showed improved ability to name three-argument verbs; however, none showed generalization to transitive or intransitive verb naming. With regard to the effects of verb naming on improved sentence production (i.e., argument structure access), two patterns emerged. Two participants demonstrated improved verb retrieval with concomitant improvements in argument production for verbs correctly produced (Figure 1a, b). In contrast, four participants demonstrated improved verb retrieval while argument production remained high (Figure 1c, d). All participants showed pre- to post-treatment changes in fMRI activation patterns with differences across participants related to several factors including site and extent of lesion. These findings will be discussed in relation to their theoretical implications.

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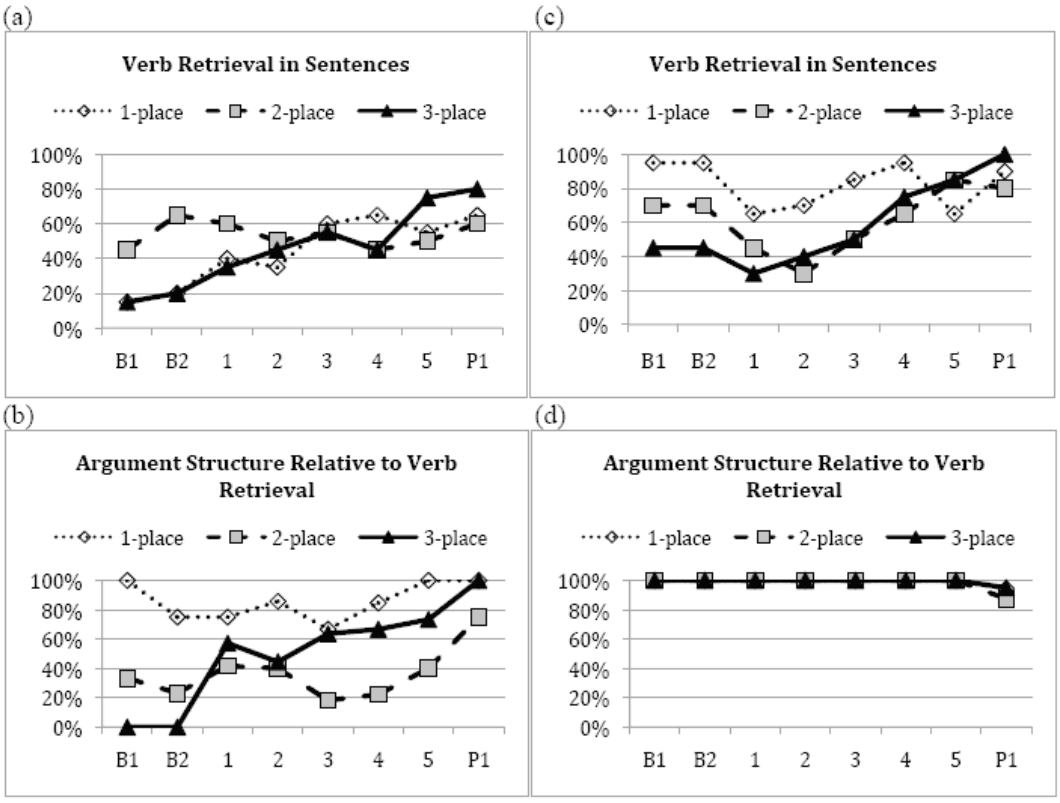
Figure 1. a, b: Example of one participant's improved verb production (in sentences contexts) and simultaneously improved argument structure production (in sentences). c, d: Example of one participant's improved verb production (in sentence contexts) with maintenance of intact argument structure production for the verbs retrieved.



Presented by: **Riley, Ellyn**

144. Neural Basis of On-Line Processing of Words and Sentences in Aphasia Revealed by Voxel-Based Lesion-Symptom Mapping

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Introduction
Language comprehension is believed to rely on the integration of hierarchically organized linguistic levels ranging from phonetic to pragmatic aspects. While growing neuroimaging literature suggests that partially segregated specialized brain networks underlie the encoding of the different levels of spoken language, the critical role of specific regions remains to be demonstrated. The lack of neuropsychological evidence for the fine anatomo-functional organization of language processing comes notably from the limited specificity of the off-line comprehension tests traditionally used in the clinical evaluation of aphasia. On-line comprehension paradigms resolve this issue by allowing to recruit selectively language processing levels of interest, therefore providing a promising tool for the fundamental and clinical investigation of aphasia. Using a voxel-based lesion-symptom mapping, we investigated the neural underpinnings of on-line language comprehension in a large group of aphasic patients. In addition, our study addresses the relevance of on-line assessment in the characterization of aphasia in brain-damaged populations.

Methods
Forty right-handed French-speaking patients with a first unilateral left-hemispheric lesion underwent an on-line comprehension assessment composed of six subtests. The first test evaluates low-level phonetic processing using a syllable discrimination task within a meaningless syllable sequence. On the lexical level, two word recognition tasks were used, one assessing access to word form and the other to word meaning. On the morpho-syntactic and semantic-pragmatic (sentence) levels we used a word monitoring task assessing the access of syntactic and semantic properties.
A voxel-based lesion-symptom mapping was performed on a subset of 30 patients with available structural CT or MRI to explore the relationship between a on-line test performance and the brain damage sites.

Results
The anatomo-clinical correlations revealed clear associations between lesion locations and most of the tests of our on-line comprehension battery. Lesions to Broca’s area were associated with impairment in the phonetic test; sylvian damage with impaired word form recognition; and posterior cortico-subcortical damage with impaired word meaning recognition.
The on-line battery revealed no specific performance pattern associated with classical aphasia syndromes determined with off-line testing. This suggests that any linguistic levels can be impaired in different aphasia syndromes.

Conclusions
Anatomo-clinical correlations of on-line speech processing demonstrated the critical role played by specific networks in phonetic, lexical-semantic and semantic-pragmatic analysis of speech. Thus, our results support strongly evidence for segregated specialized brain networks that underlie the encoding of the different levels of spoken language.

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Presented by: **Schneider, Laurence**

145. Structurally Primed Passive Sentence Production in Agrammatic Aphasia: An Eyetracking Study

Cho S., Thompson C.
Northwestern University

Introduction
Difficulty producing passive sentences is common in individuals with agrammatic aphasia. Some studies have attributed this difficulty to structural impairments (e.g., Schwartz et al., 1994; Thompson & Shapiro, 2007), and others have attributed it to morphological impairments (e.g., Caplan & Hanna, 1989). However, the source of this deficit remains unclear due to methodological issues present in previous off-line studies. Given that passive morphology is essential for identification of passive structures, it is challenging to examine impairments in passive structures when passive morphology is impaired. To overcome this problem, this study used structural priming to elicit active and passive structures, and eye movements were tracked during production attempts to determine the source of passive production difficulty.

Methods
Participants. Nine individuals with agrammatic aphasia (age: 38-66, time post-onset: 2-17 years, WAB AQ: 71.2-82.4) participated in the study. All but one were right handed, well-educated, and demonstrated good visual and hearing acuity.

Stimuli and Procedures. 40 prime sentences (20 passives, 20 actives) were paired with pictures of target transitive events, which elicited target sentences. All sentences were semantically reversible and included two animate nouns and a transitive verb. On experimental trials, participants listened to and viewed a prime sentence, and repeated it aloud. Next a picture appeared, and participants were expected to describe it using the primed sentence structure. Participants' speech and eye movements were recorded.

Results and Discussion
Production accuracy data showed that passives were produced with relatively preserved morphology, but with substantial role reversal (RR) errors (42.2%). In addition, a high proportion of actives were produced for passives (37.61%). Onset latency of passives with RR was significantly longer than that of actives-for-passives (6907 ms vs. 4219 ms) ($p < .01$), which was significantly shorter than that of correct passives (5773 ms) ($p < .05$).

The eye movement data revealed greater processing costs for passives with RR than for correct passives, and RR responses were qualitatively different from actives-for-passives (Figure 1). Before speech (the PRE N1 region), participants gazed significantly longer at the object to be produced as N1 when producing RR as compared to correct passives ($p < .05$), indicating difficulty assigning the Theme to the subject position. However, when producing actives-for-passives as compared to correct passives, this difference was seen during speech (the N1-V region) ($p < .05$), but not before speech, indicating unprepared sentence production prior to speech onset. These on-line data (speech onset latencies and eye movements) provide evidence of real-time difficulties constructing passive sentence structure when morphology is relatively intact. The theoretical and clinical relevance of these data will be discussed.

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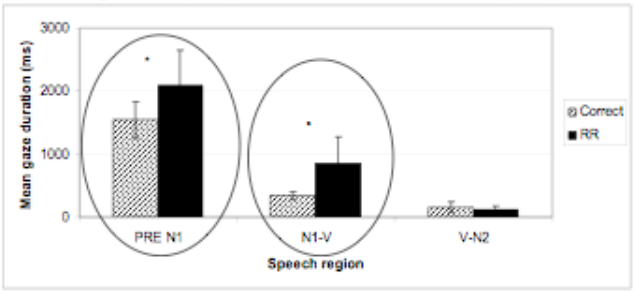
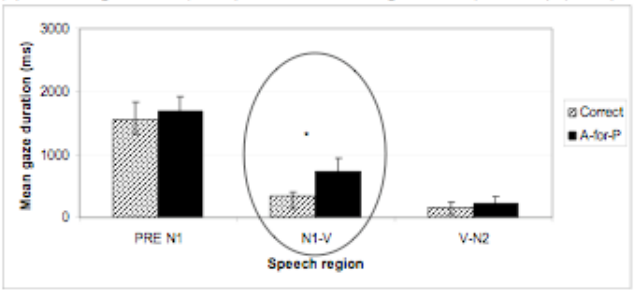
Figure 1. Mean gaze duration to N1 by speech region in correct and incorrect passives

(a) Correct passives (lined) vs. Passives with RR errors (solid)



(b) Correct passives (lined) vs. Actives-for-passives (A-for-P) (solid)



Presented by: **Cho, Soojin**

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146. The Effects of Distance on Reading Sentence Processing in Persons with Aphasia and Normal Individuals.

Sung J., McNeil M., Dickey M.
University of Pittsburgh

Introduction
Working memory (WM) has been used to account for sentence comprehension deficits in aphasia. However, the precise nature of WM and its effects on sentence comprehension remain underspecified in both normal and clinical populations. Gibson (1998, 2000) has argued that distance or locality is a critical factor consuming WM, and Grodner and Gibson (2005) investigated how distance affects the accuracy and speed of processing sentences with subject-verb (SV) and filler-gap (FG) dependencies in younger adults. The current study attempted 1) to investigate distance effects by replicating Grodner and Gibson's (2005) study and 2) to examine the effects of dependencies on sentence processing when distance is held constant between SV- and FG-dependency in persons with aphasia (PWA) and age-matched normal individuals (NI) using a self-paced reading task.

Methods
Twenty PWA (age: mean=60, SD=14) and 30 NI (age: mean=66, SD=12) participated in the study. The NI passed hearing, vision, memory, and language screens, and reported no history of communication, neurological, or psychiatric disorder. The PWA were defined by their performance on the Porch Index of Communicative Ability (Porch, 2001), the Revised Token Test (McNeil & Prescott, 1978), and the Assessment Battery of Communication in Dementia (Bayles & Tomoeda, 1993).
All participants read 240 sentences including 120 filler sentences presented using a word-by-word, self-paced reading method. The experimental sentences were constructed by manipulating distance, using three modifier

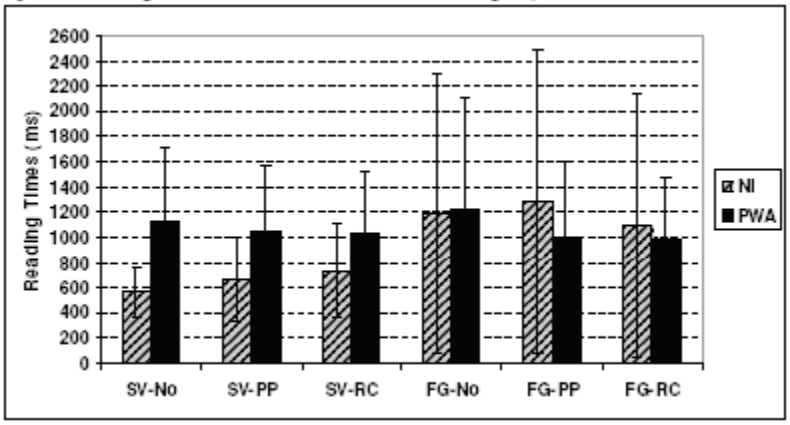
conditions (No modifier, Prepositional Phrase(PP), Relative-Clause(RC)), and two linguistic dependencies (SV vs. FG). Reading times (RT) for the embedded verbs and errors in yes/no questions served as dependent measures. A three-way ANOVA with group, modifier and dependency as factors examined distance effects. A two-way ANOVA with dependency and group as factors examined dependency effects when the distance was held constant between the two linguistic dependencies.

Results
A three-way ANOVA for the error data revealed significant main effects (all psNI) and dependency (FG>SV). RT analyses revealed a significant main effect of dependency (pSV) and group (PWA>NI). In the RT analysis, there was a significant main effect (p

Discussion
Although NI showed systematic distance effects in errors and RTs, the effects of distance were not evident in PWA. Furthermore, both groups showed more errors and longer RTs in FG than SV dependencies when the distance was controlled. These results indicate that greater computational loads were imposed by FG sentences than SV sentences when distance was held constant, for both PWA and NI.

Selected References
Grodner, D., & Gibson, E. (2005). Consequences of the Serial Nature of Linguistic Input for Sentenial Complexity. Cognitive Science, 29(2), 261-290.

Figure 1. Reading times on the embedded verbs for both groups



Presented by: **Sung, Jee Eun**

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147. The Role of the Left Inferior Frontal Gyrus in Sentence Composition: Connecting fMRI and Lesion-Based Evidence

Piñango M., Finn E., Lacadie C., Constable T.
Yale University

Introduction
We report on the neuroanatomical underpinnings of intermediate gaps (IGs), connectors triggered at the complementizer that whose function is to keep active an argument across clauses until it receives its semantic role (e.g.,Gibson & Warren, 2004). In the sample sentence below, the argument "the captain" receives a semantic role

from the subordinate verb “frighten”. To maintain the dependency that brings the argument to its predicate, an IG is created as the sentence unfolds yielding the interpretation:

The captain [who-“captain” the sailor predicted yesterday [that (IG-“captain”) the weather would frighten--“captain”]]...

Hence, IGs represent a clear marker of sentence-level (morphosyntax-semantics) composition. Consequently, knowing its cortical localization would shed light on the brain implementation of a fundamental organizing process involved in sentence structure.
Previous research shows LIFG activation associated with argument movement (e.g.,Grodzinsky & Santi 2008) working memory (e.g., Cooke et al.,2001, Fiebach et al.,2005), and semantic-role assignment (e.g., Piñango, 2004, Bornkessel et al.,2005). Crucially, IGs dissociate working memory from movement and semantic-role assignment and uniquely reveal real-time composition as they are triggered exclusively by sentence-composition demands (i.e., are not part of the lexicon). Hence LIFG recruitment by IGs would suggest that LIFG supports the real-time integration of syntactic and semantic structure involved in movement and semantic-role assignment; thus unifying previously disparate findings regarding LIFG function.

Methods
15 subjects were tested in a 1.5T magnet on four conditions (60 sentences/condition), pseudorandomly presented across 10 runs:

A. IG (^) & Argument_Gap(*):
The captain, who the sailor predicted yesterday ^that the weather would frighten *, turned back towards port.
B. Argument_Gap(*):
The captain, who the sailor’s prediction yesterday about the weather had frightened *, …
C. Argument_Gap violation:
The captain, who the sailor’s prediction yesterday about the weather had frightened the crew, …
D. No-gap:
The captain believed the sailor’s prediction yesterday that the weather would frighten the crew and …

Results
Initial results show unilateral LIFG and LpSTS activation at the complementizer (IGs) consistent with working memory activity to keep the argument active (Figure 1) and LIFG activation at the embedded verb (AGs) indicating semantic-role assignment (Figure 3).
Results also show sentence-level bilateral temporoccipital activation consistent with non-linguistic working memory/attention demands of multiclausal processing (Figure 2).

Discussion
Results support LIFG involvement in initial parallel syntactico-semantic real-time composition guided by argument-structure demands. We discuss these results within a model of brain-language relations that brings together representation and processing-based views of the LIFG and LpSTS.

References
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Gibson, E & Warren, T. (2004) Reading-time evidence for intermediate linguistic structure. Syntax 7:1,55-78.
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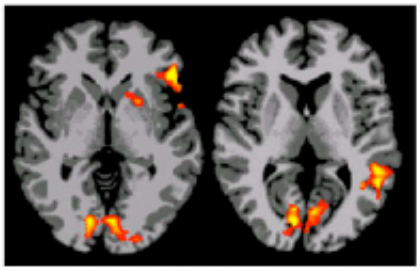

Figure 1. (A - D) *$p < .01$, corrected*

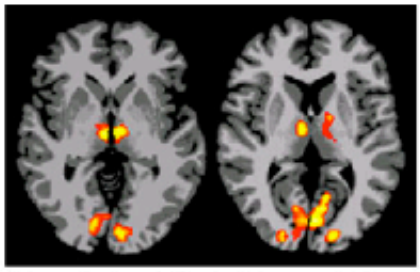

Figure 2. (B - D) *$p < .01$, corrected*

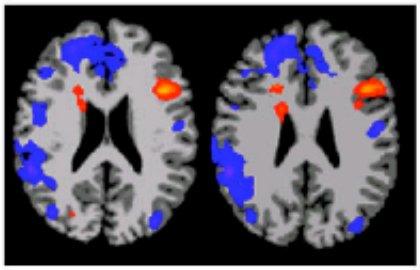

Figure 3. (B - C) *$p < .05$, corrected*

Figure 1. Activation in the left IFG and left pSTS during the processing of the intermediate gap, condition (A – D).
Figure 2. Bilateral temporoccipital activation associated with multiclausal processing. Note that whereas this is present in (A – D) and (B – D), only (A – D) reveals left IFG activation, showing its sensitivity to intermediate gaps.
Figure 3. Activation associated with processing of argument gaps (B – C) which replicates previous results (see Santi & Grodzinsky 2008 for a summary).

Presented by: **Piñango, Maria**

Poster Session 4: Conceptual and Semantic Processing

148. Abstract and Concrete Noun Processing in Healthy Older Adults using fMRI

Sandberg C., Kiran S.
Boston University Sargent College

Introduction
The difference in processing abstract and concrete words with a specific advantage for concrete words is called a 'concreteness effect' and has been shown to exist in normal and language-disordered populations (Paivio, 1991). Recent neuroimaging studies suggest the possibility of dissociable neural correlates for abstract and concrete word processing (see Binder, 2007, for a review). Binder, Westbury, McKiernan, Possing, and Medler (2005) found bilateral activation for concrete nouns and left-lateralized activation for abstract nouns in healthy young adults. To date, abstract and concrete word processing in normal, healthy older adults has not been addressed, although cognitive processes have been shown to change as a function of age (Cabeza, 2001) and persons with aphasia are usually older adults. The present study explores the processing of abstract and concrete nouns in healthy older adults in order to establish a baseline against which to compare the processing of abstract and concrete nouns in persons with aphasia.

Methods
Ten (five male, five female) monolingual, right-handed, English speaking adults aged 50-63 with no history of neurological disease participated in the experiment. All participants completed at least a high school education and did not display any cognitive or semantic deficits. Each participant completed a lexical-decision task and a word-judgment task presented in an event-related fMRI paradigm. The lexical-decision task was replicated from Binder et al. (2005) and consisted of 50 abstract, 50 concrete, and 100 pseudowords. The word-judgment task consisted of 50 abstract and 50 concrete nouns and 50 same and 50 different symbol strings. Each participant was asked to decide whether the noun was abstract or concrete and whether the symbols in each symbol string were the same or different.

Results and Discussion
In the lexical-decision task, concrete nouns produced greater overall activation and more bilateral activation than abstract nouns, which produced more right-hemispheric activation. This is contrary to the Binder et al. (2005) study, which resulted in greater left-hemispheric activation for abstract nouns but is consistent with bilateral activation observed in older adults (Cabeza, 2001). In the word-judgment task, abstract nouns produced greater overall activation and more bilateral activation than concrete nouns, which produced more left-hemispheric activation. The differences seen between tasks may be due to the nature of the control condition for each task and/or the degree of difficulty of each task. It is important to note that with the limited number of participants in this study, these findings are tentative.

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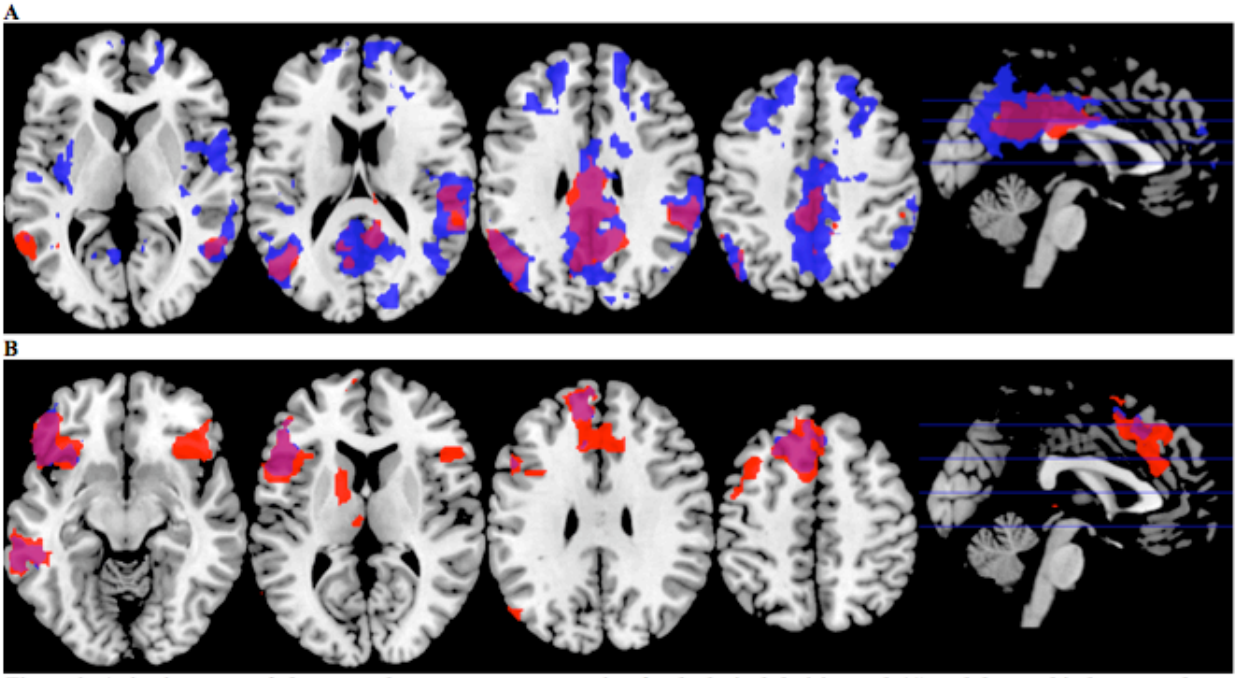

Figure 1: Activation maps of abstract and concrete noun processing for the lexical-decision task (A) and the word-judgment task (B). Red = activation for abstract nouns over control condition, blue = activation for concrete nouns over control condition, purple = overlapping activation.

Presented by: **Sandberg, Chaleece**

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149. Syntactic Structural Recursion or 'Theory of Mind' Type Embeddings in Aphasia

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[1] *Research Institute for Linguistics of the Hungarian Academy of Sciences, Budapest, Hungary,* [2] *Technical University, Budapest, Hungary*

The research has been supported by the National Scientific Research Fund (OTKA), project: NK72461.

It is a debated issue whether recursivity is a syntactic phenomenon or the source of recursion is semantics (Evans & Levinson, 2009). The issue: how aphasic impairment impinges on syntactic and/or semantic recursivity.

Tests have been conducted with four Hungarian aphasic subjects. Photographs representing situations were presented to subjects and questions were asked about them. The types of questions:
Type 1: What is X doing?
Type 2: What does X hate/want to do?
Type 3: What can be the most entertaining/urgent thing for X to do?
Type 4: What can X say/think ?

Type 1 questions did not restrict the structure of the answer. Type 2 and Type 3 questions allowed for recursive and non-recursive answers alike. In Hungarian, Type 4 questions could only be answered by using an embedded clause,

introduced recursively. We used 208 photographs for each test.

Results
Answers given by the 4 aphasic subjects have been classified in terms of whether they were structurally linked to the questions and were or were not grammatical.

The number of grammatical answers decreased from Type 1 to Type 2 and Type 3. Broca's aphasic subjects avoided giving recursive answers as a rule. See Table 1.
With respect to Type 4 questions (What does X say/ think ?), requiring a recursively embedded clause as an answer, the performance of three of the subjects turned out to be better than with Type 1 questions (What is X doing?); for one subject, it was almost as good. This result contradicts the expectation that building recursive structures should be more difficult than building non-recursive ones.

Wernicke's aphasics produced some conjunction-initial clauses and some clauses involving the subjunctive (the mood directly indicating subordination).

Broca's aphasics did not give any answers containing subordinating conjunction (a structural recursion). However, they produced statements that assumed the point of view of one of the characters seen in the photograph, rather than being purely descriptive. They answered as if they were in the "mental state" of the characters. These answers are referred to as "discourse statements." In them, the verb was inflected in the first, rather than the third, person singular, their meanings differed sharply from descriptive statements. 81.8% of Broca's aphasics' answers to Type 4 questions were discourse statements. For example:
The picture: A girl is showing her scar to a boy.
Question: Vajon mire gondol a fiú?
'What may the boy be thinking of?'
Patient's answer: Mindjárt rosszul leszek!
'I'm going to be sick'.
Possible recursive construction:
(Ő) arra gondol, hogy mindjárt rosszul lesz.
'He thinks he is going to be sick.'

Conclusion
These answers contain semantic-pragmatic operations with 'theory of mind' type embeddings instead of syntactic structural recursion. Semantic recursivity may remain selectively unimpaired in Broca's aphasia.

References
Evans, N., & Levinson, S. (2009). The Myth of Language Universals, in press: Behavioral and Brain Sciences.

Presented by: **Bánréti, Zoltán**

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150. Probing Semantic Memory with a Computerized Sorting Task

Kar J. [1]*, Den Hollander J.* [2]*, Clark D.* [3]
[1] *University of Alabama at Birmingham,* [2] *University of Alabama at BIrmingham Department of Medicine,* [3] *Birmingham VA Medical Center & University of Alabama at Birmingham Department of Neurology*

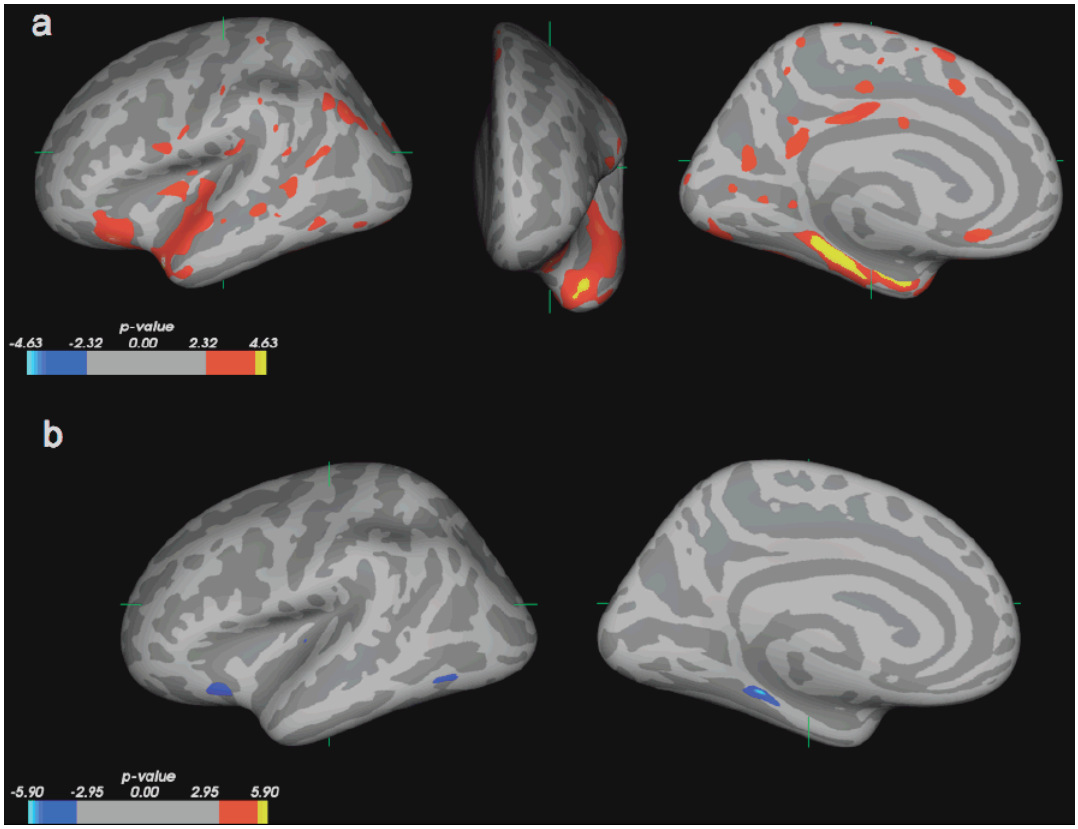
Background
Verbal fluency measures (including category and letter tasks) are among the most compact and widely used neuropsychological tests, and allow comparison of semantically cued lexical access to orthographically cued lexical access. However, the utility of these tasks is compromised by the need for subjects to verbalize, such that patients with aphasia, especially deficits of fluency, might decline to floor on both tasks. We explored the use of a computerized sorting task for quantifying semantic deficits in patients with semantic dementia, with the expectation

that elicitation of cued responses could reduce floor effects.

Methods
Thirty right-handed, English-speaking subjects were recruited, including 29 healthy controls (age 50.44 ± 20.01) and 3 semantic dementia (SD) patients (age 60.0 ± 5.29). The sorting paradigm consisted of three subtests, two of which required subjects to make a timed decision on black and white pictures, and one of which assessed raw reaction time to single letters. The first of the picture-decision tasks consisted of a series of pictures of animals, with subjects pressing the space bar for each bird and ignoring pictures of other animals. The second picture-decision task required subjects to press the space bar for each tool that was related to food or eating, but to ignore other tools. Subjects were given three seconds for each decision. Reaction times and errors were quantified. All subjects underwent neuropsychological tests and an MRI scan. The neuropsychological test battery included semantic fluency for seven categories (animals, fruits/vegetables, water creatures, tools, vehicles, boats, and verbs) and phonemic fluency for three letters (F, A, and S). These were combined to generate a single scaled fluency score that was proportional to both total score and the ratio of semantic fluency to phonemic fluency. FreeSurfer was used to generate a cortical surface map from each subject's MRI scan. These maps were correlated with error rates on the tools task and with total semantic fluency scores.

Results
Error rates were analyzed with a 2 (group) X 2 (task) ANOVA. There was a main effect of diagnosis, with SD patients making significantly more errors overall ($F(1,58) = 13.67$, $p < 0.001$). There was a main effect of category, with the tools task eliciting more errors ($F(1,58) = 11.31$, $p < 0.01$). In addition, there was a significant diagnosis by task interaction, with SD patients making relatively more errors on the tools task ($F(1,58) = 6.49$, $p < 0.05$). Reaction times were analyzed with an analogous 2X2 ANOVA, which showed only a main effect of category, with the tools task requiring more processing time ($F(1,58) = 26.4$, $p < 0.001$). Sorting errors correlated strongly with total semantic fluency ($r = -0.73$, $p < 0.001$) and semantic fluency correlated with gray matter in the left temporal lobe (a). Sorting errors correlated most significantly with gray matter in the left mesial inferior temporal lobe (b). Although one SD subject was at floor with verbal fluency for tools, he answered 41/50 correctly on the tools sorting task.

Discussion
Computerized sorting tasks may provide information comparable to verbal fluency measures, with several advantages, including (1) the opportunity to evaluate semantic memory with verbal and nonverbal cues, (2) evaluation of reaction times, (3) reduction of floor effects, and (4) results independent of articulation.



Presented by: **Clark, David**

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151. Lexical vs. Compositional Semantics: Syntax and Quantifier Scope in Aging and Semantic Dementia

Clark D. [1], *Kar J.* [2]
[1] *Birmingham VA Medical Center and University of Alabama at Birmingham,* [2] *University of Alabama at Birmingham*

Objective
To compare syntactic comprehension and interpretation of quantifier scope ambiguities in patients with semantic dementia and controls using a self-paced reading test with picture verification.

Background
Major syntactic theories employ a movement computation (Move-α) for the generation and interpretation of sentences. According to these theories, movement is involved in the interpretation of complex syntactic constructions and also leads to the ambiguous interpretations of doubly quantified (DQ) sentences. Previous studies have produced conflicting findings, with some suggesting a preference for “surface scope” (preference for the earlier quantifier to take wide scope) and others suggesting interactions between lexical and grammatical factors. We hypothesized that measures of syntactic processing would correlate with processing costs induced by quantifier scope ambiguity.

Methods
Twenty-eight cognitively normal subjects (age 51.0 ± 22.53) and three semantic dementia patients (age 60.0 ± 5.29)

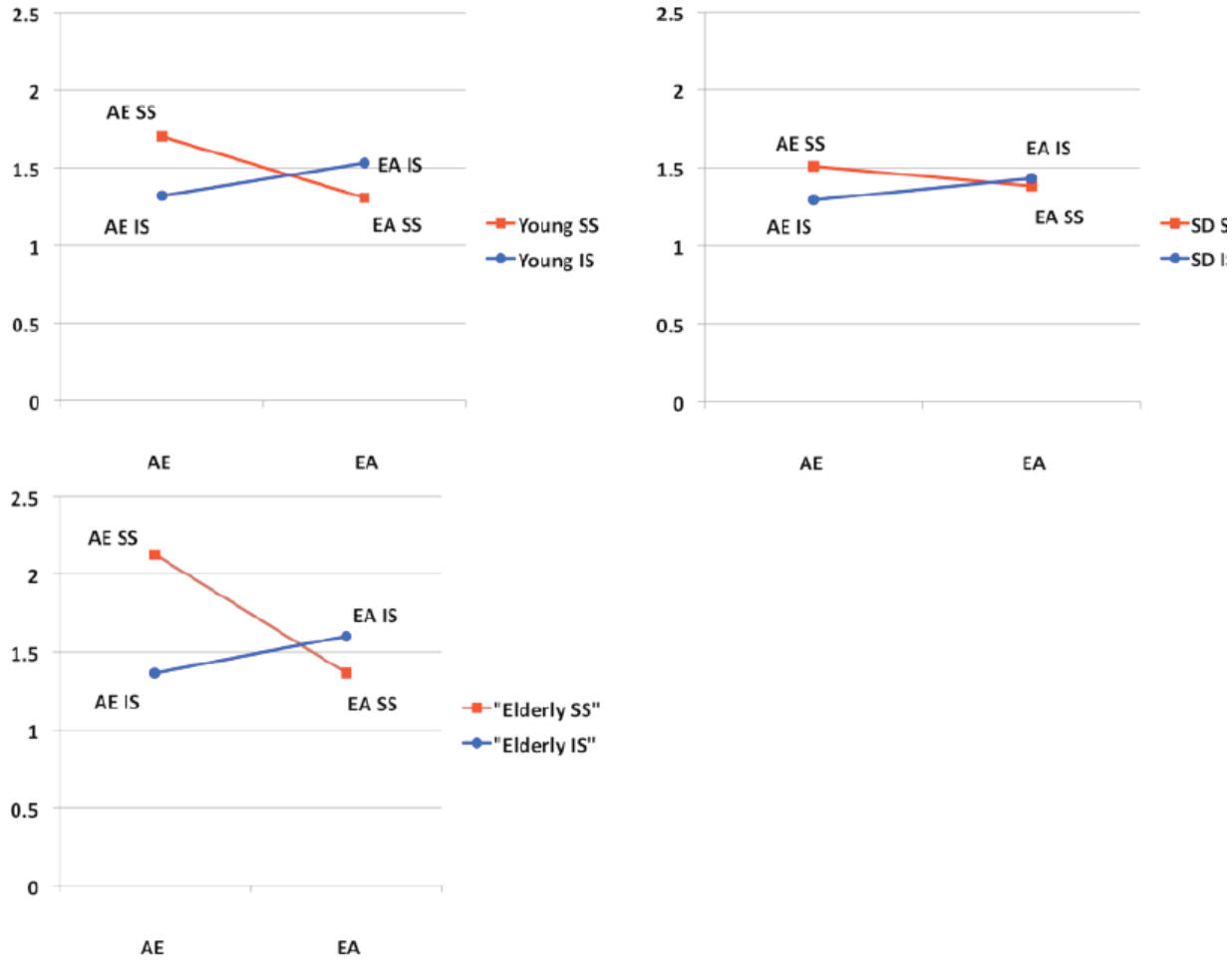
participated in a self-paced reading protocol with picture verification. Stimuli consisted of 242 sentences, divided into two subtests of equal length. Each sentence was followed by a picture that was either consistent ("positive" – 132 items) or inconsistent ("negative" – 110 items) with the preceding sentence. Positive items included 40 from the SOAP test of syntax comprehension, 40 DQ and 40 singly quantified sentences. Singly quantified sentences were paired with the same pictures as the DQ sentences, to provide a measure of visual processing time in the absence of scope ambiguity. DQ positive sentence-picture pairs were divided into four groups according to quantifier order of the sentence ("A…every" and "Every…a" – hereafter AE and EA) and the quantifier scope interpretation necessitated by the picture (inverse or surface scope- hereafter IS and SS). Negative items used sentences and pictures that were comparable to the positive items, always with one inconsistency. Hierarchical linear modeling (HLM) was used to fit a model explaining variance in picture verification times following DQ sentences while controlling for individual differences in reaction time.

Results

HLM revealed that the strongest predictor of picture verification time after DQ sentences was the interaction between scope and quantifier order, with AE-SS sentence-picture pairs taking 548 ms longer than other pairings. The interaction between age and scope was significant, with older subjects requiring more time to verify pictures requiring the SS interpretation. Scaled verbal fluency scores were negatively associated with picture verification times. Patients with semantic dementia generally performed poorly on syntactic comprehension (t-test, $p < 0.01$), but showed smaller delays in the processing of AE-SS sentences than elderly subjects (t-test, $p < 0.05$).

Discussion

Cognitively normal subjects are biased toward the interpretation of the quantifier 'every' as having wide scope regardless of quantifier order. Assignment of narrow scope to 'every' in AE sentences incurs a processing cost and normal aging is associated with slowing of this processing. Contrary to expectations, some semantic dementia patients do exhibit difficulty interpreting non-canonical sentences. Despite this difficulty, however, both interpretations of DQ sentences appear to be readily available to semantic dementia patients. The tendency to assign wide scope to 'every' might represent a learned lexical bias that is attenuated by degraded lexical semantics in semantic dementia. These findings do not support explicit movement computations during the interpretation of ambiguous doubly quantified sentences.



Presented by: **Clark, David**

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152. Nicotinic Modulation of Strategy-Based Semantic Priming in PD

Holmes A. [1]*, Copland D.* [1]*, Silburn P.* [2]*, Chenery H.* [3]
[1] *University of Queensland Centre for Clinical Research, & University of Queensland, School of Health and Rehabilitation Sciences,* [2] *University of Queensland Centre for Clinical Research, St Andrew's War Memorial Hospital, & The Welsey Hospital,* [3] *University of Queensland, School of Health and Rehabilitation Sciences*

Introduction
Many of the cognitive sequelae of Parkinson's disease (PD) are unresponsive to dopaminergic therapies, indicating dopaminergic system changes alone may not fully account for the cognitive deficits of PD. There is evidence to suggest that cholinergic, particularly nicotinic, mechanisms may play a contributing role. Recently, acute transdermal nicotine was found to selectively affect attentional lexical-semantic processing in healthy young adults (Holmes, Chenery, & Copland, 2008). In PD, attentional lexical-semantic processing is thought to be compromised (e.g., Arnott, Chenery, Murdoch, & Silburn, 2001). The aim of the current study was to investigate the effects of nicotine in medicated persons with PD on a cognitively demanding strategy-based priming paradigm. It was hypothesized that aberrant attentional priming effects would be demonstrated in PD under placebo but that nicotine would ameliorate attentional lexical-semantic processing in PD leading to normalized priming effects.

Subjects and Procedures
Twelve patients with idiopathic PD and 17 matched controls were recruited. The strategy-based priming task stimuli and procedures have been published in detail (Holmes et al., 2008). In brief, subjects were instructed to expect target words to come from specified semantic categories based on the primes, while unexpected targets were also presented. Priming conditions included two conditions that concurred with trained expectations (expected-related and expected-unrelated), two which did not (unexpected-related and unexpected-unrelated), and neutral conditions. Stimuli were presented at a 1250ms stimulus onset asynchrony. Speeded lexical-decisions (yes/no) were made on targets. Nicotine patches (7mg/24hr) and placebos were administered in a double-blind, crossover fashion.

Analyses
Linear mixed model analyses were performed on correct target-response reaction times (RTs).

Results
Analyses revealed a significant group × drug × expectancy interaction, $F(1, 1064) = 4.18$, $p = .041$. As depicted in Figure 1, controls evidenced significant expectancy effects (i.e., significant differences in RTs for expected compared to unexpected conditions) under both drug states (ps <.001). In contrast, an expectancy effect was not evidenced in PD under placebo ($p = .147$) but did appear under nicotine ($p < .001$) at a level comparable to that for controls.

Conclusions
The absence of an expectancy effect under placebo for PD is in line with previous findings but further specifies that difficulties in attentionally engaging the lexical-semantic network in PD are present even when semantic strategies are made explicit. The expectancy effect for PD under nicotine is consistent with the notion that nicotine can improve attentional and effortful processing (Rusted, Graupner, Tennant, & Warburton, 1998), at least in populations performing at suboptimal levels, normalizing attentional lexical-semantic processing in PD.

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Rusted, J. M., Graupner, L., Tennant, A., & Warburton, D. M. (1998). Effortful processing is a requirement for nicotine-induced improvements in memory. Psychopharmacology (Berl), 138(3-4), 362-368.

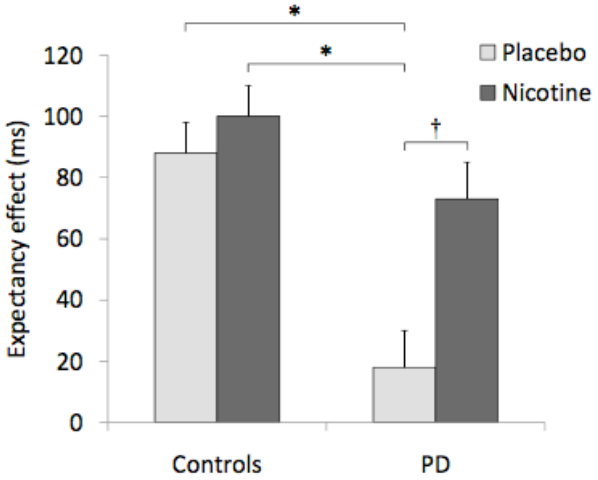

Figure 1. Expectancy effects for controls and PD as a function of drug state
PD = Parkinson's disease; ms = milliseconds; *p < .001, †p < .01

Presented by: **Holmes, Anna D**

153. Processing the same action-related stimuli in verbal and nonverbal tasks: evidence for dissociable modality-dependent representations in aphasics

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While aphasia is often associated with apraxia, double dissociations between verbal and nonverbal disorders leave unsolved the question of whether action and action- related language share neural representations. Saygin et al. (2004) proposed that there are different degrees at which linguistic and nonlinguistic domains share representations, depending on how much linguistic and nonlinguistic tasks have in common in terms of perceptual and conceptual properties and developmental stages of acquisition.

Here, we tested (i) whether language impairments were always associated with impaired action performance, when linguistic and nonlinguistic functions were tested with the same action-related stimuli; (ii) whether action-verbs and tool-nouns related to the same motor program, share neural representations. We assessed the ability of 12 left-damaged aphasics and 12 healthy participants in action performance (imitation and tool-use), naming and word comprehension (name-to-picture matching tasks). These tasks are comparable for age of acquisition as motor control develops synchronously with word production (Siegel, 1981). Participants were asked to imitate and name 15 pantomimes of tool-use; to use and name the corresponding 15 tools visually presented; to match their spoken names (action-verbs and tool-nouns) to pantomimes and tools, respectively. Stimuli were matched for name agreement, name latency, age-of-acquisition and length. A 3 task (praxis, naming, comprehension) x 2 trigger (tool-use and tools) x 2 group (patients and controls) ANOVA revealed that patients were more impaired at naming actions and tools than on the other tasks. However, action naming correlated with both imitation and verb comprehension, and tool naming correlated with both tool-use and noun comprehension. Thus, we reproduced the abovementioned group-level correlations across linguistic and nonlinguistic performance. However, the single-case analyses revealed double dissociations in pantomimes processing, between imitation and action naming, and between imitation and verb comprehension. For tool processing, although all patients were better at using than naming tools, a double dissociation was found between tool-use and noun comprehension, suggesting that word representations can be spared, even when word production is impaired. Considering the performance with verbs and nouns, at group-level, action naming correlated with tool naming and action-verb comprehension correlated with tool-noun comprehension. Again, the single-case analysis revealed double dissociations between the ability to name actions versus tools and the comprehension of action-verbs versus tool-nouns. We also observed a differential effect of age-of-acquisition (more accurate performance for early-acquired words) for nouns and verbs, suggesting distinct neural representations for the two word-categories (Boulenger et al. 2007).

Even when items are conceptually identical and tasks are matched for perceptual features and developmental stages of acquisition, representations of tool-actions and tools dissociate from lexical-semantic representations of action-verbs and tool-nouns, respectively. Action-verb representations are independent of the ability to perform the corresponding motor programs. Tools-noun representations dissociate from the ability to produce the associated action. We also provide evidence that action-verbs and tool-nouns are associated with distinct neural substrates.

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Presented by: **Papeo, Liuba**

154. Mapping Language and Action in the Brain: Evidence from Aphasia and Apraxia

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Sensorimotor theories of language have recently implied that motor representations are necessary for processing language (e.g. Gallese & Lakoff, 2005). Studying patients suffering from aphasia or apraxia offers a unique opportunity to test the predictions derived from these theories. To date only a few studies (e.g. Papagno et al. 1993; Kertesz et al. 1984; De Renzi et al. 1980) have been published that served this aim, for they demonstrated that aphasia and apraxia can double dissociate. However, these studies did not report an exhaustive analysis of the lesions that gave rise to aphasia and apraxia.
Here we present data from 61 left-brain damaged patients who performed clinical tests assessing linguistic (using the Aachener Aphasie Test, Luzzatti et al. 1996) and praxic (imitation and tool use) abilities. Behavioral analysis at group level showed a significant positive correlation between scores on linguistic and imitation tests and between scores on imitation and tool use tests; no reliable correlation was found between scores on linguistic tasks and tool use task. Single-case analyses showed that apraxic and aphasic deficits dissociated: six patients were selectively impaired at language processing, whereas five patients were selectively impaired at imitating and one patient at tool use. The lesion analysis showed aphasia was associated with regions involving insular cortex and putamen, and ideomotor apraxia with temporal white matter areas and thalamus. The patient who showed a selective impairment in tool use had a lesion restricted to the putamen. In order to establish the brain areas most affected in each deficit (controlling for the other two), a lesion analysis at group level was performed using Voxel-based Lesion Symptom Mapping technique (VLSM). Significant results were found for aphasia and ideomotor apraxia: patients' performance on linguistic tests was associated with damage of the superior temporal regions (MNI coordinates x = -55, y = -11, z = -1) extending to the insular cortex (x = -41, y = 4, z = -5); patients' performance on the imitation test was associated with damage of the inferior parietal cortex, including the angular gyrus (x = -37, y = -53, z = 50) and the surrounding white matter (x = -28, y = -47, z = 41) (see Figure). These results replicate previous neuropsychological observations by showing that linguistic and motor abilities are independent and extend our knowledge of their neural correlates.

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Presented by: **Rumiati, Raffaella Ida**

155. Do Abstract and Concrete Concepts Have Different Representational Frameworks? Further Evidence from Another Case of Refractory Semantic Access Disorder

Hamilton A., Schnur T., Martin R.
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Introduction
Patients with "refractory semantic access disorders" are characterized by three unique behavioral effects on comprehension tasks employing spoken-word / written-word matching. These patients show an increase in errors as a function of repetition, and with a faster rate of presentation. Moreover, they are extraordinarily sensitive to effects of semantic relatedness. For example, using a spoken-word / written-word matching task, these patients are much worse when words are presented among an array of semantically related items compared to an array of unrelated items. These exaggerated effects of semantic relatedness are thought to result from abnormal activity among semantic representations that share semantic space. The presence and size of these semantic relatedness effects have been used to make novel inferences about the organization of semantic knowledge. For example, Crutch and Warrington (2005) have used data from such patients to propose that concrete and abstract concepts have fundamentally different principles of organization, with concrete concepts being organized categorically (i.e., animals, tools, fruits, etc.) and abstract words being organized associatively (i.e., non-synonymous words bound by real world or sentential contexts). These conclusions were originally based on data from patient AZ, who showed exaggerated relatedness effects for categorically related concrete words and associatively related abstract words, but not associatively related concrete words or categorically related abstract words. However, a subsequent patient with a refractory semantic access pattern of deficits, patient UM-103, showed a very different pattern of performance. Specifically, patient UM–103 showed relatedness effects for both concrete and abstract words, regardless of whether they were presented in categorically related or associatively related arrays (Hamilton & Coslett, 2008).

Case Report
In this study, I present data from another patient who demonstrates all of the features of a refractory semantic access disorder. He is sensitive to repetition, is worse with rapid presentation of items, and is extremely sensitive to effects of semantic relatedness. However, when tested with abstract and concrete materials reported by Crutch & Warrington (2005), patient FC's pattern of performance closely matched patient UM-103. Specifically, he showed statistically significant relatedness effects for both concrete and abstract words regardless of whether they were presented with categorically or associatively related distractors (Figure 1). These data represent another failure to replicate the double dissociation reported by Crutch & Warrington (2005) and further challenge the replicability of the original data supporting structurally different representational frameworks for abstract and concrete concepts. The findings instead suggest a similar organizational framework for concrete and abstract words.

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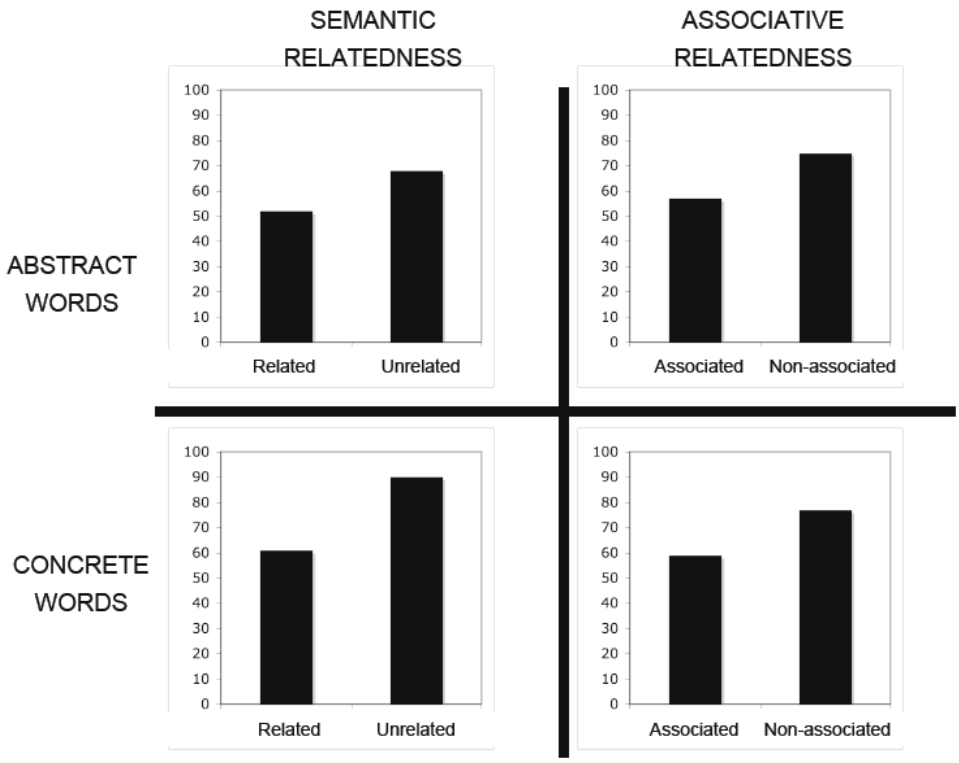

Presented by: **Hamilton, A. Cris**

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156. Shared Feature and Associative Semantic Errors in Aphasic Word Production

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Semantic errors are one of the most common types of error produced in aphasic word production. Coltheart (1980) made the distinction between shared feature errors which share semantic characteristics with the target (e.g. 'animal' or 'dog' for 'cat') and associative errors which do not (e.g. desk -> school). However, the nature and cause of these different subtypes of semantic error has received relatively little attention in the literature since then. Recently, Jeffries and Lambon Ralph (2006) demonstrated that most individuals with semantic dementia produced only shared feature errors whereas most people with aphasia following stroke, produced both shared feature and associative errors. While Jeffries and Lambon Ralph interpret the associative errors (e.g. squirrel -> nuts'; lorry -> 'diesel') as "strong but irrelevant associations", and conclude "it is difficult to account for these errors in terms of a loss of knowledge" (p2143), Nickels (1997) argued that the fact that most individuals produce both error types makes it more likely that the errors have the same source of impairment. We therefore aimed to investigate this issue further. Picture naming responses were collected from 3 case series of people with word retrieval/production impairments, on 3 different sets of pictures.

The percentage of semantic errors produced was similar across the three groups (19%, 16%, 14%; including multiword responses). Table 1 shows the percentages of each type of semantic error produced. The proportion of coordinate errors is relatively stable across each group, however, there is more variation in the proportion of associative errors produced.

We then investigated the correlations between the production of shared feature (coordinate, superordinate and subordinate) and associative response types in groups B & C. Two consistent factors emerged in the by-subjects analysis: a higher proportion of the errors of those individuals with more accurate naming were semantic errors, and there was a tendency for more associative errors to be produced the more semantic errors there were, suggesting a link with severity of impairment.

When examining the patterns across items, once again the correlations showed some consistent factors: First, items tended to produce more of one kind of error than the other (there was a significant negative correlation between number of shared feature errors and number of associative errors). This suggests that perhaps some property of an item influences whether or not it is more likely to lead to a shared feature or an associative error.

Second, there was no correlation between proportion of semantic errors and proportion of either shared feature or associative errors, suggesting that the error types are not distinguished in terms of difficulty of a particular item. Then, we investigate the effects of psycholinguistic variables (age of acquisition, imageability, rated word familiarity and number of syllables) on the production of shared feature and associative errors, under the hypothesis that if different variables affect each error type, then this is suggestive of different levels of impairment. For shared feature errors, Group A showed a significant effect of imageability; groups B & C showed no significant effects. For associative errors, all three groups showed significant effects of age of acquisition.

Further analyses will be reported from analysis of the factors affecting semantic errors for individual participants and the implications of these results for theoretical accounts of the origin of semantic errors discussed.

Table 1: Percentage of each type of semantic error produced as a proportion of total semantic errors.

% of semantic errors	Group A	Group B	Group C
shared feature: coordinate	25	22	23
shared feature: superordinate	6	4	10
shared feature: subordinate	3	2	3
associative	25	18	33
semantic description: specific/close	10	9	15
semantic description: general/distant	18	3	7
semantic description of a semantically related item	2	2	2
semantic then phonological (single word)	8	15	3
information from episodic memory	1	1	0
semantic other	2	5	3

Presented by: **Nickels, Lyndsey**

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157. Neural Correlates of Semantic Feature Analysis in Chronic Aphasia: Brain Plasticity Mechanisms Induced by Therapy Influenced by Pre-existing Networks.

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Anomia is one of the most common and persistent impairment in aphasia. Semantic feature analysis (SFA) (Boyle and Coehlo, 1995) intends to elicit the word production by activating the semantic networks and was proven to be effective in chronic aphasia (Marcotte et al., 2006; Boyle, 2004). However, it remains to be proven within a larger group of patients. Moreover, a preliminary study showed the impact of SFA on brain plasticity (Marcotte et al.,

2006), but it also needs to be studied with multiple-case studies. Thus, the present event-related fMRI study examined the impact of SFA on the neural substrate and its efficiency in 10 patients.
All participants suffered from a left CVA, from 4 to 25 years prior to the study. They were all right-handers and presented a moderate to severe aphasia. All participants received an intensive SFA therapy, in which 20 objects and verbs were trained. Before and after therapy, they performed an overt naming task in the fMRI. At the behavioural level, a statistical analysis was performed to evaluate the efficacy of the therapy and to measure the generalization effect. For the neuroimaging data, each participant has been analyzed as a single-case. Contrasts have been made with trained words and words correctly named prior to therapy in order to compare the neural networks sustaining correct naming before and after therapy.

A variance analysis showed a significant improvement ($p<0.01$) with the trained objects and verbs for all 10 participants. With these language improvements, a generalization was observed on few items, but was not significant. The areas that were activated after therapy were related to lexical selection like the MTG in both hemisphere. Activations observed after therapy were more related to the nature of the task and to the semantic nature of the therapy. Moreover, for all participants, we observed a contraction of the network after therapy.
All participants benefited from SFA to improve their naming abilities. Even in the chronic phase, older persons presenting an aphasia have a potential to improve their naming abilities. Moreover, these improvements were associated to brain plasticity mechanisms which are related to the nature of the therapy. However, cerebral plasticity appeared to operate differently for each participant according to the pre-existing network of naming. A contraction of the network with both trained objects and verbs was observed and may means that consolidation means less need for recruitment. Thus, multiple case-studies are important in order to better understand the differences in brain plasticity in chronic aphasia patients.

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Presented by: **Marcotte, Karine**

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158. Profound Jargon Aphasia with Preserved Semantic and Gestural Processing: A Case Study.

Kohen F., Martin N.
Temple University

Introduction
Jargon aphasia has been described as fluent, easily articulated, prosodic, connected speech that is mostly unintelligible and characterized by semantic, literal and neologistic paraphasias. Varying abilities to self-monitor and self-correct word errors have been reported (Marshall, 2006). Several models of lexical processing have attributed the prevalence of nonword errors to weakened connections between semantic, lexical, and phonological levels of processing (Dell, Schwartz, Martin, Saffran, & Gagnon, 2003). This case study describes the clinical profile of an individual with jargon aphasia, characterized by a profound phonological/orthographic output deficit but relatively preserved semantics and gestures. He will be discussed in relation to the themes of Marshall's (2006) review of jargon aphasia including: nonword errors, self-monitoring, writing, and syntax. His profile suggests the possibility of a complete disconnection between the lexical-semantic and phonological/orthographic levels of interaction.

Case Report
SX, a 73 year old, left-handed male experienced a left CVA in 2006 without residual aphasia, and another left CVA in 2007, resulting in severe jargon aphasia. Assessment was initiated at least 1 year after his most recent CVA.
Phonological/Orthographic System. Spontaneous speech was characterized as fluent jargon with less than 10% of utterances consisting of content words. In connected speech, function words were often evident but surrounded by islands of jargon, so that intelligibility was less than 25%. Naming and repetition accuracy, even for high imageability/ high frequency words, was less than 10%. Despite frequent findings in the literature that paraphasias in jargon aphasia are target-related (Marshall, 2006), his neologistic errors preserved phonological similarity or syllable length less than 25% of the time. Similar errors were present orthographically, even with automatic tasks such as signing his name, writing serial numbers, and copying simple words. Self-monitoring and self-correction behaviors were virtually non-existent for both orthographic and phonological paraphasias.
Rhyming judgments were profoundly impaired with both auditory (43%) and orthographic presentations. Phoneme discrimination and auditory lexical decision were moderately impaired (78%).
Semantic System. In contrast to the severe-profound deficits noted in phonology and orthography, lexical and semantic processing was remarkably preserved. Tasks involving lexical comprehension, ability to follow multi-step commands, synonymy judgments, sentence comprehension, and word reading comprehension were completed with over 80% accuracy.
Gestural System. Another contrast to the severe deficits in the connection between semantics and phonological/orthographic output systems was the preserved connection between semantics and action output lexicon, demonstrated by his outstanding ability to use finely-tuned, complex meaningful gestures.
Treatment. Therapeutic attempts to use his strong semantic or gestural systems to facilitate improved phonological or orthographic output have been unsuccessful.

Discussion
It is hypothesized that because of the severity of the deficit at the orthographic/phonological level, the spread of activation from this level is too weak to support lexical-semantic processing. Therefore, treatment outcomes may be maximized by exploiting the nonverbal semantic system for communication.

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TABLE 1
Examples of SX's Errors in Naming and Repetition Tasks
Proportion of Shared Phonemes between Target and Response, Correct # of Syllables Retained

Task	Target	Response	Proportion shared phonemes	# syllables retained
Naming	gun	/ɛmtʃu/	0	no
	hammer	/pɔlsiagə/	0	no
	scotchtape	/kewar/	.29	yes
Repetition	bed	/sɪlistihakinartɪk/	0	no
	window	/stɪli/	.20	yes
	The telephone is ringing.	/ɛs anɪʃi aʃəl/ are	.06	yes
	He is not coming back.	/estərin nɛsand/	.27	no

Presented by: **Kohen, Francine**

Platform Session 4: Neural Bases of Language

159. Lesion Localization of Chronic Aphasia Syndromes

Dronkers N. [1], Baldo J. [2], Ogar J. [2], Wilkins D. [2], Ludy C. [2], Arevalo A. [2], Knight R. [3]
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Knowledge of the brain regions associated with the different types of aphasias has changed over the years since the advent of superior brain imaging techniques. Differences in lesion localization between acute and chronic patients have also become apparent with most current models being derived from patients in the acute stage of their illness. The present study evaluated the brain lesions associated with the major aphasia syndromes in a large group of carefully-controlled chronic aphasic stroke patients to evaluate these brain-behavior relationships once the aphasia has stabilized.

Methods
All patients had suffered a single left hemisphere infarction with a residual speech or language deficit. All were right-handed and native English-speaking with no prior neurological or psychiatric history, and were evaluated with

the Western Aphasia Battery more than one year post onset. All had undergone structural neuroimaging, and patients' lesions were computer-reconstructed and normalized into MNI space. Patients classified into the different aphasia types were grouped together and their lesions overlapped to yield common areas of infarction.

Results (see figure)
Broca's aphasia. Results from 36 patients with chronic Broca's aphasia indicate a large region of common overlap primarily in the insula with involvement of surrounding tissue including white matter, motor cortex and the inferior frontal gyrus.

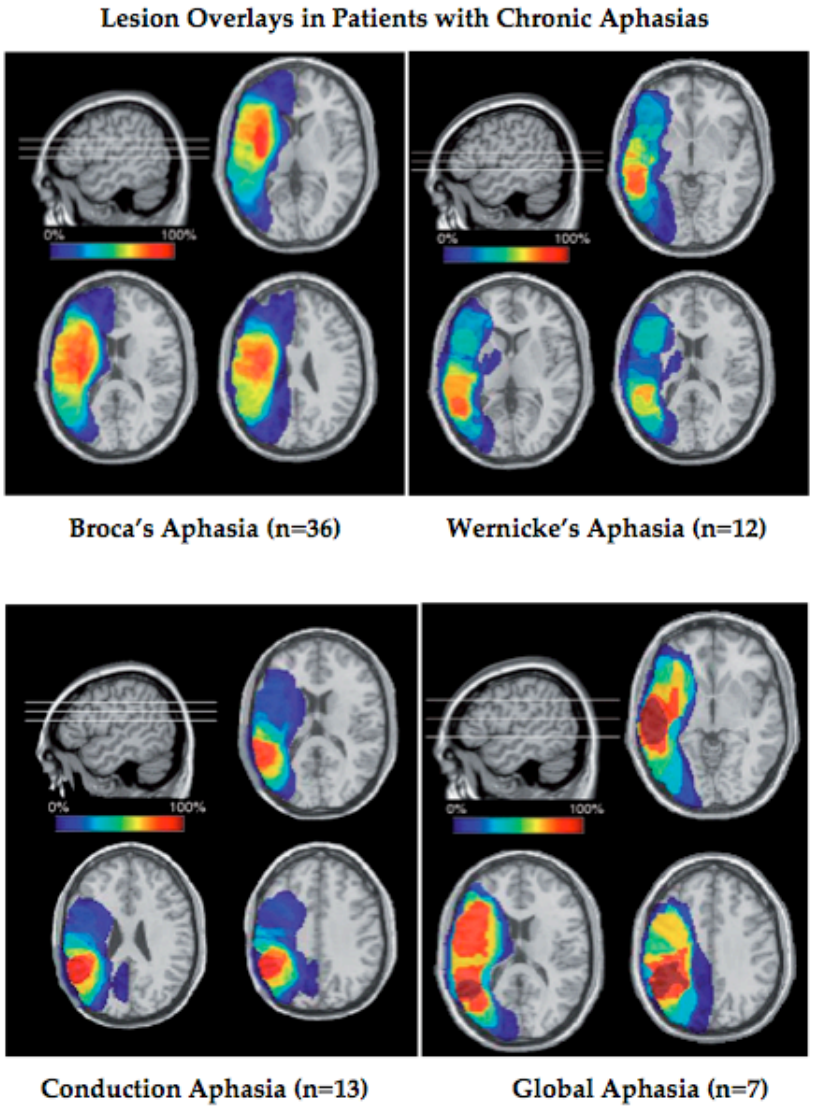
Wernicke's aphasia. The overlay of 11 patients' lesions reveals that the middle temporal gyrus is consistently infarcted in patients with persisting Wernicke's aphasia. Other areas commonly affected include the posterior, superior temporal gyrus and inferior parietal cortex.

Conduction Aphasia. The lesion overlay from 13 patients with chronic conduction aphasia shows the most common region of overlap is centered in inferior parietal cortex and the posterior superior temporal gyrus.

Global Aphasia. Overlays from 7 patients reveal that the lesion associated with a persisting, chronic global aphasia encompasses large portions of the left peri-Sylvian region. Key regions of common overlap include the middle and superior temporal gyri, insula and inferior frontal regions, the inferior parietal lobule, and white matter surrounding these areas.

Anomic aphasia. No single common region of overlap is found for this group of 37 patients. The lesions cover a wide range of areas extending over the middle and posterior cerebral artery distributions of the left hemisphere.

Discussion
Lesion overlays in chronic aphasic patients, whose behavior has stabilized, reveal consistent areas of infarction in the same general areas as derived from acute data, but also with some fundamental differences. Lesions in chronic Broca's aphasia involve primarily deeper areas than Broca's area and include the insula and underlying white matter. Lesions in chronic Wernicke's aphasia often include Wernicke's area, but the key region was the middle temporal gyrus. In chronic conduction aphasia, the area of common infarction is the inferior parietal cortex and posterior superior temporal gyrus, rather than the arcuate fasciculus. These results suggest important differences in the lesion patterns between acute and chronic patients that can significantly alter our perceptions of the key brain areas involved in the different aphasia syndromes.



Colored bars indicate the degree of lesion overlap across patients, from 0% (dark blue) to 100% overlap (dark red).

Presented by: **Dronkers, Nina**

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160. Areas of Ischemia Associated with Semantic vs. Phonological Errors in Auditory Comprehension

Pitz E. [1], *Rogalsky C.* [2], *Pawlak M.* [3], *Hickok G.* [4], *Hillis A.* [1]
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Introduction
We previously reported data from 289 unselected acute left hemisphere stroke patients on a test of auditory word/picture verification showing that severe impairments of word comprehension (using signal detection methods

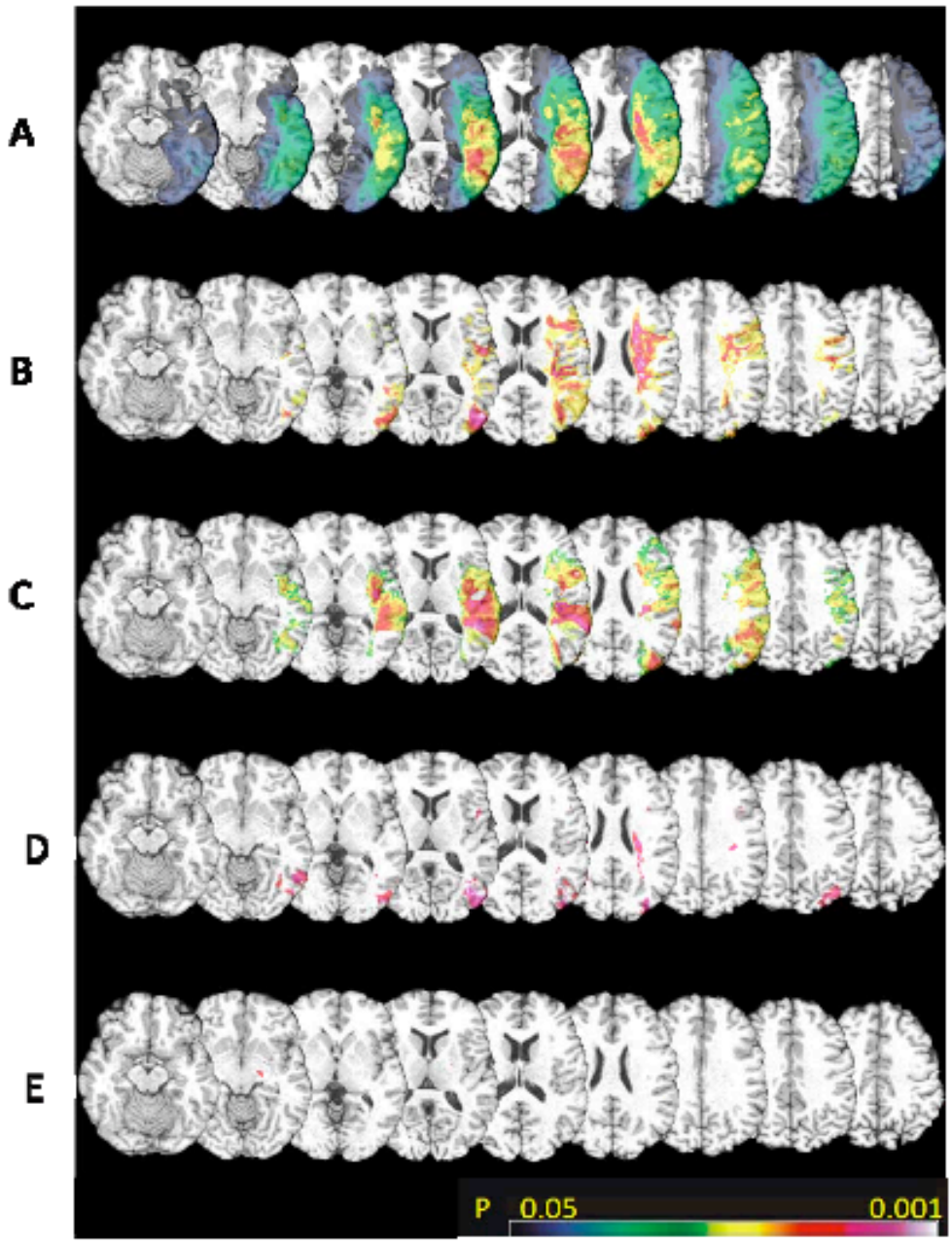
to control for response bias) are relatively uncommon, and that semantic errors are more common than phonological errors. A majority of patients showed higher proportions of correct responses, corrected for response bias (measured with a-prime) with phonologically related foils than with semantically related foils. In this study, we identified areas of dysfunctional (infarcted and/or hypoperfused) tissue associated with (1) a predominance of semantic errors, (2) equivalent performance with semantically and phonologically related foils, and (3) a predominance of phonological errors in patients who made more than 10% errors on the test (> 2 SD more than controls).

Method
We analyzed data from the subset of patients (n=120) from the previous study who had interpretable diffusion-weighted and perfusion-weighted MRI as well as assessment of spoken word comprehension within 24 hours of stroke onset. Dysfunctional tissue was defined as bright on diffusion weighted imaging (DWI) and dark on apparent diffusion coefficient maps, or hypoperfused as defined by greater than 4 second delay in time to peak arrival of contrast in a voxel, relative to the homologous voxel on the right. We used MRICroN to identify voxels associated with each pattern of errors, using a False Discovery Rate (FDR) analysis to correct for multiple comparisons.

Results
The figure shows the "prior probability map" - areas of hypoperfusion/infarct of all 120 included patients (Panel A), voxels associated with normal performance (<10% errors) (Panel B), as well as voxels most strongly associated with each error pattern. Normal performance (n= 34 patients) was associated with infarct/hypoperfusion in frontal and fusiform cortex and corona radiata. Production of equal numbers of errors with phonological and semantic foils (n= 9) was associated with infarct/hypoperfusion in left posterior superior temporal cortex. Production of more semantic than phonological errors (n= 65) was associated with infarct/hypoperfusion in inferior temporal and parietal cortex. There were few scattered subcortical voxels associated with more phonological errors than semantic errors (n= 12), but no clear region. This pattern was uncommon (14.0% of patients with deficits).

Discussion
Patients with the most severely impaired auditory word comprehension made errors equally with semantically related and phonologically related foils. These patients had tissue dysfunction (infarct/hypoperfusion) predominantly in Wernicke's area. Patients who accurately rejected phonologically related foils that were not semantically related to the target, but incorrectly accepted some semantic foils had more posterior and inferior temporal or inferior parietal tissue dysfunction. Few patients made more errors with phonological foils than semantic foils. Tissue dysfunction in posterior frontal cortex or corona radiata was associated with normal performance on word/picture verification. Future analyses of these data will evaluate the independent contributions of ischemia in various regions of interest and total volume of dysfunctional tissue in accounting for the rate of errors with semantic and phonological foils.

Figure. Voxels Where Tissue Dysfunction was Associated with each Pattern of Errors. Panels: A. Prior probability of lesion localization expressed as number of lesions per group, B. Voxels associated with normal performance,C. Voxels associated with equal numbers of semantic and phonological errors; D. Voxels associated with predominantly semantic errors; E. Voxels associated with predominantly phonological errors.



Presented by: **Hillis, Argye**

161. Anatomical Correlates of Spelling Errors in Primary Progressive Aphasia

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Objective
Primary progressive aphasia (PPA) has recently been divided into three clinical subtypes that appear to be associated with different regions of cortical atrophy and hypometabolism and loosely associated with different pathologies (Rabinovici, Jagust, Furst, Ogar, Racine, Mormino, O'Neil, Lal, Dronkers, Miller, Gorno-Tempini, 2008). One of the earliest symptoms of PPA can be spelling difficulties, arising before verbal features that distinguish between subtypes. At present, there is no way of predicting from their spelling behavior which clinical subtype a patient is likely to develop.

Methods
To identify regions where cortical loss predicts single word spelling difficulties, we acquired high-resolution structural MRI from 10 patients with a clinical diagnosis of PPA who had a range of severity of spelling impairment and other language impairments. Continuous measures of gray matter density were correlated with continuous measures of spelling error types on a voxel by voxel basis across the whole brain. The most common error types, phonologically plausible errors (PPEs; e.g. couch spelled kowtch) and phonologically implausible nonwords (PINs e.g. couch spelled cuopth), were included in the analyses.

Results
Damage to two discrete left hemisphere brain regions was significantly associated with spelling difficulties: head of the caudate (x -18, y 26; z 2; z score= 4.52; cluster size=119 voxels) and anterior temporal pole (x -30, y 14, z -38; z score= 4.58; cluster size 54 voxels), p=0.001 uncorrected for the whole brain; p=0.05 corrected at a cluster level (See Figure 1). In addition there was a double dissociation between patterns of gray matter loss and the types of spelling errors patients produced. Increasing gray matter damage to the caudate correlated with increasing numbers of PINs, whereas preservation of the caudate was correlated with PPEs. In contrast, increasing damage to the anterior temporal lobe was correlated with increasing numbers of PPEs, whereas preservation of the anterior temporal lobe region was correlated with PINs.

Interpretation
Patients who produce a high rate of PPEs but low rate of PINs on spelling tasks have a high likelihood of having gray matter loss in the left anterior temporal lobe. Semantic dementia (SD) is associated with left (>right) anterior and inferior temporal lobe atrophy, and are known to frequently have surface dyslexia and dysgraphia, with a high rate of PPEs. However, the dysgraphia may precede other features of SD, and may be helpful in predicting the eventual diagnosis. The association between a high rate of PINs and low rate of PPEs in spelling and gray matter loss in the left caudate is a novel finding and may be most common in patients who will progress to PNFA. However, longitudinal studies are required to evaluate these hypotheses.

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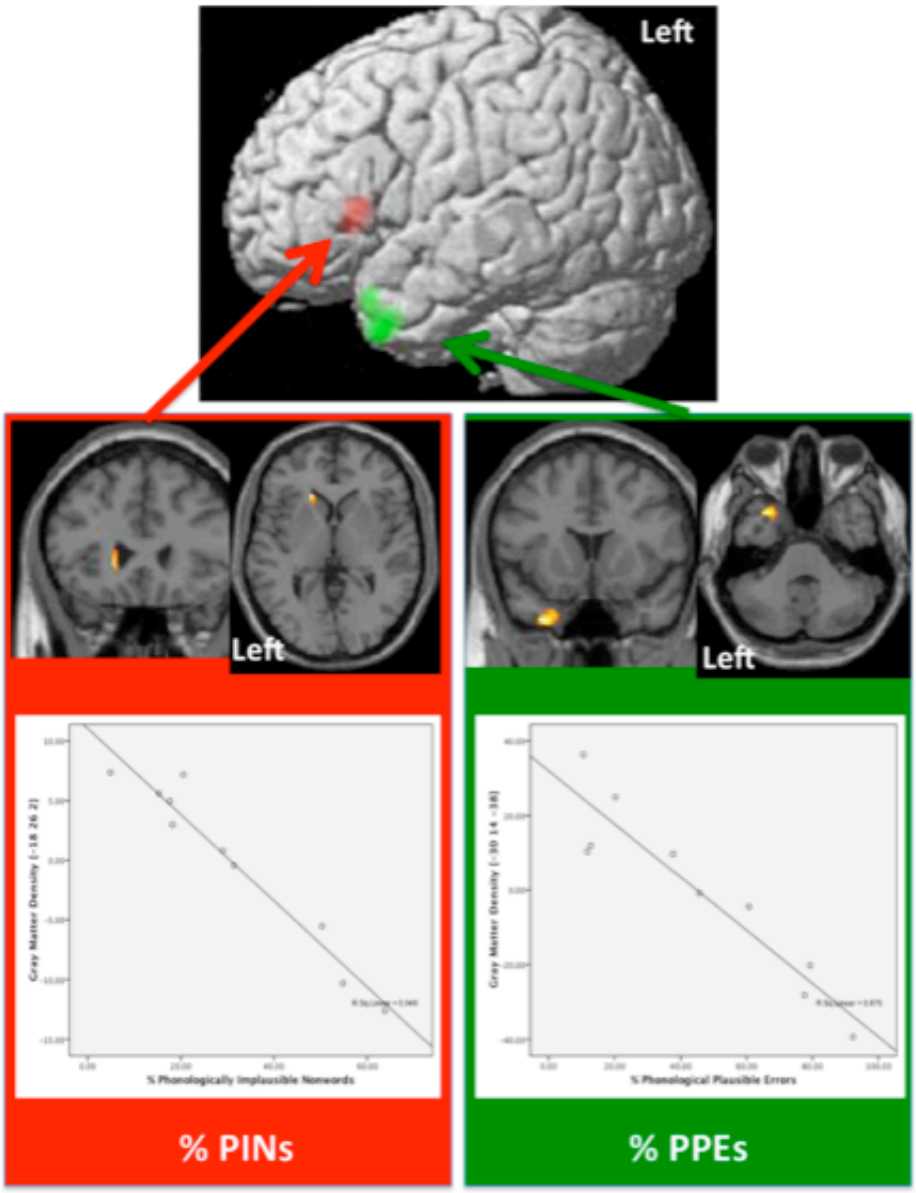

Figure: Regions where brain damage is associated with spelling difficulties.
The top image illustrates voxels where there were significant correlations between regional gray matter density and single word spelling in an analysis of 10 PPA patients. The results are rendered here on a SPM5 template brain. The colors relate to the type of spelling errors made: red= phonologically implausible nonwords (PINs) and green= phonologically plausible errors (PPEs). The left column (red background) of images and plot illustrate where gray matter loss in the head of the left caudate correlates significantly with increased PINs. The right column (green background) of images and plot illustrate where gray matter loss in the anterior temporal lobe correlates significantly with increased PINs. The results are displayed in these columns on sagittal and coronal slices of a SPM5 single-subject brain T1 template.

Presented by: **Crinion, Jenny**

162. Anterior Temporal Involvement in Semantic Word Retrieval: VLSM Evidence from Aphasia

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Introduction
The task of naming pictures invokes semantically-driven lexical retrieval, as shown by the occurrence of semantic errors in healthy speakers and, more prominently, people with aphasia. To examine the brain basis of semantic word retrieval, this study mapped the lesions associated with semantic naming errors in post-stroke aphasia using voxel-based methods.

Methods
We report on 64 right-handed English speakers (42% female; 48% minorities) with left hemisphere stroke and aphasia. Mean for age was 58 + 11, education, 14 + 3; months post onset, 68 + 78, and WAB AQ (76.8 +15.2). From the 175-item Philadelphia Naming Test (PNT), the semantic error score (SemErr) was computed as a proportion of total items. Additionally, standard scores on four semantic comprehension tests were averaged to create a measure of core semantic processing (CoreSem).
Lesions from patients with recent high-resolution MRI scans [n = 34] or CTs [n = 30] were segmented manually and registered to a standard 1x1x1mm template. In each voxel that was lesioned in at least 5 patients, a t-test was computed comparing SemErr scores between patients with and without lesions in the voxel. The resulting t-map was thresholded to control the False Discovery Rate (FDR) at 0.01. In a second analysis, errors arising during conceptualization were factored out by mapping the (SemErr – CoreSem) residuals.

Results
We found 25,669 voxels for which there was a significant correlation between lesion status and SemErr. The highest t-value voxels were in left anterior temporal lobe (ATL); the highest concentration was in the middle temporal gyrus and the temporal pole. Clusters of significant voxels were also found in the posterior portion of the middle temporal gyrus (lateral and superior portion of BA 37), and in the inferior and middle frontal gryi (BA 45 and 46). There were no significant voxels in the posterior superior temporal gyrus (Wernicke's area); peak t-values here were approximately 1.8, far below the critical t (3.86).
Filtering out CoreSem changed the strength of effects but not the pattern (see Figure 1). The majority of significant voxels (7,332) were in the mid- and anterior temporal lobe, thus implicating this region, specifically, in the mapping from semantics to lexical items during production.

Discussion
Aphasia lesion studies have long linked semantic word retrieval to left posterior temporal and parietal regions. Instead, we found the strongest effects in mid- and anterior temporal lobe. Drawing on evidence from semantic dementia (Patterson, Nestor & Rogers, 2007) and functional neuroimaging (Indefrey & Levelt, 2004), we suggest that this role is one of transmitting information from an ATL semantic hub to lexical representations localized in the mid part of the left middle temporal gyrus.

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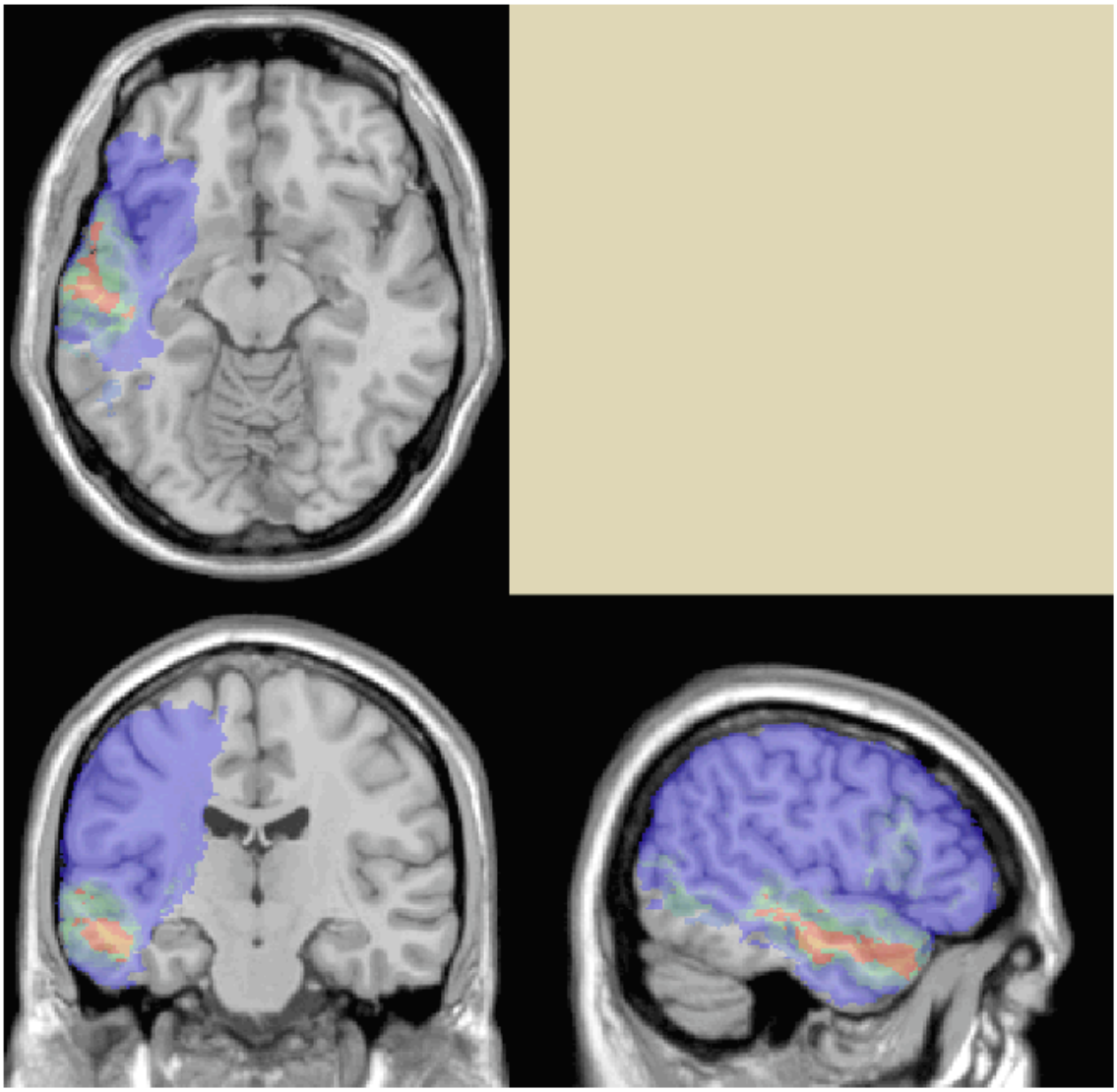

Figure 1. Representative axial, coronal, and sagittal views of a map of the reliability of the difference in SemErr (after factoring out CoreSem) between patients with and without lesions in each voxel (rendered on the MNI-space ch2 volume). Voxels with a statistically significant result after correction for multiple comparisons are rendered in a red ($t = 3.86$) to yellow ($t > 5.86$) scale, while non-significant values are rendered on a scale from green (t just below 3.86) to blue ($t < 1.86$).

Presented by: **Schwartz, Myrna**

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