Neuroimaging, University of Iowa, developed a novel lesion analysis approach that incorporates probabilistic fiber tract analysis to distinguish critical cortical damage from fiber tract damage. We developed a discrete entities, but these analyses have not been able to formally distinguish these areas. We have identified regions of the cerebral cortex necessary for naming concrete entities, but these analyses have not been able to formally distinguish critical cortical damage from fiber tract damage. We developed a novel lesion analysis approach that incorporates probabilistic fiber tract analysis to distinguish critical cortical damage from fiber tract damage.

**E71 NEURAL ACTIVITY IN LANGUAGE AREAS REFLECTS VERB GENERATION PERFORMANCE IN CHILDREN**

**Jerod Rasmussen1, Jennifer Vannevel2, Vincent J. Schnitzkorst2, Prasanna Karonananukala1, Anna W. Byars1, Scott K. Holland1, Cincinnati Children’s Hospital Medical Center — Covert Verb Generation is a convenient functional MRI (fMRI) task for mapping language areas in pediatric neurosurgery patients. Because the covert responses are not monitored explicitly, the relationship between fMRI activation and task performance is unknown. Our study compared the activation from this task with a version of the Verb Generation task including overt responses. Fifteen children, ages 11-13, were presented with a series of concrete nouns and were prompted to respond with related verbs. The paradigm alternated between 30-second blocks of covert response, overt response, and control task of overt noun repetition. A clustered fMRI acquisition method allowed for recording of overt responses during quiescent scanner intervals. Individual covert generation versus noun repetition (covert-rep) and overt generation versus noun repetition (overt-rep) contrast maps were generated using the General Linear Model (GLM). CLM regression analysis determined correlations between contrasts and the mean number of verbs generated overtly per subject, modeling full-scale IQ as a confounding factor. For the covert-rep contrast, the left inferior frontal gyrus (LIFG, BA 44) and left posterior superior temporal gyrus (LSTG, BA 22) showed positive correlations with verb generation performance (LIFG: r-squared=.62, p<.001; LSTG: r-squared=.53, p<.003). Overt-rep contrast also showed positive correlations in both LIFG (r-squared=.31, p<.039) and LSTG (r-squared=.36, p<.023). These results suggest that increased verb generation performance leads to increased fMRI activation. In addition, overt performance may be used as an effective estimator of covert performance.

**E72 DISENTANGLING FIBER TRACT AND CORTICAL CONTRIBUTIONS TO THE PROCESS OF NAMING VARIOUS CATEGORIES OF CONCRETE ENTITIES**

**David Rudrauf1, Sonya Mehta1, Carissa Philipps1, Thomas Grabowski1,2, Laboratory of Computational Neuroimaging, University of Iowa, 2University of Iowa — Lesion studies have identified regions of the cerebral cortex necessary for naming concrete entities, but these analyses have not been able to formally distinguish critical cortical damage from fiber tract damage. We developed a novel lesion analysis approach that incorporates probabilistic fiber tract information, to detect lesion-deficit associations related to damage to major association fiber tracts, and to reduce effects attributed to the cerebral cortex due to confounding fibers of passage. We re-analyzed a dataset of 129 brain damaged subjects (Damasio et al. 2004), tested for naming impairments in 5 categories of concrete entities. Using voxelwise logistic regressions, we incorporated covariates for probable damage to the inferior frontooccipital fasciculus (IOF), superior longitudinal fasciculus (SLF), uncinate fasciculus (UNC), and inferior longitudinal fasciculus (ILF). Inclusion of tract information removed some cortical regions previously implicated in category-related deficits. The SLF explained many of the significant voxels associated with naming animals and tools, and the UNC and IOF explained some of the voxels associated with naming famous faces. Some perisylvian and inferotemporal cortical regions remained associated with impaired naming, even after the effects of nearby association fiber tracts were modeled. For musical instruments and fruits/vegetables, tract effects and gray matter effects were statistically confounded. Supplementary tractwise analyses implicated the IOF and UNC for naming famous faces, and the SLF for animals, tools and fruits/vegetables. The results suggest a possible distinction between cortical and fiber tract systems underlying naming unique versus non-unique concrete entities.

**E73 LEARNING TO READ SHAPES SPEECH RECOGNITION**

**Ulrike Schild1, Brigitte Roder1, Claudia K. Friedrich1, Biological Psychology and Neuropsychology/ University of Hamburg — Learning to read and write requires the knowledge that words consist of phonemes and that each phoneme has a corresponding grapheme. Using event-related potentials (ERPs) we investigated whether reading acquisition modifies neuronal speech recognition. We recorded ERPs in an unimodal auditory word fragment priming paradigm. Former research with adults suggests that the amplitude of the P350 deflection reflects neuronal word form activation as a function of the goodness-of-fit between the target words and their preceding fragments (Friedrich, 2005, BMC Neuroscience). In an identity condition, fragments matched following target words (e.g., dra-Drache [engl. dragon]). In a Variation condition, fragments and targets differed in the initial place of articulation (PLACE, e.g., gra-Drache). In a Control condition, fragments and targets were completely unrelated (pul-Drache). Adults, beginning readers and preschoolers were tested. P350 amplitudes for adults replicate gradual activation of word form representations: Most positive amplitudes were found in the Control condition, medium amplitudes in the Variation condition, and weakest amplitudes in the Identity condition. Beginning readers did not tolerate the variation: P350 amplitudes in the Variation condition did not differ from P350 amplitudes in the Control condition. By contrast, preschoolers tolerate the variation in PLACE: Targets in the variation condition did not differ from identical targets. Thus, lexical representations appear to represent more detail after literacy acquisition. All groups showed a central negativity that was more negative for unrelated control words compared to the other two conditions. This negativity is associated with rapid phonological expectations, which might not be altered by literacy acquisition.

**E74 MONITORING OF SPEECH ERRORS: ELECTROPHYSIOLOGICAL EVIDENCE FROM DUTCH**

**Niels Schiller1,2, Femke Horeman2, Dirk Koester1,2, Leiden Institute for Brain and Cognition, Leiden University, The Netherlands, 1Maastricht University, The Netherlands, 2C. C. Donders Centre for Cognitive Neuroimaging, Nijmegen, The Netherlands — When we perceive speech, our goal is to extract the meaning of the verbal message which includes semantic processing. However, how deeply do we process speech that we encounter while carrying out another task? In two experiments, native Dutch participants heard spoken sentences describing simultaneously presented pictures. Sentences either correctly described the pictures or contained an anomalous final word (i.e. a lexical substitution error or a phonemic perseveration error). In the first experiment, when spoken sentences were task-irrelevant, we found that the
amplitude of a centro-parietal N400 was the same for both anomalous conditions as compared to the correct condition. In the second experiment, we ensured that participants processed the sentences and the pictures to a semantic level. In an early time window, we found similar phonological mismatch negativities in both anomalous conditions compared to the correct condition. These negativities were followed by an N400 that was larger for lexical than perseveration speech errors. These data suggest that we process speech, even if task-irrelevant, deeply enough to allow semantic processing. Furthermore, once we allocate more cognitive resources to the processing of speech, we try to predict upcoming words, presumably by means of the internal monitoring loop, to facilitate lexical access.

**E75**
WHEN 'UMKOMMEN' (PERISH) PRIMES 'KOMMEN' (COME); ELECTROPHYSIOLOGICAL EVIDENCE FOR STEM ACCESS IN SEMANTICALLY OPAQUE DERIVATIONS Eva Smolka¹, Matthias Gondan¹, Frank Rösler²;¹University of La Laguna, Spain, ²University of Regensburg, Germany — This study investigated whether semantically transparent and opaque derivations are accessed via their constituent units or as whole words. Reaction times (RTs) and event-related potentials (ERPs) were measured when verb targets (e.g. ‘kommen’, come) were preceded by a purely semantically related verb (‘nahen’, approach), by a morphologically and semantically related verb (‘mitkommen’, come along), by a purely morphologically related verb (‘umkommen’, perish), by an orthographically similar verb (‘Kommen’, comb), or by an unrelated verb (‘scheiden’, harm). Morphological relatedness produced robust RT facilitation and N400 modulations regardless of semantic relatedness. These morphological effects were even stronger than pure semantic effects. Moreover, morphological derivations induced an early frontal negativity indicating prefix-stripping. Orthographic similarity produced RT interference and early frontal effects that differed from those of the morphological effects. Behavioral and ERP data favor a single system that accesses the stems of both semantically transparent and opaque derivations.

**E76**
EVIDENCE FOR EARLY MORPHOLOGICAL DECOMPOSITION IN VISUAL WORD RECOGNITION: A SINGLE TRIAL CORRELATIONAL MEG STUDY Olla Solomjak¹, Alec Marautz², ¹New York University — We employ a single trial correlational MEG analysis to investigate early processing in the visual recognition of morphologically complex words. Three classes of affixed words were presented in a lexical decision task: free stems (e.g. taxaitable), bound roots (e.g. tolerable) and pseudo-affixed words (e.g. vulnerable, the root of which does not appear elsewhere). Analysis was focused on brain responses within 100-200ms post-stimulus onset, in the letter string and visual wordform areas. MEG data were analyzed using cortically constrained minimum-norm estimation. Correlations were computed between activity at functionally defined regions of interest and continuous measures of the words’ morphological properties. ROIs were identified across subjects on a reference brain and then morphed back onto each subject’s brain (N=9). We find evidence of decomposition for all three classes of affixed words. Peaks corresponding to letter-string (~130ms) and wordform (~170ms) components in the literature are shown to be sensitive to affix properties, such as affix frequency, for both bound roots and pseudo-affixed words. For free-stemmed affixed words, the M170 response is shown to be sensitive to the conditional probability of the word given the stem. These morphological properties are contrasted with orthographic form features (letter string frequency, transition probability from one string to the next). Effects of decomposition can in fact be attributed to morphological properties of complex words, rather than purely orthographic and form related properties. Our data support a model of word-recognition in which decomposition is attempted, and possibly utilized, for complex words of all three classes.

**E77**
EARLY COMPOUND CONSTITUENT PROCESSING BY RIGHT AND LEFT FUSIFORM GYRUS Linhua Stockall¹, Roberto de Almeida¹, Michael von Grunau2, ¹Concordia University – Stockall et al (2008) investigated the lateralization of the early visual processing of morphological complexity with a lexical decision experiment. Compounds (teacup) and monomorphic pseudocompounds (carpet) were presented briefly (74 ms) and centered on the screen, but with the point of visual convergence (fixation) falling either at the constituent boundary (e.g., TEA+CUP) or one character off the boundary (e.g., TE+ACUP). We obtained a main effect of word type (compounds faster than monomorphemes) and a main effect of morphological legality, with convergence at morphological boundary yielding faster RTs than at off-boundary, suggesting hemifield of presentation plays a role in early morphological processing. In an MEG experiment Zweig and Pykkänen (2006) found that morphologically complex forms (teacher, refill) evoke increased activation from sources in the left and right fusiform gyrus (Visual Word Form Area; Cohen et al., 2000) peaking approximately 170 ms after stimulus onset (M170; Tarkiainen et al., 1999), as compared to matched monomorphemes (winter, resume). Our experiment combines the design of the lexical decision experiment (compound vs. monomorpheme, aligned vs. unaligned constituent boundary, short SOA) with the dependent measure of the MEG experiment: left and right fusiform gyrus activity. Preliminary results (N=18) show that participants exhibit a significant M170/VWFA response, which initial analyses confirm is sensitive to the morphological complexity of the stimuli. Many participants also show a second evoked posterior response 50-80ms after the M170. Further analysis will be required to determine the relationship of this second response component to the stimulus manipulations.

**E78**
THE FUNCTIONAL ACTIVATION AND NETWORK CHARACTERISTIC IN THE LEFT TEMPOROPARIETAL CORTEX Xiaoli Wang¹, Xia Wu¹, Haijuan Zhou¹, Jie Lu², Li Yao³, Hua Sha¹; ¹State Key Laboratory of Cognitive Neuroscience and Learning, Beijing Normal University, Beijing, China, ²International WIC Institute, Beijing University of Technology, Beijing, China, ³Xuanwu Hospital, Capital University of Medical Sciences, Beijing, China — This fMRI study aimed to examine the functional activation and network characteristic in each part of the left temporoparietal cortex in Chinese. BOLD changes were recorded in thirteen healthy right-handed speakers in Mandarin Chinese during auditory Chinese word, visual Chinese word and picture dangerous judgment tasks. The results of functional activation and conjunction analysis showed the supramarginal gyrus(SMG) and angular gyrus(AG) were activated in all the three tasks and the superior parietal lobule(SPL) for two visual tasks, while the posterior superior temporal gyrus(pSTG) was for none, suggesting visual Chinese word approach to the picture in the activation feature. The further ROI analysis for the contrast between the AG and SMG of each judgment task showed that the AG were more activated than the SMG, indicating the AG was more sensitive to the semantic judgment than the SMG. The contrasts of among the different tasks in the same area showed that the activations of the AG, SMG and SPL were larger in the visual tasks than in the auditory task and there were not significant between the two visual task. Furthermore, the structural equation modeling analysis to three areas for three tasks found the left temporoparietal cortex connected the left prefrontal cortex to be centered at the AG in the word tasks (auditory or visual), while taking the SPL as the center for the picture task. This result implied the universal mechanism in the network of language processing in spite of the difference among the functional activation tasks.