Research Project Title: The role of visual salience on plural noun production

Student Presenter: Nathan Baker

Faculty Mentor: Nikole Patson

Faculty Mentor Department: Psychology

Research Abstract: There are many factors that influence the perception of distinctive visual groups. Visual salience, the distinctive qualities of an object that distinguish it from its surroundings, is one such factor. To test the impact of visual salience on perceived distinctiveness, participants were asked to complete a photo caption for a series of photographs. Pictures contained either: one individual, a group of individuals, or a group of individuals with one visually salient individual (i.e., the “VIP”). The study examined which visual features will impact when adults view an individual as being separate from a larger group of people. For example, if in a group of people, one individual is visually salient, will that person seem independent from the rest of the group? To test this hypothesis, each photograph was accompanied by a photo caption containing a blank space that could be filled in with either a plural or singular noun. We predict that people will be less likely to use a plural noun in the VIP condition, as that would indicate that the participant viewed the visually salient member as separate from the rest of the group. Preliminary analyses indicate that participants were indeed less likely to use a plural noun in the VIP condition compared to plural condition where there were multiple individuals, but no “VIP.” These data suggest that pictured individuals with greater visual salience were more likely to be viewed as separate from a larger group of people.
Research Project Title: Optimizing spell checking introduction

Student Presenter: Sarah Ewing

Faculty Mentor: Michael White

Faculty Mentor Department: Linguistics

Research Abstract: Introduction

The Department of Linguistics and the Department of Family Medicine are collaborating on a virtual patient dialogue system to help medical students with their patient questioning skills. The system uses a rule-based pattern matching system in combination with a machine-learned classifier to interpret questions. The system currently uses typed interaction leading to significant problems with misspelled words, especially with the rule-based system. This project aims to determine whether automated spelling correction can improve the system's accuracy in question interpretation.

Methods

I have annotated our 94-dialogue data set with over 250 spelling corrections. The machine learned system did no better on the annotated data which was disappointing although expected. I will focus on improvements to the rule-based system, by assessing two spell-checkers: one open-source and one made by Bing. Bing’s system uses machine learning and statistical machine translation trained on a corpus of web searches and documents to correct errors. I will observe the accuracy of each system’s corrections on the original data. Additionally, I will alter each to consider a domain specific language model and test their improvements. A general purpose spell checker may consider 'dogs' or 'drugs' equally likely corrections for the misspelling 'drogs'. However, for a system with a medical domain specific language model, 'drugs' would be a preferred correction.

Results

At the Denman I will present which of the four systems (open-source, Bing, biased open-source, or biased Bing) performs with the closest accuracy to my annotations, as well as its effect on the rule-based classifier and the virtual patient system overall.

Conclusions

The results have applications in further technology as well. The next step for the virtual patient system is to understand speech. The speech-to-text technology does not require a spell-checker, however a biased language model 'word-checker' will improve the system's translations from sound waves to text by preferring relevant words over acoustically similar irrelevant ones.
Research Project Title: Linguistic, talker, and stimulus factors as predictors of dialect classification accuracy

Student Presenter: Megan Dailey

Faculty Mentor: Cynthia Clopper

Faculty Mentor Department: Linguistics

Research Abstract: Evidence from perceptual dialect classification research suggests that listeners have good intuitions about regional differences between speakers. Less studied is the relationship between dialect classification and speech intelligibility. Regional dialect is known to affect speech intelligibility: in some cases, familiar dialects can facilitate speech processing, but in other cases, less marked dialects facilitate speech processing. Many other linguistic, sociolinguistic, and stimulus factors also affect speech intelligibility, including lexical frequency, phonological similarity, semantic predictability, mention within a passage, speech style, and talker gender. The present study explores predictors of dialect classification accuracy for the Northern and Midland dialects of American English. In previous studies, Midland speech in noise was found to be more intelligible than Northern speech in noise for both Midland and Northern listeners. Given that listeners are sensitive to differences between Northern and Midland speech in terms of intelligibility, we might expect that listeners use differences in intelligibility to identify where talkers are from. To explore this possibility, participants completed a speech intelligibility in noise task followed by a dialect identification task. Stimulus materials were short phrases taken from passages read aloud by eight Northern and eight Midland speakers and were balanced for the relevant linguistic, stimulus, and talker factors that affect speech processing. Participants heard the same phrases in both tasks. Accuracy scores from both tasks were obtained. A linear regression model revealed that token intelligibility did not predict token classification accuracy. The results reveal that easily classifiable tokens are not always the least intelligible, suggesting that dialect-specific forms are encoded for lexical processing, but may not be available to the listener for explicit classification. Ongoing analysis will determine the role of the other predictors of dialect classification accuracy, leading towards a better understanding of the relationship between perceptual and processing mechanisms.
Research Project Title: "Tapping" into the etiology of pediatric communication disorders: spontaneous rhythm tapping predicts auditory working memory

Student Presenter: Katherine Corbeil

Faculty Mentor: Yune Lee

Faculty Mentor Department: Speech and Hearing Science

Research Abstract: A growing body of evidence has shown that auditory working memory (AWM) deficits present in people with speech and language disorders such as specific language impairment (SLI), dyslexia, and ADHD. However, the causal direction between working memory and these disorders remains elusive. This study proposed that innately slow auditory temporal processing pertaining to speech/language deficits adversely affects AWM. A spontaneous tapping task was used to examine the variation in individuals’ temporal processing and provided data on the length of the temporal window (i.e., inter-tapping interval). We hypothesized that a large temporal window (manifesting as slow rhythm tapping) stores more information and, due to heavy storage and retrieval demands on the working memory unit, leads to poorer AWM. A small window, however, facilitates precise processing and better AWM. Prior to recruiting children with speech and language disorders, 21 typically-developing children, aged 7-17 years old, were recruited at the Center of Science and Industry (COSI) Language Pod in Columbus. We proposed that children’s less biased (and fewer number of) life experiences were most appropriate for analyzing what we believe to be innate, perhaps genetic, rhythm skills. Participants first completed computerized visual and auditory working memory assessments and then engaged in two tablet-based rhythm tapping tasks: a beat synchronization measure and the spontaneous tapping measure. A linear mixed effect (LME) regression analysis confirmed our hypothesis, demonstrating that mean inter-tapping interval was the sole predictor (F= 5.01; P = .043) of AWM performance, while other factors (e.g., age, sex, parental education, music training, languages spoken) were not. Perhaps most notably, beat synchronization did not significantly predict AWM (F=4.03; p = .066), supporting the argument for dissociable rhythm skills. No measures predicted visual working memory performance, further arguing for a domain-specific relationship between rhythm and AWM. These results serve as promising evidence for poor rhythm processing underlying AWM deficits in populations with speech and language disorders. Further data collection and analyses are underway to solidify this connection.
Research Project Title: Executive function and psychosocial outcomes in prelingually deafened CI users

Student Presenter: Jillian Harrington

Faculty Mentor: Irina Castellanos

Faculty Mentor Department: Otolaryngology

Research Abstract: A cochlear implant (CI) is a device that provides the sensation of hearing to many individuals with profound hearing loss. Commonly, pediatric CI research revolves around speech-and-language outcomes. While deaf children face obvious obstacles with hearing and language, there is increased concern for their entire neurocognitive development. In fact, CI users are at an increased risk for disturbances in neurocognitive development including delays in executive function: the self-regulation of cognitive and emotional processes. The present study seeks to examine how neurocognitive delays are associated with psychosocial, functional-everyday, outcomes in prelingually deaf, CI preschoolers compared to their normal-hearing (NH) peers. Psychosocial outcomes include social, emotional, and behavioral development and our previous research indicates that these areas of development differ between adolescent CI users and NH controls at clinically significant levels (Castellanos, Kronenberger, & Pisoni, 2017). This makes the early identification and treatment of psychosocial disturbances a pressing, clinical issue. To investigate the impact of executive functioning on psychosocial development, this study utilizes two well-validated parent-completed behavioral checklists: the Learning, Executive, and Attentional Functioning (LEAF) to assess executive functioning and the Behavior Assessment System for Children (BASC) to assess psychosocial development. Additionally, preschool children (CI, n=4; NH, n= 9) were administered the Primary Test of Nonverbal Intelligence (PTONI). Parent-reported data indicates that preschool CI users exhibit more externalizing behavioral problems, more social disorders, and less functional communication in comparison to their NH peers. Moreover, nonverbal intelligence scores and executive functioning skills are associated with psychosocial outcomes. Higher nonverbal intelligence is associated with fewer symptoms of anxiety, depression, internalizing problems, withdrawal, and better control of anger and emotions. Similarly, better working memory is associated with fewer symptoms of hyperactivity, attentional problems, social disorders, and more adaptability, resiliency, and emotional self-control in preschool-aged children. These preliminary findings suggest that neurocognitive disturbances, specifically delays in executive functioning, contribute to the early development of psychosocial skills in prelingually deafened CI users.
Research Project Title: Acquisition of Spanish sounds among college students in a Spanish pronunciation course

Student Presenter: Allison Goldman

Faculty Mentor: Rebeka Campos-Astorkiza

Faculty Mentor Department: Spanish and Portuguese

Research Abstract: This project analyzes the acquisition of Spanish sounds among college students learning Spanish as a second language (L2). Differences in pronunciation of a sound depending on context, which are called allophones, are important for the L2 learner to acquire because their production contributes to the perception of accented speech. The distribution of allophones varies according to the presence of allophones in the L2 that do not exist in the L1, or the presence of similar allophones in both L1 and L2 but with a different distribution. This study compares the acquisition of the Spanish voiced ([b, d, g, ð, ð, ɣ]) and voiceless ([p, t, k]) stops allophones by L1 American English learners. Spanish presents an alternation between voiced stops and approximants, while English displays only voiced stops. Additionally, Spanish voiceless stops are unaspirated in all environments, while English alternates aspirated, unaspirated, and weakened allophones. Our project compares the difference in the rate of acquisition of approximant allophones of voiced stops vs. that of unaspirated allophones of voiceless stops for L1 American English learners of Spanish.

This study is part of a bigger project called “See Your Speech,” which analyzes data from a teaching module developed for college-level Spanish pronunciation courses. Participants received the same Spanish pronunciation curriculum and teaching methodology, and recorded themselves reading English and Spanish words at the beginning and at the end of the course via a web-based interface.

To evaluate the production of voiced and voiceless stops, we measure the VOT of voiceless stops and the intensity of voiced stops. We then compare the rate of change in reducing VOT (less aspiration) and increasing intensity (more approximantization) to elucidate which type of sounds present a higher rate of change, which would mean a higher rate of acquisition. Preliminary results indicate that the change in intensity is greater than the change in VOT, suggesting that learners become better at producing approximants instead of voiced stops than at producing unaspirated vs. aspirated voiceless stops. We interpret this as an indication that the acquisition of approximants is faster or more successful than the acquisition of unaspirated stops.
Research Project Title: The impact of individual differences across two AAC systems

Student Presenter: Michelle Kryc

Faculty Mentor: Allison Bean-Ellawadi

Faculty Mentor Department: Speech and Hearing

Research Abstract: Category: Social and Behavioral Sciences

Title: The impact of individual differences across two AAC Systems

Student Presenter: Michelle Kryc

Faculty Advisor: Ellawadi, Allison

Abstract: Augmentative Alternative Communication (AAC) devices are considered “all forms of communication (other than oral speech)” (ASHA, n.d.). Devices may be motor or symbol based systems. Symbol-based systems require learning that a consistent graphic represents a specific referent (e.g., a picture of an apple represents the word “apple”). Motor-based systems involve learning that a consistent motor pattern represents a specific referent (e.g., when you form a specific set of motor movements with your mouth to say the word “apple”). The present study investigates whether individual differences (e.g., nonverbal cognition) are correlated with vocabulary learning across two different types of AAC systems (motor and symbol) and whether the number of words being taught (six versus ten) differentially affects learning across the systems. To answer this question 23 college age students were taught novel words on the two AAC systems. In the symbol system, participants were taught symbols that corresponded with a specific referent. In the motor system, participants were taught motor sequences that corresponded with a specific referent. The number of words taught (six versus ten) was randomized across participants. Receptive and expressive vocabulary learning were assessed immediately after teaching. Results revealed that participants demonstrated better expressive vocabulary learning on the symbol system. For receptive vocabulary learning, the interaction between condition and number of words taught was trending towards significance (p=.05). Individual differences were not correlated with learning in either condition. Overall, the findings from this study suggest that adult learners with intact language may benefit more from a symbol system. Further research should explore if such results maintain for adults with aphasia, who at one time had intact language. This study will provide a first step in exploring how the individual differences of children with Autism can be utilized for efficient vocabulary learning.
Research Project Title: A neurolinguistic study of Spanish Agreement

Student Presenter: Katy McFarland

Faculty Mentor: John Grinstead

Faculty Mentor Department: Spanish and Portuguese

Research Abstract:

Background:

In Spanish, there is person, number and gender agreement. The current study focuses on better understanding two specific cases of non-canonical agreement which include a person mismatch, known as Unagreement (e.g. “Las cocineras (3rd-pl) cocinamos (1st-pl) en la cocina.”), which is grammatical in adult Spanish, and a general lack of person agreement found in child Spanish known as the Bare Stem Phenomenon (e.g. “Hace (3rd-sg.) esto yo (1st-sg).”), which is ungrammatical in adult Spanish, but produced by children. Though grammatical, the Unagreement cases produce an Event-Related Potentials (ERP) signature consistent with semantic anomaly. However, the grammaticality of Unagreement cases has never been put to a large-scale behavioral test. The Bare Stem phenomenon cases, in contrast, are judged by child Spanish-speakers to be acceptable, but their acceptability by adult speakers has never been tested.

Methods:

The first experiment consists of an adult Spanish language acceptability survey, in which monolingual adult Spanish-speakers in Mexico were asked to provide Likert Scale ratings from 1-5, with 1 being most acceptable, of standard subject-verb agreement, standard subject-verb agreement clashes, as well as Unagreement cases and Bare Stem cases. This survey was administered electronically to 94 monolingual Spanish-speaking participants in Mexico.

Results:

Of these, 55 completed the entire survey. Answers showed that participants judged agreeing sentences (mean acceptance=1.64, SD=.36) and Unagreement cases (mean acceptance=1.74, SD=.63) as equally grammatical (p=.940). Further, the Bare Stem cases (mean acceptance=4.31, SD=.74) were found to be as ungrammatical (p=.940) as the Agreement Clash cases (mean acceptance=4.23, SD=.56). Thus, Unagreement Cases appear to be judged as completely grammatical. Bare stem sentences, in contrast, are judged as completely ungrammatical.

Conclusions:

Based on these results, my second experiment seeks to determine whether we will replicate the semantic anomaly reaction to Unagreement cases, documented in the literature, and find straightforward syntactic ungrammaticality reactions to the Bare Stem cases or perhaps something different. The ERP component of the project will be carried out over spring break in Mexico City with collaborators at the Universidad Nacional Autónoma de México.
Research Project Title: Early math skills as predictors of narrative ability

Student Presenter: Flora Hong

Faculty Mentor: Kiren Khan

Faculty Mentor Department: Psychology

Research Abstract: Despite a growing body of literature establishing the relationship between literacy and math ability in early childhood, very few studies have explored the association between early mathematical and narrative ability, a skill that is separate from, but predictive of early literacy skills. Understanding associations among these developing skills can help inform best practices for instruction so that optimal gains may be made in these skills prior to kindergarten entry. In order to determine the cross-domain association between mathematical and narrative retelling ability, different measures of early math skills (Patterning, Cardinality, Math Language, Counting) and one measure of narrative comprehension (Test of Narrative Language) were administered to 48 children between 4 and 5 years of age. All measures were assessed at one time point as a part of a general Kindergarten Readiness Screener. Simple correlations between measures showed that narrative comprehension was moderately correlated with general math ability ($r=0.55$), and significantly correlated with three math subtests: Patterning, Cardinality, and Math Language ($r = 0.33, 0.54, 0.52$). A multiple regression analysis indicated that together, all four math subtests explained 37.9% of variance in narrative comprehension skills ($R^2 = 0.38, F(3,44) = 6.41, p<0.001$), with Cardinality and Math Language each accounting for significant variance ($R^2 = 0.44, 0.56, p<0.05$). Rote counting was neither significantly correlated with narrative, nor accounted for narrative ability in the regression model. We interpret this data to suggest that the mathematical skills most strongly associated with narrative are those that require reasoning about causal relationships—whether they are associations between number sets, operations, and sequences in the case of mathematics, or relationships between characters and sequences of events as in the case of narrative. An implication of this work is that hybrid interventions focusing on teaching patterning, cardinality, and math language in the context of shared book reading sessions may be particularly powerful in supporting cross-domain advances in narrative and math.
Research Project Title: Pragmatic factors influencing existential determiners in child Spanish

Student Presenter: Nicolette Leon

Faculty Mentor: John Grinstead

Faculty Mentor Department: Spanish and Portuguese

Research Abstract: Introduction/ Background

Early work on developmental semantics (e.g. Beilin & Lust 1975) investigated what children knew about logical language, including quantifiers such as some, and concluded that children were not adult-like in their comprehension. However, others (e.g. Chierchia et al. 1998) were able to demonstrate children’s understanding of some, with respect to inferences referred to as pragmatic implicatures, in the terms of Grice (1975) and Horn (1972). Seeking to make certain interpretations easier to grasp by ensuring that experimental contexts follow a discourse structure that answers what is referred to as the Question Under Discussion (e.g. Roberts 1996, 2004), Gualmini et al. (2008) showed that children could demonstrate more adult-like comprehension of ambiguous sentences, if the hard-to-access interpretation was the answer to an implicit Question Under Discussion. An explicit Question Under Discussion design has not yet been used in studies of children’s interpretations of some and its associated some, but not all pragmatically enriched interpretation, which is what I have studied, in monolingual pre-school-aged Spanish-speakers in Mexico City.

Methods

To study this question, our project administered a Truth Value Judgment Task to monolingual Spanish-speakers in Mexico City, including 60 adults (mean age = 305.49 months, SD= 63.0) and 42 children (mean age = 70.65 months, SD = 5.7). To study some in Spanish, we looked at both unos and algunos, which are the Spanish version of some, which previous work has suggested that children understand (Vargas-Tokuda et al. 2009). Because unos and algunos are similar, but subtly different quantifiers (Gutiérrez-Rexach 2001; López-Palma 2007), participants were assigned to either unos or algunos conditions, in a partially between-subjects design, to avoid confusion.

Results & Conclusion

Results showed that adults generated a some, but not all implicature with algunos, but not with unos, which is consistent with, though more categorical than, findings from previous research. In contrast with previous research, the children in our sample did not generate an implicature with either algunos or unos. Future research will investigate predicate type as a potential source for this distinction with previous research. I discuss the significance of the more categorical adult judgments.
Research Project Title: Effects of high-pass filtering on dialect and gender perception

Student Presenter: Magan McClurg

Faculty Mentor: Robert Fox

Faculty Mentor Department: Speech and Hearing Science

Research Abstract: Category: Social and Behavioral Sciences

Title: Effects of high-pass filtering on dialect and gender perception

Student Presenter: Maggie McClurg

Faculty Advisors: Fox, Robert & Jacewicz, Ewa

Abstract: Linguistic (message related) and indexical (related to individual talker characteristics) information are conveyed in spoken language. It has been demonstrated that listeners are sensitive to indexical cues such as regional dialect spoken in their speech community (Clopper et al., 2006; Jacewicz & Fox, 2012). However, we have relatively little information in terms of how listeners form a perceptual representation of speaker identity and how the indexical information is conveyed by the vocal source (related to voice) and filter (related to the changing shape of the vocal tract during speech production). We do not know the necessary and appropriate acoustic cues that listeners use to determine speaker identity. This project analyzes how listeners process information about talker sex (male, female) and dialect (Ohio, North Carolina) with high-pass filtered speech. Research shows that intelligibility remains relatively high even when large portions of the speech spectrum are eliminated by filtering (Stickney & Assmann, 2001), indicating that speech cues are widely distributed. This study explores the contribution of cues at different frequency ranges to the identification of speaker dialect and gender by systematically removing the segmental and semantic content from speech using high-pass filtering. Two types of tests will be given: Identification and Intelligibility. In the Identification (ID) task, listeners will be required to identify each sentence as having been produced by an Ohio speaker or a North Carolina speaker; male or female. In the Intelligibility task participants will be asked to write down (using a Matlab program) the messages (i.e., linguistic content). Intelligibility data will be analyzed using Signal Detection Theory to separate sensitivity to indexical cues from the response bias. Based on previous findings for low-pass filtered speech, I expect to find greater amount of dialect cues than gender cues in high-pass filtered speech. Intelligibility is expected to increase with each decreasing cutoff frequency of the filter.
Research Project Title: Functional activation during reading comprehension in opposite-handed MZ twins

Student Presenter: Nick Mannix

Faculty Mentor: Steve Petrill

Faculty Mentor Department: Psychology

Research Abstract: The purpose of the present study was to examine differences in functional activation during reading comprehension tasks among monozygotic (MZ, or identical) twin pairs. Previous literature suggests left lateralization of language areas associated with working memory in right-handed adults. In addition, prior research has shown that left-handed adults may be more bilateral in their processing of working memory. Finally, our previous research has shown that working memory is bilaterally processed in MZ twins suggesting handedness is not related to working memory processing. MZ twins provide a unique approach for studying the etiology of differences in functional brain activation, as functional differences can be examined while controlling for genetic differences between individuals. Data from four opposite-handed MZ twin pairs (Age range 14 to 18) were analyzed in the current study. Twins were also administered reading comprehension measures by separate examiners. Results examined differences in functional activation if reading comprehension compared to baseline, based on handedness. Because MZ twins are almost completely genetically identical and live in the same environments, these differences are indicative of non-shared environmental and/or epigenetic effects. Since MZ twin pairs are genetically identical, any functional differences in activation, lateralization, or handedness are due to either non-shared environmental factors or an unknown difference which should be studied further.
Research Project Title: The role of gestures in the mental representation of plurals

Student Presenter: Madeline Nicol

Faculty Mentor: Nikole Patson

Faculty Mentor Department: Psychology

Research Abstract: This project investigated what effect hand gestures have on the mental conceptualizations listeners construct when hearing a plural noun (e.g., cats) produced in speech. In our study we used punctuated and unpunctuated gestures. Punctuated gestures are discrete from the other surrounding gestures and more accurately convey the number of items compared to unpunctuated gestures, which are not clearly separated from the surrounding gestures and do not give specified information, but rather are currently understood to mean “more than one.” These gestures are produced by homesigners for conveying information about quantity. Homesigners are individuals unable to produce spoken communication but do not have access to conventional sign language and, therefore, create their own gestural system to communicate. We hypothesized that the gestures of homesigners reflect innate processes, thus individuals from the normally-speaking population should interpret these gestures in the same manner.

In the normal-speaking population, different modes of expressing plurality have been shown to influence the conceptualizations of the plural noun created by listeners. Previous research has identified one such difference, wherein the objects in the set are separate and distinct versus a collective group. We predicted that when given a neutral sentence, such as “The books are on the table,” paired with one of the above-mentioned gestures, the punctuated gestures will produce scattered representations due to their emphasis on discreteness and accuracy, while the unpunctuated gestures will produce collective and underspecified representations because of their use for grouping items into a sum. Participants in this study watched videos of an actor performing the gesture while simultaneously saying the target sentence. Following this, participants were given two pictures and instructed to select the picture that best matched the scene described in the video. One picture showed the items spread out and the other showed the items in a pile. Preliminary data analyses do not confirm our hypotheses. Participants’ picture preference was not dependent on the gesture in the video. These data suggest that the homesigners gestures do not reflect innate processes, but future work is necessary.
Research Project Title: Language induced attention optimization in children and adults

Student Presenter: Ted Oyler

Faculty Mentor: Chris Robinson

Faculty Mentor Department: Psychology

Research Abstract: Effects of linguistic labels on category learning are well established; however, developmental research examining possible mechanisms underlying these effects have provided mixed results. For example, while there is some evidence that hearing the same label associated with multiple objects directs visual attention to the category relevant features, other studies have found that infants and young children learn the categories with focusing on the correct information. However, previous studies relied on habituation/familiarization tasks, which may not work on infants and children because of their known novelty preference.

To further examine if labels direct attention to category relevant features, we used a novel paradigm where 8-year-olds and adults were simultaneously trained on three sparse categories (categories that have very little in common) and category members were either presented with a common label (same label associated with all category members), unique labels (different labels associated with all category members), or no labels (silent baseline). The three categories were rule-based groups determined by specific visual components of the stimuli. At the end of the study, there was a recognition task which tested whether increased attention to the category relevant features would spill over to a non-categorization task. Similar to infant paradigms, participants were not instructed about the categories, nor were they asked to make category judgements, and we examined fixations to category relevant features across training as participants passively viewed the novel stimuli.

While it is well established that adults can optimize their attention in forced-choice categorization tasks without linguistic input, the present findings provide support for label induced attention optimization: simply hearing the same label associated with different exemplars pushed children’s and adult’s attention to category relevant features over time. Moreover, children continued to focus on these features on a subsequent recognition task. Participants also viewed images longer and made more fixations when images were paired with unique labels.

The current study provides support for the claim that labels may facilitate category learning by directing attention to category relevant features. Additional data will be presented examining participants' explicit knowledge about category defining features with patterns of looking during training.
Research Project Title: Semantic processing projects

Student Presenter: Peiyuan Tang

Faculty Mentor: William Schuler

Faculty Mentor Department: Linguistics

Research Abstract: Introduction: Research methods for Improving the efficiency and effectiveness of implementations for the semantics processing algorithms

Background: The current semantics processing method used by OSU's Computational Cognitive Modeling Lab currently have around 90% of accuracy in parsing English semantics into computer. However, the modelling of running the deep learning algorithms on experimental data takes very long time, running on the GPU. Our goal is to optimize the time and space used for semantics processing.

Methods:

1. Apply mathematical and statistical ideas and methodology to improve the efficiency of models for data storing.

2. Apply complexity optimization algorithms in improving the speed in parsing the experimental data.

Result: it can be improved, but we are stilling finding better methods. (I will have results later)

Modification of the matrices representation might be useful.

Conclusion: there is some way to improve the semantics processing. (I will get conclusions later, should get before the presentation time).
Research Project Title: Listener tolerance of nasality: A dialectal and comparative perspective

Student Presenter: Karl Velik

Faculty Mentor: Youkyung Bae

Faculty Mentor Department: Speech & Hearing Science

Research Abstract: Nasality in speech is defined differently in speech physiology than in popular belief. Nasality is a perceptual term referring to the degree of nasal resonance perceived in speech. In speech physiology, nasal sounds, such as /m n Â¬/ in English, are produced with the velopharyngeal (VP) port open, resulting in a greater degree of nasal resonance. For non-nasal sounds, the VP port ideally remains closed in order to keep nasal resonance minimal. Nasalization of vowels adjacent to nasal sounds occurs naturally, resulting from partial VP port opening during the articulation of such vowels. There is natural variation in the level of VP port opening between speakers, which may cause the perception of greater nasality from some speakers than others. Greater nasality of certain dialects is also remarked upon by speakers. Some such dialects are affected by a vowel shift affecting the height of the first formant (F1), especially in /Ä/ (Labov et al 2006). Acoustic correlates of nasalization include modulation of F1 bandwidth and amplitude (Chen 1997), suggesting that listeners perceive these dialects as more nasal than others due to differences in F1. This study investigates the connections between speaker nasal resonance and perception of nasalized vowels while controlling for dialectal variation. The study explores whether a â€œtolerance effectâ€ for nasality exists. If speakers with a higher degree of nasal resonance are shown to perceive the same nasalized stimulus as less nasal than speakers with lower degrees of nasal resonance, this would support the notion of tolerance. A recent study (de Boer & Bressmann, 2017) suggests that speakers to some degree perceive nasality in their own speech and make simultaneous articulatory adjustments based on auditory feedback. The projectâ€™s experiment comprises 1) a linguistic background interview, 2) a measurement of speaker nasal resonance using nasometry, 3) and rating of nasality in synthesized speech clips acoustically manipulated to simulate varying degrees of nasalization, rated via direct magnitude estimation with modulus. Preliminary results showed no appreciable overall effect of tolerance of nasality. This study is still in progress, and will be completed in spring 2018. Further findings and implications will be presented.
Research Project Title: Facilitative language techniques and neurocognitive development in preschool children with and without prelingual hearing loss

Student Presenter: Maria Zulliger

Faculty Mentor: Irina Castellanos

Faculty Mentor Department: Otolaryngology

Research Abstract: Prelingual hearing loss and delayed access to spoken language place some deaf children with cochlear implants (CIs) at an elevated risk for delays in specific domains of neurocognitive functioning. The current study investigated the effect of prelingual hearing loss on the relationship between mother’s linguistic input and children’s neurocognitive (language and executive functioning, EF) skills. Two groups of preschoolers (aged 3-6 years) with and without prelingual hearing loss and their normal hearing (NH) mothers participated. Mother-child dyads participated in a 5-minute free-play session with age-appropriate toys in a laboratory setting. Maternal linguistic input was categorized as employing lower-level (imitation, closed-ended questions, linguistic mapping, directive, and comments) or higher-level (parallel talk, open-ended questions, expansion, and recast) facilitative language techniques (FLTs).

Additionally, mothers completed the Learning, Executive, and Attention Functioning-Preschool (LEAF-P) scale, which assesses everyday EF and related learning skills in children aged 3 to 6 years. The LEAF-P contains 40 items, divided into two Cognitive-Learning subscales (Comprehension and Conceptual Learning, Factual Memory) and six Cognitive-EF subscales (Attention, Processing Speed, Visual Spatial Organization, Sustained Sequential Processing, Working Memory, and Novel Problem Solving).

Although both groups of children had comparable intelligence and language skills, mothers of CI users provided significantly more linguistic input than mothers of NH children. Mothers of CI users also produced significantly more directives and closed-ended questions (comprising lower-level FLTs) than mothers of NH children. CI users, as compared to NH peers, were rated by their mothers as experiencing greater problems in the EF areas of Comprehension and Conceptual Learning, Sustained Sequential Processing, and Working Memory. Correlational analyses revealed that higher-level FLTs were associated with higher intelligence scores and higher global language skills. Additionally, higher-level FLTs were associated with fewer parent-reported problems with Comprehension and Conceptual Learning, Visual Spatial Organization, and Novel Problem Solving. The findings suggest that mothers who employ higher-level FLTs during play scaffold children’s language and EF skills. This is the first study to demonstrate that maternal FLTs are associated with preschool children’s EF skills. These findings may provide an avenue for early, individualized clinical intervention for improving EF skills in prelingually deaf CI users.
Research Project Title: Preschoolers' false belief understanding, story comprehension, and inference production

Student Presenter: Michael Blosser

Faculty Mentor: Tompkins No

Faculty Mentor Department: Virginia

Research Abstract: Previous research suggests that theory of mind (i.e., the ability to understand our own and other’s mental states) predicts reading comprehension among children in grade school. Our study investigated the possible connection between theory of mind and narrative comprehension in preschoolers. This relation is important to examine in the preschool years because there is continuity between children’s narrative comprehension and later reading comprehension. Thus, understanding the earlier precursors to reading comprehension is important for understanding the underlying mechanisms of reading development, and also for its potential as an intervention tool. In this study, we examined the relations among false belief understanding and two aspects of narrative comprehension—story comprehension and inference production—across a six-month time period. Participants included 52 3- to 5-year-olds (M = 4.42 years); 83% were Caucasian, 50% were female, and most were middle to middle-upper class. Children were tested twice, six months apart, on false belief understanding and narrative comprehension. False belief understanding assesses the child’s understanding that a belief can differ from reality (e.g., a character will think there are crayons in a box that the child knows to contain ribbons). The story comprehension assessment consisted of ten questions (five implicit, e.g., causal inference and five explicit, e.g., setting). The inference production tasks consisted of children narrating a wordless book; spontaneous inferences made by the child were coded (e.g., emotional states, goals). Children’s receptive vocabulary was also assessed as a control variable. We found that children’s false belief understanding and story comprehension were significantly related controlling for child age and vocabulary within time points and across the six months. We have coded the inference production task and results are soon to be analyzed. We expect that children’s ability to make accurate inferences about a story will also significantly relate to false belief and story comprehension. This study is novel in its focus on pre-readers and on children’s production, not just comprehension, of stories. It suggests that the comprehension-theory of mind link occurs earlier in development than previously studied and suggests possible new avenues for early literacy intervention work.