CRBLM Scientific Day – Poster abstracts

May 18, 2021

Note: odd-numbered posters will present during session 1 (1:00-2:00pm), while even-numbered posters will present during session 2 (2:00-3:00pm)

1. Investigating the link between perception of rhythmic timing and inhibitory control

J. Slater, R. Joober, S. Dalla Bella, C. Palmer

Keywords: rhythm, inhibitory control, timing

Abstract: Rhythm and timing skills have been linked to inhibitory control in both expert musicians and clinical populations, including individuals with Attention Deficit/Hyperactivity Disorder (ADHD). Previous research suggests beat-based and interval-based timing are supported by basal ganglia and cerebellar pathways, respectively; these pathways are also important for inhibitory control and are implicated in ADHD. However, individual differences in beat and interval perception and inhibitory control have not been examined in the general population. We used an online data collection platform to administer beat alignment and interval discrimination tests as well as auditory stroop and go/no-go tasks in a community sample of young adults (n=127, age 18-27 years, including a range of ADHD symptomatology assessed via self-report). Performance on the beat and interval tasks were not correlated with one another. In the higher ADHD-like symptom group, beat and interval perception both correlated with performance on the auditory go/no-go task, and regression analysis revealed that each rhythm task predicted unique variance in go/no-go performance. These outcomes are consistent with the hypothesis that beat-based and interval timing rely on partly distinct mechanisms, both of which are important for inhibitory control. This study provides a basis for further investigation of rhythm processing and inhibitory control in clinical populations.

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2. The language of my eye: Pupillometric correlates of codeswitching

A.L. Beatty-Martínez, R.E. Guzzardo Tamargo, P.E. Dussias

Keywords: bilingualism, language control, pupillometry

Abstract: Codeswitching is a hallmark of the flexibility of bilingual language control, yet the processes that mediate how bilinguals selectively attend to and control their languages during codeswitching remain poorly understood. This study examined the interplay between narrow and broad attentional states by examining changes in pupil size during the comprehension of unilingual and codeswitched speech. In a visual world task, 92 Spanish-English bilinguals saw pairs of objects as they heard instructions to select a target image. Instructions were either in Spanish (Encuentra el tenedor, 'Find the fork') or codeswitched at the target noun (Encuentra el fork). We found that the pupillary response was larger for codeswitched than for unilingual trials. Notwithstanding, this difference in pupil size was jointly modulated by individual differences in auditory attentional ability and participants' codeswitching tendencies. Only individuals who used their languages separately and had high auditory attention sensitivity exhibited differences in pupil responses, reflecting a shift from a narrow to a broad attentional state from the expected to the unexpected language. Conversely, bilinguals who tended to codeswitch in conversation did not show switching costs regardless of attentional skill. These results suggest that when language control is engaged cooperatively, bilinguals can maintain a sufficiently broad focus of attention when processing a codeswitch. Together, the findings speak to the flexibility and efficiency to which bilinguals draw on resources associated with language control as they selectively attend to and extract linguistic information on the fly, and highlight the complexity of the pupillary response in bilingual spoken language processing.

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3. A robust tongue shape model from ultrasound recordings of normal and impaired speech

S. Changizi, C. Laporte, L. Menard

Keywords: tongue shape modeling, Discrete Fourier transform, tongue ultrasound

Abstract: The tongue plays an important role in all oropharyngeal operations. Different tongue configurations can be used to produce a broad variety of speech sounds. Ultrasound imaging is a useful instrument to observe tongue movements without interfering with natural speech. The objective of this research is to construct a concise model to quantify tongue shape dynamics during speech. However direct application of such a model to tongue contours extracted from ultrasound images is challenging. For example, due to imaging artefacts, parts of the tongue might be missing in ultrasound images. As a first step towards our objective, we survey the effect of various contour extraction errors on the accuracy and consistency of different shape measures. We add random noise and heuristically simulate missing tongue tip and root to investigate the effect of poor image quality on the robustness of models based on discrete Fourier transform (DFT) and a triangular fit. This is applied to a set of CV utterances collected from healthy and impaired speakers to measure the robustness of the shape model according to different criteria. Interesting results from this research include the effectiveness of the DFT and triangular fit in clustering different phonemes despite the added noise.

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4. Quantifying bilingual language experience as a complex, socially dynamic spectrum

J.W. Gullifer, S. Kousaie, A.C. Gilbert, A. Grant, N. Giroud, K. Coulter, D. Klein, S. Baum, N. Phillips, D. Titone

Keywords: bilingualism, language entropy, individual differences

Abstract: Bilingualism is a complex life experience comprised of several continuous constructs, including language usage, exposure, and proficiency. Yet bilinguals are often dichotomized into ostensibly homogeneous groups. The age of acquisition (AoA) of a second language (L2) is known to impact linguistic knowledge and neurocognition, but recent work identifies current language exposure as another crucial factor. Critically, these indices are collected through self-report questionnaires, and their validity has been scrutinized in favor measures of objective language ability. Here we show that bilingual experience can be estimated jointly and continuously through L2 AoA, amount of exposure, and language entropy (a measure of balance). We use factor analyses to estimate these constructs, and we assess their relationships with language proficiency (objective and self-report). Results suggest that current exposure exhibits distinct but interrelated patterns depending on the domain of language usage. Counter-intuitively, our participants more accurately self-assess proficiency in the L2 than in the native language. A precise quantification of bilingualism is necessary to enhance future research on language processing, acquisition, and control.

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5. Characterizing the Linguistic Landscape of Eastern Canada

L. Silva, E. Hernánadez-Rivera, N. Vingron, D. Titone

Keywords: Multilingualism; Linguistic Landscape; Psycholinguistics; Cognates; Interlingual Homographs

Abstract: The term linguistic landscape is defined as "the linguistic items found in the public space" (Ben-Rafael et al., 2006). Prior work shows that Canadian cities have different language census properties (Leimgruber, 2020). It is unclear; however, how federal and provincial language policies constrain their linguistic landscapes. We examined the linguistic landscape across four eastern Canadian cities: Montreal-QC, Quebec-QC, Ottawa-ON, and Fredericton-NB. In addition, given its highly multilingual landscape, we examined linguistically distinct zones within Montreal. By way of systematic sampling of signs of one street

from each city (except Montreal, where four streets were photographed), we examine the distribution of French and English word types, specifically cognates (i.e., words that overlap in form and meaning) and interlingual homographs (i.e., words that overlap only in form). We conducted these analyses across three sign types: governmental, commercial and grassroots community signs across cities. For our city-level and street-level comparisons, we observed an interaction between city/street and sign type for the proportion of French words; this was consistently higher for governmental signs. The proportion of cognates was higher than interlingual homographs across all cities and sign types. We found that three-way interactions showed that the difference between cognates and interlingual homographs varied across cities and Montreal streets in ways that may be explained by the sociolinguistic properties of these specific regions. Taken together, the linguistic landscapes of these cities differentially reflect linguistic properties of the people who live in these regions and the official language policies enacted within each region.

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6. Assessing Language Attitudes in Montréal Through a Dynamic Systems Approach

R.Y. Feng, M. Tiv, E. Kutlu, J. Gullifer, P. Palma, E. O'Regan, N. Vingron, M. Doucerain, D. Titone

Keywords: Bilingualism, language attitudes, social network analysis, demographic analysis, social-ecological model, social systems

Abstract: Language use – especially bilingualism – is impacted by a variety of complex, dynamic and interrelated individual and socio-ecological systems. This holistic perspective has been discussed in the context of some aspects of the bilingual experience, namely language acquisition and development. In the present work, we applied a Systems Framework of Bilingualism (Tiv et al., under review) to language attitudes, which may be especially responsive to social-ecological influences. Though language-tagged social network analysis and geospatial demographic analysis, we examined the role of personal language dynamics (i.e., person-to-person interactions) and ecological language dynamics (i.e., neighborhood language exposure) on the language attitudes of 123 bilingual adults. We focus on the city of Montréal, Canada, given its history of linguistic tension between English and French speakers. On an individual level, we found that attitudes of solidarity towards a language (i.e., the extent to which a language is associated with personal identity and belongingness) were related to one's first language. When considering linguistic layers of influence, we found that bilinguals' personal social network and neighborhood-level language exposure jointly predicted their attitudes of solidarity towards a language, as well as their attitudes towards the protection of minority languages. Taken together, this suggests that interrelated personal, ecological, and societal systems are associated with bilinguals' language attitudes, which could have important implications for planning future language policies in multicultural societies such as Montréal.

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7. Does language ecology in Montréal modulate COVID-19 health outcomes?

M. Ahia, E. Hernánadez-Rivera, M. Senaldi, M. Tiv, B. Johns, M. Doucerain, D. Titone

Keywords: Language Barriers in Healthcare; Language Affiliation; Health Literacy; COVID-19 Outcomes; COVID-19.

Abstract: Our world is highly globalized and multilingual. Nevertheless, English is arguably the lingua franca of global health communication (e.g., Segalowitz & Kehayia, 2011; Piller Zhang & Li, 2020). As such, the global prominence of English poses challenges to health outcomes in regions where people speak other languages. Prior work posits these effects are driven by a varying degree of health information availability during global health crises, such as the COVID-19 pandemic (e.g., Lin et al., 2014). To explore these issues, we examined whether English-language use in Montréal, ascertained from census data (Statistics Canada, 2016), explains unaccounted variance in borough-level COVID-19 new case counts over and above other socio-demographic factors. To this end, we assessed via backward stepwise linear regression models whether

English-language use across Montréal's 34-geographically-defined boroughs predicted new COVID-19 cases per 100,000 people beyond other factors, such as population density, socioeconomic status, and total immigrant population. Our working hypothesis was that borough-level language discordance with the English-dominant global context would pattern with increased new COVID-19 cases. Preliminary analyses indeed showed that English-use at home significantly predicted new COVID-19 cases per 100,000 people, for both the first and second waves of the pandemic assessed independently (i.e., winter/spring 2020 and fall/winter 2021, respectively). In addition to English-use at home, percentage of the total immigrant population emerged as a significant predictor. These preliminary data suggest that language use at a societal level may be one of many important factors in predicting real-world health outcomes. However, further work is needed to examine alternative factors that may operate independently or co-vary with language use (e.g., cultural and health-related attitudes).

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8. Functional Dissociation of the SLF II and III and Second Language Learning Success

K. Sander, E. Barbeau, X. Chai, S. Kousaie, M. Petrides, S. Baum, D. Klein

Keywords: Second language, anatomy, biomarkers

Abstract: The Inferior Parietal Lobule, known to play an important role in second language (L2) learning success, is anatomically connected to frontal language areas through the superior longitudinal fasciculus (SLF). The second and third branches of the SLF (SLF II and III) have seldom been studied separately in the context of language, yet are known to have dissociable fronto-parietal connections. Studying these pathways and their functional contributions to L2 learning is thus of great interest. Using diffusion MRI tractography, we investigated 18 adults undergoing language training to explore brain structural predispositions to L2 learning success. We reconstructed SLF II and III based on gold standard anatomical definitions and related pre-learning WM integrity to language improvement corresponding with hypothesised tract functions. We found that properties of SLF II predicted improvement in lexical retrieval, while the properties of SLF III predicted improvement in articulation rate.

9. Analyzing the role of Frequency and Contextual Diversity in the Lexical Organization of Multiword Expressions

M.S.G. Senaldi, D. Titone, B.T. Johns

Keywords: Lexical organization; semantic diversity; idioms; multiword expressions; big data; distributional semantics

Abstract: While classical accounts of lexical organization assigned a central role to word frequency in determining the relationship between the language environment and lexical behavior, corpus-based models of lexical strength have revealed that contextual and semantic diversity measures provide a closer fit to lexical behavior data (Adelman, Brown & Quesada, 2006; Jones, Johns, & Recchia, 2012). Contextual diversity measures modify word frequency by ignoring word repetition in context, while semantic diversity measures consider the semantic consistency of contextual word occurrence. Recent research has shown that an even better account of lexical organization data is provided by socially-based measures of diversity, which encode the communication patterns of individuals across discourses (Johns, 2021). While most research on contextual diversity has focused on single words, a wealth of corpus-based and experimental evidence suggests that an integral part of language use actually involves recurrent and more structurally complex units, such as multiword phrases and idioms. The aim of the present work was therefore to determine if contextual and semantic diversity drive lexical organization at the level of multiword units, in addition to single words. Normative ratings of familiarity for 210 English idioms (Libben & Titone, 2008) were analyzed using a set of contextual, semantic and socially-based diversity measures that were computed from a 55-billion word corpus of Reddit comments. Results confirm the superiority of diversity measures over frequency in predicting the

processing of multiword expressions, suggesting that idiomatic phrases show similar lexical organization dynamics as single words.

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10. Early reading comprehension and listening comprehension intervention for preschoolers with autism, with and without hyperlexia

D. Macdonald, G. Luk, E.M. Quintin

Keywords: autism, hyperlexia, reading comprehension, intervention, preschool

Abstract: Children with autism and hyperlexia (ASD+HPL) demonstrate advanced word reading in the presence of poor reading comprehension and listening comprehension. According to the Simple View of Reading (SVR; Hoover & Gough, 1990) the product of word reading and listening comprehension equals reading comprehension. Based on this model, we built a parent-supported, tablet-based intervention app that targets listening comprehension via word-picture matching to improve reading comprehension for preschoolers with ASD+HPL. English-speaking preschoolers with ASD+HPL (n=8), ASD without hyperlexia (ASD-HPL (n=7) and typical development (TD) (n=15) age 3-5.11 years old participated in this study. Reading comprehension and listening comprehension were evaluated using the Passage Comprehension subtest of the Woodcock Johnson Test of Achievement–4th edition and the Oral and Written Language Scales (OWLS)-2nd Edition–Listening Comprehension Scale respectively and using an InApp measure. This ABA repeated measures design began with a 6-week, no-intervention period (Time 1-2), followed by a 6-week intervention period, where parents supported their child's use of the tablet-based application (Time 2-3), and ended with a 6-week, no-intervention period (assessing generalization, Time 3-4). Friedman's test revealed a statistically significant increase in reading comprehension scores from Time 2-3, p=.007 but not Time 1-2, p=1.00, and the Kruskal-Wallis test showed these scores were higher for the group with ASD+HPL compared to the TD group (p=.017). ANOVA revealed gains for listening comprehension for all groups taken together from Time 2-3, p=.002 and Time 3-4, p=.013, suggesting generalization may have occurred. Results indicate that this intervention can be successfully implemented by parents to improve both reading comprehension for preschoolers with ASD+HPL and listening comprehension for preschoolers with ASD and TD.

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11. Dopamine in sensorimotor circuitry differentially modulates temporal and spectral features of birdsong

A. Vochin, G. Isola, J.T. Sakata

Keywords: HVC, dopamine, SKF81297, songbird, Bengalese finch, vocal control, tempo, birdsong

Abstract: Birdsong consists of discrete acoustic elements ("syllables") precisely produced, timed, and sequenced. Discerning the neural mechanisms regulating these distinct aspects of birdsong is fundamental for understanding mechanisms of behavioral control, communication, and social behavior. Dopamine (DA) has been implicated in vocal motor control, but relatively little is known about where and how DA acts to modulate vocal production. In songbirds, the activity of DA-synthesizing neurons differs when males produce courtship to females or non-courtship song in isolation and, therefore, DA has been proposed to mediate various context-dependent changes in song organization. Here we assessed the contribution of DA in forebrain sensorimotor circuitry to song organization in a songbird, the Bengalese finch, Lonchura striata var. domestica. Specifically, we analysed the extent to which infusions of the D1-receptor agonist SKF81297 in and around HVC (used as proper name) affected song tempo, syllable sequencing, and the acoustic features of syllables. We discovered that infusions of the D1-receptor agonist affected song tempo in a manner that resembled social context-dependent changes to song tempo. However, such infusions did not affect various aspects of syllable sequencing (e.g., sequence variability at branch points, repetition of introductory notes). These data lend support to the notion that DA in sensorimotor circuitry contributes to vocal control and to the social

modulation of behavior and highlights numerous parallels in the neuromodulation of vocal communication in songbirds, rodents, and humans.

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12. Vocabulary Learning and its Relationship with Sleep Quality and Language Background in Bilingual Individuals: And Exploratory Study

M-J. Bourbonnais, P. Palma, D. Titone

Keywords: lexicalization, sleep, bilingualism

Abstract: Bilingual word learning and retention is often overlooked in the literature. As shown in previous studies, vocabulary learning may be impacted by sleep, and this relationship may be mediated by language background and learning conditions. To explore this, 17 French-English bilinguals filled language history and sleep questionnaires and underwent two vocabulary learning tasks during a two-day experiment. Subjects were trained explicitly or incidentally on novel words which were lexical neighbors to English base-words (e.g., diffodil). Subjects also learned the new words and their meanings either through an inference (i.e., associated to one of two animal pictures, one familiar and one unfamiliar) or not (i.e., a novel word and an unfamiliar animal picture). We assessed episodic memory of the novel words through a 3-AFC task in which participants had to correctly identify the referent of a learned novel word. Explicit learning of vocabulary led to stronger episodic memory traces than incidental learning. Furthermore, inferencing enhanced episodic memory, especially in subjects with French as a first language, suggesting a reduction in the cognitive load of doing tasks in a second language. We also assessed integration of the novel words in semantic memory via a semantic decision task, in which participants determined whether an English base-word (i.e. daffodil) was a natural or artificial thing. We found that good sleep quality, under incidental learning conditions, was associated with lexical competition. This suggests a trade-off between episodic and semantic memory, as novel words become integrated into the bilingual mental lexicon.

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13. Integration of auditory feedback in daily conversation: what cochlear implant users experience

R. Alemi, A. Lehmann, M. Deroche

Keywords: Auditory feedback, cochlear implant, pitch

Abstract: Background: Speaking or singing relies on the quality of auditory feedback, which is distorted in cochlear implants (CIs). This is particularly true for voice pitch. We hypothesize that the control of voice pitch must be hindered in CI users. Some devices aim to reproduce finer details in fundamental frequency (F0), and therefore have the potential to strengthen the reliance of vocal production on the voice pitch feedback.

Methods: Two groups of subjects, CI users and controls participated in the study. The first phase was an altered feedback paradigm in which participants listened to their own voice, while producing different vowels. When altered, the F0 of their voice was shifted up or down by 100 cents. In the second phase, participants performed a F0 discrimination task of their own voice using an adaptive Bayesian procedure. The third phase was a direct replication of the first but adjusting the size of the alteration to the F0 JND.

Results: In the first phase, control participants exhibited an adaptation phenomenon of 19.5 cents (opposing the direction of the pitch alteration). In the second phase, control participants obtained F0 JNDs ranging from 18 to as much as 269 cents, with a mean around 56.4 cents. Preliminary results among CI users suggest that they are not able to show any adaptation in response to 100 cents F0 perturbation, but some of them showed adaptation to the personalized size of F0 perturbation.

Conclusion: This project emphasizes that a "normal F0 production" by CI users will not be achieved simply by enhancing pitch cues in the processors. Restoring a healthy perception-production loop is a complex

machinery. This investigation could in turn explain some differences in vocal quality observed over years of CI use.

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14. Bilingual Non-Selective Activation Modulates Attention During Visual Object Search

N. Vingron, N. Furlani, O. Mendelson, M. Thomas, D. Titone

Keywords: bilingualism, non-selective activation, visual search

Abstract: Bilinguals concurrently activate representations of word referents within their known languages (i.e., non-selective activation). As a result, both first and second language communication may be obstructed when words share orthographic form but not meaning (i.e., interlingual homographs). In these cases, non-selective activation of conflicting representations burdens working memory, as both interpretations remain activated until contextual information resolves ambiguity. The ways in which the bilingual language system manages this has been studied extensively; however, less is known about how it interacts with the visual system in the context of object processing.

To investigate this, Fifty-eight bilinguals performed a visual object search task for targets corresponding to either interlingual homographs or language-unique words. Their task was to decide whether one of the ten images shown in the search array corresponded to a word cue. When cued with an interlingual homograph word, the search array contained both representations of the word. We further manipulated search difficulty by presenting a semantically related distractor object on some trials.

Our results showed that response accuracy was lower and reaction times were longer for interlingual homographs compared to language-unique words. Verification times were longest for homograph searches where no semantic distractor was present. This suggests that the additional working memory load introduced by a semantic distractor does not impact search performance, but may reinforce target-language context aiding participants' search performance. More broadly, this suggest that bilingual language processing interacts with visual object processing, as participants flexibly adapted their search strategies, integrating visual information to resolve cross-language ambiguity.

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15. Neural dynamics support enhanced auditory-motor synchronization with increased musical training

E. Sahlas, R. Scheurich, C. Palmer

Keywords: auditory-motor synchronization, flexibility, musical training

Abstract: The adaptation of human behaviour to a changing environment is fundamental to successful movement execution. Auditory-motor synchronization requires flexibly coordinating one's actions in response to changes in sound. Previous research using electroencephalography (EEG) to study synchronization indicates that neuronal activity aligns with auditory rhythms during auditory-motor synchronization. Moreover, synchronization performance improves as the strength of coupling between auditory and motor rhythms increases, and musical training enhances synchronization and neural coupling. Less is known about how musical training shapes the temporal dynamics of oscillatory neural activity to support synchronization. Using Recurrence Quantification Analysis (RQA), a nonlinear analysis technique for characterizing the temporal dynamics of complex systems, this project tests the hypothesis that flexibility of auditory-motor synchronization is enhanced by musical training and has a neural signature that RQA can capture. Musicians and non-musicians performed rhythmic tapping tasks while EEG was recorded. Flexibility of coordination was assessed by having participants synchronize their tapping with auditory rhythms presented at comfortable movement rates and slower rates. Analyses of behavioural data addressed the accuracy and consistency of synchronization. RQA yielded metrics of the predictability and stability of neural activity, two possible neural markers of synchronization flexibility. Musicians showed enhanced accuracy and consistency of

synchronization and higher neural stability. All participants showed greater neural determinism when synchronizing with slower rates. High determinism and stability of neural activity corresponded to higher synchronization consistency at slower rates. This research will help to develop neurophysiological markers of behavioural flexibility and contributes to explaining how musical training supports auditory-motor integration.

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16. Do Individual Differences in Mentalizing Capacity Relate to Racialized Accent Perception?

S. Asgharizadeh, M. Tiv, E. Kutlu, D. Titone

Keywords: Accent Perception, Social language, Mentalizing

Abstract: Numerous factors influence how speech is perceived, including social cues about race and individuals' accents. These factors are dynamic and may rely to some extent on one's ability to understand the mental states, goals, and intentions of others – that is, mentalizing – particularly when interacting with speakers of different social identities. Here, we investigated the potential link between mentalizing and accent perception by testing twenty-five adults in Montréal on a mentalizing and accent perception task. In the mentalizing task, participants read sentence pairs across three inference types (i.e., logical, mental state, and incoherent inferences), and rated the need for mentalizing on a 5-point scale (1= none, 5= completely). In the accent perception task, participants listened to a recording of Indian, American, or British English paired with a South Asian or a White face, and rated the speaker's accent on a 9-point Likert scale (1= not accented, 9= heavily accented). The results yielded a marginally significant interaction between mentalizing ability, accent type, and face type, indicating that as mentalizing capacity increased, accentedness ratings to White faces paired with American accents decreased in comparison to British accents. These results offer preliminary insight on how mentalizing may differentially facilitate communication in contexts when the social identity of the speaker is familiar vs. unfamiliar. This work speaks to the socially-nuanced nature of communication and the various social cues that may impact basic perceptual comprehension.

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17. Iterated Learning in Bilingual Populations: The Impact of Prior Linguistic Knowledge on Cultural Transmission of a Novel Language

S. Lee, P. Palma, D. Titone

Keywords: multilingualism, language evolution, iterated learning, cultural transmission

Abstract: One of the defining properties of human languages is structure, as reflected for instance in compositional morphology (e.g., cat + -s = many cats). It has been proposed that linguistic structure is the product of individual cognitive biases on learning and processing, which become amplified through a process of inter-generational cultural transmission. This hypothesis has been verified using the iterated learning paradigm, which simulates the process of cultural transmission over generations of participants using a diffusion chain (Kirby et al., 2008). In that paradigm, a first agent is exposed to an artificial language that they need to reproduce. The output of that first agent becomes the input of a second agent, and this process is repeated for multiple generations. Crucially, it has been argued that the outcome of cultural transmission depends on participants' individual learning biases, which may differ between monolingual and bilingual individuals (Navarro et al., 2018). In the present study, we were specifically interested in understanding how similarity with the known languages may affect cultural transmission. We recruited 30 English-French bilingual individuals and created two low-structured artificial lexicons. One lexicon shared some of French phonological/orthographical features, via the presence of diacritics (e.g., kâtur). The other lexicon was more similar to English (e.g., palpo). Each individual learned the French-like lexicon in one diffusion chain and the English-like lexicon in the other. Preliminary results suggest that although lexicons become increasingly structured across generations, this was especially true of the French-like lexicon, suggesting that bilingualism may crucially impact language evolution.

18. Can sleep spindles be influenced with sound?

A. Ujevco, H.R. Jourde, E.B.J. Coffey

Keywords: Sound, Sleep Spindles, Slow Oscillations

Abstract: Faulty memory consolidation during sleep might be a contributing factor to age related memory decline. Slow oscillations (SO) and sleep spindles are electrical brain activities thought to be important in this process. Studies have shown that SO amplitude can be enhanced using precisely timed sound stimulation, which improves participants' memory consolidation. Non-invasive auditory stimulation allows a causal manipulation of brain activity linked with memory processes. It is not known if sound can influence the amplitude of sleep spindles synchronized to SO and if the effect differs when the sound is presented at different spindle phases. In our study, preliminary data collected from 4 young adults, out of a planned total of 20, will receive sound stimulation during sleep timed to hit peaks of SO. As the stimulation occurs during different spindle phases, we will look at its impact on the spindle amplitude. If sleep spindles can be manipulated and possibly enhanced, deteriorating memory processes could be improved.

19. The Use of Semantic and Prosodic cues Among Bilingual and Monolingual Adults

C. Neumann, A. Sares, M. Deroche

Keywords: Emotion recognition, prosody, bilingualism

Abstract: To infer emotions in speech, listeners can use the way people speak (prosody) or what people literally say (semantics). Early on, infants rely on prosody to detect emotions before their understanding of semantics is mastered. As language develops, children learn to integrate semantic cues into their emotional judgements. However, monolingual children have been shown to rely more on semantics in ambiguous situations, whereas bilinguals rely more on prosodic cues. We hypothesized that this difference is still observable in adulthood, years after the first and second languages were consolidated. In two online experiments, we collected data on 600 young adults (18-30 y.o.) across two studies recruited through Prolific. Participants listened to 144 emotionally-loaded sentences and were asked to either 1) identify the emotion enacted by the speaker regardless of what they said or 2) identify the emotion in the semantic content of the sentence regardless of how it was spoken. In addition, they completed a language questionnaire to self-identify as monolingual or bilingual and indicate their age of acquisition, proficiency, and use of each language. In both experiments, performance suffered when prosody and semantics conflicted (10-20% lower performance compared to consistent). However, the nature of this interference depended on language group: bilinguals resisted semantic interference in the prosody task and monolinguals resisted prosodic interference in the semantic task. Therefore, there may still exist a difference in monolinguals and bilinguals use of semantic and prosodic cues when making an emotional judgement, even in adulthood.

20. Perceived Social Support by Typically Developing Children and Children with Autism Spectrum Disorder

M. Kaedbey, H. Dahary, E-M. Quintin

Keywords: Autism Spectrum Disorder, Typical Development, Social Support, Student-Teacher Closeness

Abstract: Background: Social support has been demonstrated to be an important factor in the lives of those with ASD, yet very little research has investigated the extent of perceived social support available for children with ASD. Teacher reported child-teacher relationships among children with developmental exceptionalities,

particularly children with ASD, are marked by less closeness and more conflict, compared to those of typically developing and children with ID. The aim of our study is to compare self-reported perceptions of social support by children with ASD vs TD students. Our second aim is to investigate group differences (ASD vs TD) in teacher perceived child-teacher closeness.

Method: Twenty-five children with ASD (n= 12) and TD children (n= 13) aged 8 to 12 years were recruited. The participants completed the Social Support Appraisal Scale with an examiner and teachers completed the Student-Teacher Relationship Scale.

Results: An independent-samples t-test revealed that children with ASD reported having less social support from their peers compared to TD children (p<.05). Teachers reported less self-perceived closeness with ASD students compared to TD students (p<.05).

Conclusion: In cases when children with ASD can develop positive relationships with their teachers, they stand to greatly benefit, including perceiving their learning environment as a less dangerous place and experiencing less problem behaviours and more social support at school, and allowing them to focus on learning academic and social skills. Findings support the need for interventions, targeted school activities, and research to ameliorate social support of students with ASD, and to recognize the different social support needs of distinct populations.

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21. Native and Non-Native Processing of Mandarin Sentences

J. Ao, M. Wolpert, H. Zhang, S.R. Baum, K. Steinhauer

Keywords: bilingualism, grammar, sentence processing

Abstract: While English uses word order for role assignment, Mandarin is more flexible and can rely on multiple cues, namely plausibility and coverbs (BA/BEI, which explicitly assign agent/patient). Given this disparate cue validity, how do native (L1) and non-native (L2) Mandarin speakers manage competing cues? We tested L1 (N=33) and L2 (first language English, N=22) processing of Mandarin sentences with multiple cues for agent-patient assignment. We used three different sentence structures (BA, BEI, and Noun-Noun-Verb (NNV i.e., no coverbs)) with mixed animacy for agents and patients. Participants' task was to judge who/what was the agent of each sentence. We found L1 speakers showed three different strategies: relying on plausibility, relying on coverbs, or relying equally on both cues . Using mixed-effect models to analyze reaction time (RT), we found L2 speakers are slower overall, and have difficulty with sentences lacking coverbs. We also found that all participants took longer when relying more on plausibility. However, a greater difference in RT between NNV and BA/BEI sentence processing was reported in L2 speakers than L1 speakers, which indicated ambiguous sentences and scenarios requiring processing of plausibility were more challenging for non-native speakers. Overall, despite L2 speakers having longer RT, the data pattern suggests L2 speakers have similar cue processing strategies as L1 speakers and did not transfer the L1 English word order strategy for cue weighting in Mandarin.

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22. Investigating the melodic pitch memory of children with autism spectrum disorder

S. Wong, S. Stanutz, E. Stubbert, S. Sivathasan, J. Burack, E-M. Quintin

Keywords: Autism, Enhanced perception, Music, Melodic memory, Pitch memory

Abstract: Short and long-term memory for individual tones and melody is enhanced among some musically untrained persons with autism spectrum disorder (ASD) (Bonnel et al., 2003; Heaton, et al.1998; Stanutz, et al., 2014). Positive association between visuospatial skills and musical strength in children with ASD (Bennett & Heaton 2012; Quintin et al., 2012) offers a potential explanation for musical memory strength in children with ASD. The current project extends previous research (Heaton et al., 1998; Stanutz et al. 2014) indicating

enhanced long-term melodic memory over a weeklong interval in children by investigating pitch memory specifically. We assessed the extent to which children with ASD aged 8-12 years encode melody in long-term memory in the specific key that the melody was first heard in comparison to transposed versions of the melody (pitch memory). In preliminary analyses, the children with ASD (N = 7) showed more accurate long-term melodic memory (p < .05) than TD children (N = 16) while controlling for verbal comprehension skills and auditory working memory, but no group difference in pitch memory (p > .05). Although there is a positive correlation between pitch memory and perceptual reasoning skills (p < .05). Further data collection to increase sample size will provide stronger analytic power on the quality of pitch memory in the two groups and elucidate its association with other cognitive strengths.

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23. Fine sound processing is altered by brain state

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Keywords: FFR, sound processing, frequency tracking, sleep, brain states, MEG, EEG

Abstract: Neural populations in the brainstem, thalamus and auditory cortex react in a phase-locked fashion to periodicity in auditory stimuli. This response, termed the frequency-following response (FFR), is used in auditory research to measure the quality and precision of sound encoding in the brain. Recent electroencephalographic work suggested that its amplitude differs according to alertness. The sleeping brain is less sensitive to external stimuli, and auditory evoked responses vary in amplitude and components across brain states. By exploring the properties of these brain responses along sleep stages, we tend to better characterize and understand the impact of brain states on sound processing using FFR components. We obtained MEG/EEG sleep recordings during a 3-hour nap from 15 subjects with binaural auditory stimulation at 55dB SPL. We report differences in frequency encoding and in pitch tracking across sleep stage.

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24. You heard "potato," I heard "botato": Lexical factors influence bilinguals' phonetic perception

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Keywords: bilingualism, phonological categorization, Ganong effect

Abstract: Changing a single sound in a word can completely change its meaning. "Bat" can be changed to "pat" through altering the phonetic cue of Voice Onset Time (VOT), or the time it takes from the lips bursting apart to the vocal cord vibration. In any particular language, there is a specific VOT value that acts as a boundary between /b/ and /p/, but this value can vary across languages. This variation is particularly relevant for bilinguals whose languages have different VOT boundaries. Some research has suggested that bilinguals have a different boundary for each language (e.g., Gonzales et al., 2019), but this work has relied on syllables or nonwords as stimuli. Here, we evaluate if bilinguals have a different boundary for each language using real words. To date, 65 French-English bilinguals (mean age=24.29 years) have completed an online task where they reported if French and English words started with a /b/ or /p/. Words were edited on a continuum to begin with different VOTs, spanning the boundary in both languages (e.g., "puppy" was edited to sound like "buppy"). A logistic mixed-effect model revealed that participants' perceptions were not guided by separate VOT boundaries in each language. Instead, participants were more likely to report hearing the sound that resulted in a real word (e.g., reporting hearing "puppy" despite the stimulus being phonetically "buppy"). These preliminary results suggest that lexical information influences bilinguals' perception of sounds more than the phonetic cue of VOT.

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25. Effects of temporal degradation on misophonic reactions to sound

M-A Savard, E.B.J. Coffey, A. Sares, & M.L.D. Deroche

Keywords: misophonia, perception, emotions, sound degradation, online experiment

Abstract: Nearly one in five people experiences negative and sometimes debilitating reactions to seemingly innocuous trigger sounds, a condition known as misophonia. Despite its prevalence and deleterious effects on the wellbeing of individuals and their family members, there is little understanding of the mechanisms by which sound leads to extreme emotional reactions. Our goal is to clarify whether misophonic responses are a result of abnormal acoustic processing or lie in the interactions between the auditory system and other brain networks such as those involved in attention, salience, memory, and emotional processing. As a first step, we are exploring whether temporal properties of the sounds, and their recognizability, relate to emotional responses. We are collecting perceptual data online, via an interface implemented on Pavlovia and collected via Prolific (in progress). Adults between 18 and 70 years of age are asked to listen to and identify neutral, negative and trigger sounds in their original form or which have been temporally degraded, and then to evaluate their own reactions to sound (anxiety, anger, and disgust). They also complete a questionnaire (MisoQuest) that quantifies their degree of misophonia. The mechanistic understanding that we will gain from this investigation will lay essential groundwork for devising effective intervention strategies, and it will help identify connection points with extent literature. For example, to treat other (and better understood) auditory and affective disorders, non-invasive and even enjoyable training-based interventions are available, which could perhaps be applied to misophonia.

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26. [TITLE TBA]

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Keywords: auditory perception, fMRI, vocal communication, experience-dependent plasticity

Abstract: Vocal communication requires proper interpretation of vocal signals which can depend not only on the content of the signal, but also on an individual's experiences. While social interactions throughout life appear to play a significant role in shaping perception, experience-dependent changes in perception remain poorly understood. To address this question, our project investigates the degree to which developmental and social experiences affect the perception of vocal signals and drive plastic changes in the brain. Female songbirds, such as the zebra finch, are an excellent model for studying auditory perception as they use learned vocal signals (songs) produced by males to identify individuals and choose mates. Like humans, zebra finches have an auditory system that is tuned during development and shows more limited plasticity in adulthood that may depend on salient social experiences. Our recent work demonstrates that adult mating experiences profoundly affect female song preferences while auditory-only exposure to a male is not sufficient to drive song preference. These data suggest that receiving auditory stimuli demands more than passive listening - it requires dynamic encoding of the signal. To investigate the impact of these experiences on neural processing, we recently coupled our behavioral paradigm with whole-brain functional imaging (fMRI). Using BOLD fMRI, we explored changes in neural responses to song before, during, and after social or auditory-only experience. Taken together, these studies aim to uncover the experiences and neural mechanisms that shape the perception of auditory signals, thereby addressing essential questions about neuroplasticity and learning in a behaviorally-relevant model species.

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27. Low-resource Neural Machine Translation: The case and challenges of Inuktitut

N.T. Lê, F. Sadat

Keywords: Low-resource, polysynthetic languages, morphological analysis, machine translation, Inuktitut

Abstract: Translating to and from low-resource polysynthetic languages has always presented numerous challenges due to the computational and linguistic particularities and aspects posed by such morphologically complex languages (Littell et al., 2018; Mager et al., 2018). This research focuses on the revitalization and preservation of Indigenous languages through pre-processing and NLP applications, in the study case of Inuktitut and Inuinnaqtun. These languages belong to the same Inuit languages family, the Indigenous polysynthetic languages spoken in Northern Canada. Our focus is on (1) the preprocessing phase in order to build (2) NLP applications for Indigenous languages, while taking into consideration the morphological analysis and machine translation. We propose a new method of morphologically motivated segmentation for Inuit languages family. First, we build a rich word segmentation by using a set of rich features and by leveraging character-based and word-based pretrained embeddings from large-scale raw corpora. Second, we train a neural network-based model for word segmentation. Then we evaluate empirically our proposed approach, in both Inuktitut and Inuinnaqtun languages, with others state-of-the-art. Our proposed neural machine translation (NMT) system incorporates linguistic knowledge to preserve both linguistic and semantic information in the word structure while reducing the vocabulary size at the training phase. Experiments and evaluations on Inuktitut-English NMT have shown promising results and performance improvements through the proposed system, over the baseline system in terms of BLEU score.

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28. White matter differences underlying superior hearing-in-noise skills

J. Chudy, S. .Dresbach, R. Zatorre, E.B.J. Coffey

Keywords: hearing-in-noise, diffusion, MRI, musicianship, expertise

Abstract: Musical ability relies on integration of auditory, visual and motor information to achieve fine control over an instrument. Previous studies have suggested that structural integrity of cortical white matter supports these integrative processes, specifically in occipito-temporal tracts. In this study, we aimed to investigate the relationship between white matter and behavioural measures. We collected diffusion-weighted MRI images and behavioural data on a music-in-noise paradigm, in which melodies were presented in noise and accompanied by either visual or predictive cues in 14 musicians and 15 non-musicians. Preliminary results suggest that participants' ability to use both cues is higher amongst musicians. Fractional anisotropy correlated with the performance benefit of visual cues in posterior regions, and related to predictive cues in frontal areas. We anticipate that the results will further clarify the anatomical substrate for higher-order audio-visual integration and use of predictive information in hearing-in-noise conditions.

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29. Do gender-agreement errors on adjectives and determiners elicit the same ERP patterns in French? (Bilingual French-English presentation)

A. Brucher, É. Courteau, K. Steinhauer, P. Royle

Keywords: gender agreement, event-related brain potentials (ERPs), French language, visuo-auditory experiments

Abstract: In French, feminine gender is marked with a transparent vowel on definite determiners (le/la, 'the.M/F'), and with an irregular consonant on adjectives (e.g., vert/e, 'green.M/F'). Event-related potential (ERP) studies have found that gender-agreement errors in written sentences typically elicit biphasic LAN/P600 waves (Molinaro et al., 2011). We used a bimodal visual-auditory paradigm to study gender processing in oral French. Twenty-nine neurotypical adults saw images of a scene described with a correct or ungrammatical spoken sentence, and completed a judgment task. Ungrammatical sentences contained a gender mismatch on the determiner (Je vois *la soulier vert sur la table…, 'I see *the.F green.M shoe.M on the table'), or on the adjective (…le soulier *verte…, '…the.M *green.F shoe.M…'). Global ANOVAs analyzed ERP time windows at relevant cues. Determiner errors elicited an anterior negativity (AN, 400–500 ms), and a P600

(750–1050 ms), while adjective errors elicited a widely-distributed left-lateralized negativity (300–500 ms), and a P600 (650–1050 ms). Late anterior negativities followed both P600s. The AN elicited by determiner mismatches reflects transparent morphological cue processing. In contrast, the negativity elicited by adjective errors suggests that a frontal left-lateralized negativity is superimposed by an N400, indicating a combination of lexical-semantic integration and phi-feature checking (Courteau et al., 2019). These data suggest that different neurocognitive mechanisms can underlie processing of two similar linguistic errors in French.

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30. The impact of cue familiarity on autobiographical memory retrieval

L. Gurguryan, H. Yang, S. Köhler, S. Sheldon

Keywords: autobiographical memory, lifetime familiarity, cued retrieval

Abstract: Retrieving autobiographical memories involves accessing and elaborating on personally experienced past events, often in response to an encountered cue. Although research has established the importance of recollection in supporting the retrieval of these memories, less is known about the role of familiarity—a process linked to semantic knowledge. Past work has established that cumulative lifetime familiarity of a concept is a valid real-world metric of familiarity. Extending on this work, we directly examined how variability in the lifetime familiarity of a cue can affect autobiographical memory retrieval, while disentangling these effects from those related to the amount of semantic knowledge associated with the cue. Participants were presented with concept cues and instructed to think of a memory as quickly as possible (Experiment 1) or to describe a memory in as much detail as possible (Experiment 2); ratings (e.g., date, vividness, importance, etc) associated with the retrieved memories were collected. Across both experiments, participants also provided estimates for lifetime familiarity and amount of semantic knowledge associated with the cues. Cue familiarity but not amount of semantic knowledge facilitated retrieving a memory such that memories elicited by highly familiar cues were accessed more quickly and were of more recent events. Additionally, cues rated high on familiarity and semantic knowledge elicited memories that were more vivid and these memories were described with a greater number of details. Together, these data provide important insights into how familiarity can affect the access to autobiographical memories and the specificity with which they are retrieved.

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31. Effet des émotions sur l'apprentissage syntaxique chez les enfants de la 1re à la 6e année du primaire

M. Michaud, C. Mimeau, S. Rigoulot

Keywords: Apprentissage syntaxique, Enfants, Grammaire semi-artificielle, Émotions

Abstract: L'apprentissage syntaxique est l'apprentissage de nouvelles structures de phrases, une composante primordiale pour l'acquisition des langues. Si un effet des émotions sur l'apprentissage d'autres composantes du langage, comme la sémantique ou l'orthographe, a déjà été démontré chez les enfants, à notre connaissance, cet effet sur la syntaxe n'a pas encore été exploré. Pourtant, plusieurs études suggèrent un effet bénéfique des émotions négatives sur l'apprentissage syntaxique chez les adultes. La présente étude a examiné l'effet du contenu émotionnel des mots sur l'apprentissage syntaxique auprès de 50 enfants de la 1re à la 6e année du primaire. Les participants ont réalisé une tâche d'apprentissage syntaxique, dans laquelle 48 phrases contenant des mots français combinés selon une structure syntaxique japonaise étaient présentées oralement. Les phrases avaient un contenu émotionnel négatif (« furieux »), positif (« heureux ») ou neutre (« pensif »). Pour chacune d'elles, les participants devaient identifier quelle image, parmi trois, décrivait la phrase. Une rétroaction permettait l'apprentissage. Dans l'ensemble, les enfants ont répondu plus rapidement pour les phrases neutres que pour celles positives et négatives. Les enfants de la 1re à la 3e année, mais pas ceux de la 4e à la 6e année, ont eu une performance plus élevée et un taux d'apprentissage plus rapide pour les phrases positives que pour celles neutres et négatives. Il semble donc que les mots émotionnels captent l'attention des enfants et que les

mots positifs favorisent l'apprentissage des plus jeunes. Nos résultats pourraient avoir d'importantes implications pour les méthodes d'enseignement de la syntaxe.

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32. Abstract thinking impact on the identification of emotion congruency

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Keywords: emotional facial expressions; emotions; abstract thinking

Abstract: Des travaux proposent que l'identification d'expressions faciales émotionnelles (EFE) reposerait sur des processus cognitifs de haut niveau comme ceux associés au traitement sémantique. Cependant, les travaux précédents n'ont pas manipulé directement de processus cognitifs généraux pour examiner leur impact sur l'identification d'EFE. Nous proposons que la pensée abstraite, définie comme le processus d'identification des caractéristiques centrales de différents stimuli, peut améliorer le traitement d'EFE. Pour évaluer cette hypothèse, 39 adultes sains (33 femmes, 6 hommes) ont réalisé en ligne une tâche d'identification d'émotions. En guise d'induction de pensée abstraite, les participants devaient d'abord classer une image selon qu'elle représente quelque chose de vivant ou non. Lors de l'induction de la pensée concrète, ils devaient plutôt indiquer si l'image présentée était de couleur rouge ou bleu. Après chaque présentation d'image, les participants devaient indiquer si un mot et un EFE présentés simultanément correspondaient à la même émotion (joie, peur, surprise, tristesse et neutralité). Sur les temps de réaction des réponses correctes, des ANOVAs à mesures répétées ont révélé que l'induction de pensée abstraite a entraîné des réponses plus rapides à la tâche (pensée abstraite : M = 1,11, ÉT = 0,17 vs. pensée concrète (M = 1,13, ÉT = 0,17; F(1,38) = 5,10; p = 0,30; η² partiel = 0,12)). Ces résultats appuient l'idée que la pensée abstraite est un mécanisme permettant d'améliorer l'identification des émotions. Ils remettraient en question l'approche classique soutenant que les traitements émotionnels se font de manière automatique, sans recours à des processus cognitifs de haut niveau.

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33. A new method for uncovering individual differences in walking to an auditory beat

A. Zagala, N.E.V. Foster, F. Van Vugt, S. Dalla Bella

Keywords: Sensori-motor synchronization, Rhythm perception and performance, Gait, Individual differences

Abstract: Recent studies of auditory-motor synchronization using gait tasks suggest that individuals may vary in their response to rhythmic auditory stimuli. Some individuals ("responders") tend to adapt their walking pace to the stimulus beat while others ("non-responders") show little or no adjustment to the beat. However, the initial observation requires confirmation. Unfortunately, to date there is no suitable method which is highly sensitive to people's individual differences in adapting to rhythmic stimuli while walking. To fill this gap, we propose a new method, using a portable Arduino device to measure individual differences in gait adaptation. The method affords real-time synchronization of an auditory stimulus to the participant's preferred walking cadence (captured using force-sensitive resistors - FSRs). After several steps, the audio output starts in synchrony with the footfalls and the stimulus tempo progressively departs from the walker's preferred walking cadence, thus testing whether the participant adapts or not to the change. The method aims to discern responders from non-responders and to pave the way to studies on mechanisms driving individual differences in gait synchronization, which remain quite unknown.

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34. Affective Modulation of the Acoustic Startle Reflex by Stimulating and Relaxing Music

M-A. Richard, G. Pelletier, S. Hébert, P. Fournier, M. Roy, N. Gosselin

Keywords: Music, Acoustic Startle Reflex, Emotions, Arousal, Music Information Retrieval

Abstract: A previous study stated that the acoustic startle reflex was the most effective measure of musical valence. However, its capacity to measure musical arousal remains unknown. This study aims to test the affective startle modulation by stimulating and relaxing music. In a within-subjects design, 47 healthy participants listened to stimulating music, relaxing music and environmental sounds. White noises (50 ms, 105 dB(A)) were added over the excerpts to induce startle while eyeblink magnitude and latency were measured by electromyography. Excerpts' acoustic features were also extracted and compared through conditions to explore their effect on startle modulation. Results show that startle latency was longer in the stimulating condition compared to the relaxing one, but no differences in magnitude were found. Acoustic analyses suggest that startle modulation is also attributed to bottom-up processes of acoustic features, which were found to have a different impact on magnitude and latency. This study highlights the effectiveness of startle latency as a measure of emotional arousal while listening to music. It also paves the way for comparisons between the effect of emotions and acoustic features processes on the startle reflex modulation.

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35. Selecting musical stimuli for a rhythmic synchronization video game for children: An online study

K. Jamey, H. Laflamme, N.E.V. Foster, A. Levasseur, S. Dalla Bella

Keywords: rhythm-based training, finger tapping, children

Abstract: There is a growing interest in using rhythm-based music training programs to strengthen non-musical skills. This project was an online study evaluating rhythmic tapping performance and music appreciation of 58 musical excerpts to be considered for use in a rhythm-based video game. The main objective was to select a set of 32 songs that have a motivating range of rhythmic complexity and difficulty in terms of rhythmic synchronization. A secondary objective was to investigate the effects of age on rhythmic performance and the relationships between music appreciation, perceived difficulty, level of syncopation and tempo. Children aged 7-14 tapped on a keyboard to the beat of each excerpt, and tap timing consistency was evaluated. Children also provided subjective ratings of appreciation and tapping difficulty. The study took place using the BRAMS Online Testing Platform (BRAMS-OTP). Preliminary findings with 50 participants show that three musical excerpts were clearly not appropriate and rated low on rhythmic consistency and music appreciation. Appreciation was sufficiently independent from perceived and measured difficulty to allow selecting well-liked music across a range of difficulty. The results will help optimize the selection of music for a rhythm-based video game to be used in a training study in children.

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36. Facteurs individuels pouvant favoriser l'apprentissage de nouvelles catégories visuelles

C. Cyr, M. Véronneau, F. Pérez-Gay, P. Louis, C. Prévost, E. Kim, É. Harnad

Keywords: apprentissage, catégorisation, fonctions cognitives

Abstract: Une catégorie est un « type de choses », qui peut comprendre des objets, des évènements, des états ou des propriétés. La catégorisation est l'action de faire ce qu'il faut faire avec les membres d'une catégorie et non avec les membres d'autres catégories. Certaines personnes réussissent plus rapidement que d'autres à apprendre des catégories complexes. Les différences individuelles favorisant l'apprentissage de catégories ayant été peu explorées dans la littérature, les objectifs de cette étude sont de les dégager. Celles-ci ont été établies en matière de traits cognitifs (ex. attention sélective visuelle, raisonnement perceptif) et de stratégies d'apprentissage (attention globale ou locale portée aux catégories). Cette étude est constituée de trois échantillons (n = 11, n = 10, n= 149). Chaque participant a complété une tâche de catégorisation de textures

abstraites en laboratoire (apprentissage par essais et erreurs avec rétroaction). Le premier échantillon a rempli un questionnaire concernant leurs stratégies d'apprentissage, le deuxième a complété des tests mesurant des traits cognitifs et le troisième a fait les deux. Les traits cognitifs ont été mesurés à l'aide de tests psychométriques normés (sous-tests du WAIS-IV et de la TEA, Door & People test, Ruff 2&7, figures enchevêtrées, BVMTR et Stroop de la D-KEFS). Les résultats indiquent que les habiletés de perception visuelle sont corrélés positivement au score de perception catégorielle alors que l'inhibition est corrélée négativement au pourcentage de réponses correctes au 4e bloc de catégorisation. Les participants ayant utilisé une stratégie d'attention globale ont eu un taux de succès au 4e bloc de catégorisation significativement plus élevé que ceux ayant utilisé une stratégie d'attention locale. De plus, l'attention portée aux formes dans les textures prédit positivement le score au sous-test complétion d'images du WAIS-IV mesurant la perception visuelle.

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37. Visual Category Learning Causes Categorical Perception

L. House, S. Harnad

Keywords: categorization, categorical perception, visual search task

Abstract: To learn a category is to do the right thing with the right kind of thing (e.g.: to eat what's edible; to avoid what's toxic). Categories are sets of things that share features distinguishing their members from members of other categories. Learning a category requires detecting the invariant features that are relevant to category membership. This feature abstraction (sometimes) induces categorical perception (CP): members of different categories look less similar (between-category separation) after learning than they did before, and members of the same category look more similar (within-category compression). Past research on CP effects has focused mostly on categories varying along visual and auditory continua. Outside the laboratory, categories vary on multiple dimensions. Little is known about CP effects induced by learning multidimensional categories. According to the Dimensionality Reduction Hypothesis, to categorize correctly, attention to the dimensions that covary with category membership must be selectively enhanced and the irrelevant dimensions must be ignored. To study this, two unfamiliar visual categories varying on multiple dimensions will be generated. CP effects induced by category learning will be measured with the visual search task. The visual search task requires subjects to indicate the location (left or right) of an odd stimulus ("target") in a circular array of identical stimuli ("distractors"). The target and distractors can be from the same or different categories. We predict faster between-category than within-category discrimination in subjects who learn to categorize. In non-learners, we predict that the between- and within-category discrimination speeds will be the equal.

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38. Des prédicteurs de capacités d'apprentissage de catégories visuelles chez les enfants autistes

C. Prévost, N. Goulet, É. Harnad

Keywords: Trouble du spectre de l'autisme, catégorisation, apprentissage, développement

Abstract: La catégorisation est une habileté adaptative permettant de faire des actions appropriées avec le bon type d'objet. Certaines catégories sont considérées comme innées, l'humain en possédant des prédispositions (par exemple, les couleurs et expressions du visages), et d'autres, sont plutôt acquises et doivent être apprises. L'apprentissage des catégories est précurseur au développement du langage et consiste en une difficulté chez les enfants ayant un trouble du spectre de l'autisme (TSA). Or, le développement de capacités cognitives telles que l'attention sélective, l'inhibition et l'abstraction a été précédemment relié aux compétences d'apprentissage de catégories chez les enfants à développement typique. La présente étude vise donc à élargir les connaissances sur les facteurs prédisposant à l'apprentissage de catégories visuelles chez les enfants autistes. Des liens significatifs sont observés entre plusieurs facultés cognitives spécifiques (habiletés

visuospatiales, inhibition, flexibilité cognitive, abstraction et attention) et globale (quotient intellectuel) avec la réussite à une tâche d'apprentissage de catégories visuelles. De plus, un effet développemental des performances de l'apprentissage des catégories est confirmé chez les enfants autistes, soit une amélioration des capacités des enfants selon l'âge. Ces découvertes peuvent ainsi mener vers des pistes d'intervention appropriées afin de favoriser un développement optimal des habiletés de catégorisation chez les enfants autistes, ainsi que leurs aptitudes langagières.

39. The electrophysiological markers of hyperacusis: a scoping review

B. Villatte, C. Bigras, V. Duda, S. Hébert

Keywords: hyperacusis; sound intolerance; electrophysiology; scoping review

Abstract: Hyperacusis is the intolerance or sensitivity of sounds. Currently the diagnostic tools and outcome measures used for hyperacusis are under debate. The present study reviewed the published literature on electrophysiological data and hyperacusis. Four electronic databases were searched, Medline, Embase, CINAHL, and PsychINFO, using the keywords 'hyperacusis', 'phonophobia', 'sound intolerance' and 'electrophysiology'. A total of 2,901 papers were identified. After screening, a final yield of 20 articles were retained for qualitative analysis. The results indicate several etiologies related to hyperacusis: autism (n=5), Fragile X syndrome (n=3), idiopathic hyperacusis (n=4), insular lesions (n=1), multiple sclerosis (n=1), noise-induced (n=2), salicylate (n=1), synaptopathy (n=1), and Williams syndrome (n=2). Electrophysiological measures used were event-related potentials (ABR, MLR, and LLR), magnetoencephalography (MEG), electrocochleography (ECochG), and electrocorticography (ECoG). Outcomes were latencies and amplitudes of short (I, II, III, IV, V), middle (Pa, Na, Pb, Nb), long-latency waves (P1, N1, P2, N2, P3a, P3b, MMN) and MEG potentials (M50, M100, MMF). The results of this scoping review and the knowledge gaps revealed the potential use of electrophysiological measures for further understanding the mechanisms of hyperacusis. Furthermore, these results suggest the potential use of these measures as a clinical objective tool for investigating this functional disorder.

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40. Effects of musical predictability on affective response to short melodies

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Keywords: music, expectation, enjoyment, statistical learning

Abstract: Expectation has been identified as a driving force behind music enjoyment. Passive exposure to music leads us to develop internal models of musical structure which are employed when listening to music. Using this implicit knowledge of musical structure, we often generate predictions for upcoming musical events, and the balance between confirmation and violation of these predictions influences affective response to music. Predictable music will have fewer surprises while more unpredictable music will violate expectations. Previous research has found an inverted U-shaped relationship between predictability and liking in music, such that moderately predictable music is preferred over highly unpredictable or overly predictable music. The presented research tests this relationship on a set of novel melodies that vary in predictability, measured using an information theoretic model of music (IDyOM) which generates probabilities of events in a sequence. Participants listened to the melodies and rated each on perceived liking and predictability. Results showed a linear relationship between participant predictability ratings and the predictability estimates from the IDyOM model. We also replicated the inverted U-shaped relationship between predictability and liking, with melodies of intermediate predictability being most liked. Notably, while predictability ratings showed a linear relationship with IDyOM estimates, the IDyOM model that best fit human ratings was one without training on a corpus, suggesting that people may not have used their prior music knowledge when rating the stimuli, instead making predictions based only on the local context and features of the melodies.

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41. Towards a positive perspective on tinnitus

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Keywords: tinnitus, attention, hearing science

Abstract: Recent findings highlight the role of attentional mechanisms in the development and persistence of tinnitus. Here we investigate whether or not adults with tinnitus are more able than controls to scan auditory information while focusing on a non-auditory (visual) task, in a dual-task paradigm. Thirteen tinnitus participants and 35 control participants without tinnitus were asked to respond to irregularly paced background sounds in four test conditions with increasing difficulty (primary tasks): (1) detecting simple tones, (2) classifying sounds as animal/non-animal sounds, (3) classifying sounds with emotional characteristics, and (4) understanding speech in noise. A visual (secondary) task consisted in the presentation of letters on a screen and participants had to respond to the letter "X" by pressing the space bar. Interstimulus intervals (ISI) were 1 or 2 seconds. Participants with tinnitus were less accurate at classifying the "happy" emotion in the auditory modality than controls on the emotional classification task. No other differences were observed between groups in terms of accuracy or reaction times in either modality. Participants with tinnitus performance was worse at classifying the ''happy'' emotion, although they were neither slower nor less accurate on other tasks than controls without tinnitus in a dual-task attention paradigm. An in-depth investigation of the role of top-down cognitive control mechanisms in the development and persistence of tinnitus, using tasks with higher levels of difficulty, could allow a better understanding of the cognitive difficulties not found here but often reported by tinnitus sufferers.

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