ESLP 2016

9th Embodied and Situated
Language Processing
Conference

October 6th-9th, 2016
Pucón
Chile

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Embodied and Situated Language Processing Conference
ESLP2016

October 6th-9th, 2016.
Pucón, Chile

NURTURING A LEXICAL LEGACY:
LANGUAGE EXPERIENCE AND LEARNING TO READ WORDS

Kate Nation
University of Oxford
FRIDAY 7 9:00 AM

The scientific study of reading has taught us much about the beginnings of reading in childhood, with a rich literature informing both theory and educational practice. Similarly, there is a large evidence base charting the cognitive processes that characterise skilled word recognition in adults. Less understood is how children develop orthographic expertise. What factors are critical for children to move from novice to expert? This talk will outline the critical role of experience in this transition. Encountering individual words in text provides opportunities for children to refine their knowledge about how spelling codes spoken language. Alongside this however, reading experience provides much more than repeated exposure to individual words in isolation. Words are experienced in meaningful language environments that capture events in the world. According to the lexical legacy perspective, outlined in this talk, experiencing words in diverse and meaningful language environments is critical for the development of word reading skill. At its heart is the idea that reading provides exposure to words in many different contexts, episodes, and experiences which, over time, sum to a rich and nuanced database about their lexical history within an individual's experience. These rich and diverse encounters bring about local variation at the word level: a lexical legacy that is measurable during word reading behaviour, even in skilled adults. This framing also helps us understand how semantic variables influence word-level lexical processing in tasks such as lexical decision.

THE CO-EVOLUTION OF EMBODIED AND SITUATED LANGUAGE AND COGNITION:
GESTURE, DEMONSTRATIVES, AND OTHER "LIVING FOSSILS"

Rafael Nuñez
University of California San Diego
FRIDAY 7 4:30 PM

The study of the evolution of language has usually focused on the biological pre-conditions that might have led to the emergence of speech and/or grammar. This approach, however, is unnecessarily narrow. Among others, it leaves out the fundamental role of situated bodily actions which, unfolding in real-time, are immersed in meaningful physical and social worlds. Building on research in primatology, developmental psychology, linguistics, and cross-cultural psychology, I'll argue that the study of contemporary "living fossils" such as the gestures co-produced with demonstratives (in concrete and abstract contexts), can bring important insights into the complexities of the co-evolution of body, language, and cognition.

EMBODIED COGNITION FOR KIDS

Arthur Glenberg
Arizona State University & University of Wisconsin
SATURDAY 9:00 AM

Language comprehension is an embodied simulation process: Language drives neural and bodily systems of action, perception, and emotion into states homologous to those experienced when in the situation described by the language. But when children learn to read, particularly in an orthographically opaque language such as English, they must concentrate on simply pronouncing the words. In this case, embodied simulation may be absent, comprehension is poor, and reading is a boring exercise in word calling. Moved by Reading is a two-part intervention for teaching children how to simulate while reading. First, children manipulate objects or pictures to externally simulate the content of the sentences they are reading. Second, children are taught to imagine moving the objects as a scaffold to independent reading. Our latest instantiation of the intervention is called EMBRACE (Enhanced Moved By Reading to Accelerate Comprehension in English;https://www.dropbox.com/s/n4ck5vf8vswe4vz/EMBRACE%20Project%20video.mp4?dl=0). This iPad application is designed to help English Language Learners develop comprehension skill when reading in English. I will present data demonstrating the effectiveness of Moved by Reading and EMBRACE. I will also briefly discuss the relation between embodied cognition and STEM learning.

RHYTHM, RESONANCE AND LANGUAGE ACQUISITION

Marcela Peña
Pontificia Universidad Católica de Chile
SATURDAY 8 4:30 PM

Speech and human brain are rhythmic by nature. Do these rhythmic activities shape each other during language acquisition? We present a series of studies showing that adult and infant brain resonates to the rhythm of syllables and words during speech processing. Moreover, we present studies showing that resonance also involves other rhythmic communicative behaviours such as turn taking between mothers and infants. Taken together the data suggest that brain activity can synchronize with external stimulation during learning, that the synchrony between the brain and the external rhythmic stimulation may reflect an efficient mechanism for language and communicative learning in young infants, and that brain synchrony may be a new tool to estimate on-going learning.

BEYOND LEXICAL BEAN COUNTING: MAPPING LEXICO-SEMANTIC STRUCTURE IN EARLY VOCABULARY CAN HIGHLIGHT PROCESSES IN LANGUAGE LEARNING AND PROCESSING

Arielle Borovsky
Florida State University
SUNDAY 9 1:00 PM

Measures of early vocabulary growth often focus on the number of words children know and say, and this enterprise has yielded many insights into the development of early language skills. But early word growth is not random – children tend to learn words that have connections with their existing vocabulary and ongoing language experience. This insight suggests that mapping the structure of meaning in the early lexicon may illustrate important processes in language learning and processing. In this talk, I will describe a series of projects that explores whether and how the development of lexico-semantic structure in early childhood can lend insights into language processing and word learning.I will first describe several studies that track real-time lexical recognition of known and novel words as a function of semantic density in the lexicon. I will then outline a project to develop detailed feature norms for many early-acquired concepts that will facilitate the development of graph-theoretic metrics of early vocabulary structure and discuss potential implications for the development of vocabulary interventions and models of early language acquisition.

	FRI. 07	SAT. 08	SUN. 09
8:00 AM	Registration/Opening		
8:30 AM			
9:00 AM	Keynote presentation	Keynote presentation	Oral Presentations
9:30 AM			
10:00 AM	Morning coffee	Morning coffee	Morning coffee
10:30 AM	Oral Presentations	Oral Presentations	Oral Presentations
11:00 AM			
11:30 AM			
12:00 PM			
12:30 PM	Lunch	Lunch	Lunch
1:00 PM			Keynote presentation
1:30 PM	Oral Presentations	Oral Presentations	
2:00 PM			Social Event
2:30 PM			
3:00 PM			
3:30 PM	Afternoon coffee	Afternoon coffee	
4:00 PM	Poster Session 1	Poster Session 2	
4:30 PM	Keynote presentation	Keynote presentation	
5:00 PM			
5:30 PM			
6:00 PM			
6:30 PM			
7:00 PM		Social dinner	

HRS

ORAL PRESENTATIONS FRIDAY MORNING

MENTAL MOTOR IMAGERY SKILLS PREDICT WORD-DEFINITION PROFICIENCY IN CHILDREN
Tatjana Nazir[1], Coralie Rotival[1], Yves Paulignan[1]   **10:30**
1 - Institute for Cognitive Sciences - Marc Jeannerod (France)

QUALITY OF PRESCHOOL TEACHER LANGUAGE IS CONSTRAINED BY THE ACTIVITY BEING
CARRIED OUT IN THE CLASSROOM
Katherine Strasser[1], Michelle Darricades[1], Gabriela Barra[2], Susana Mendive[1]   **11:00**
1 - Pontificia Universidad Católica de Chile (Chile), 2 - Universidad Alberto Hurtado (Chile)

RECONSTRUCTION OF IMPLICIT THEORIES REGARDING PRIMARY TEACHER STUDENT
WRITING SKILLS: TOWARDS UNDERSTANDING THEIR DISCURSIVE-ENUNCIATIVE ATTITUDE
ABOUT THEIR WRITING PROCESSES
María Constanza Errázuriz[1], Paula Aguilar[2]   **11:30**
1 - Pontificia Universidad Católica de Chile (Chile), 2 - Heidelberg University (Germany)

CHILDREN'S USE OF DEPICTION IN AUTOBIOGRAPHICAL AND FICTIONAL NARRATIVES
Paula Marentette[1], Reyhan Furman[2], Amanda Maclurg[3], Marcus Suvanto[1], Elena Nicoladis[1]   **12:00**
1 - University of Alberta (Canada), 2 - University of Central Lancashire (United Kingdom),
3 - Alberta Health Services (Canada)

ORAL PRESENTATIONS FRIDAY AFTERNOON

A RHETORICAL APPROACH TO SOCIAL COGNITION: SOCIAL IDENTIFICATION EFFECTS ON
MEMORY AND JUDGEMENT
Andres Haye[1]   **13:30**
1 - Pontificia Universidad Catolica de Chile (Chile)

THE EXPRESSIVE ASPECTS OF BODILY COORDINATIONS AND REMEMBERING
Himmbler Olivares[1,2,3], Esteban Hurtado[2], Carlos Cornejo[2]   **14:00**
1 - Universidad de Concepción (Chile), 2 - Pontificia Universidad Católica de Chile (Chile),
3 - European University Viadrina Frankfurt-Oder (Germany)

BRINGING A NARRATIVE TO LIFE: MANIPULATING THE OBSERVABLE INDICES OF NARRATIVE
TRANSPORTATION
Elena Nicoladis[1], Lisa Smithson[1], Ahmed Hayat[1]   **14:30**
1 - University of Alberta (Canada)

USE OF L1 GLOSSES IN FOREIGN LANGUAGE READING: AN EYE-TRACKING EXPERIMENT
Carolina Bernales[1]   **15:00**
1 - Pontificia Universidad Católica de Valparaíso (Chile)

ORAL PRESENTATIONS SATURDAY MORNING

OBJECT MANIPULATIONS AND GESTURES CAN ENHANCE STEM LEARNING
Juan Cristobal Castro-Alonso[1], Paul Ayres[2], Fred Paas[3]   **10:30**
1 - Center for Advanced Research in Education (Chile), 2 - University of New South Wales (Australia),
3 - Erasmus University Rotterdam (Netherlands)

DOING MATHEMATICS: CONTENT AND PRACTICES IN SITUATED ABSTRACTION
Ian O'loughlin[1], Katie Mccallum[2]   **11:00**
1 - Pacific University (United States), 2 - University of Brighton (United Kingdom)

MATHEMATICAL LANGUAGE ACQUISITION AND CREATIVITY: AN ENACTIVE APPROACH
Ximena Gonzalez[1], Jorge Soto-Andrade[2]   **11:30**
1 - Instituto de Filosofía y Ciencias de la Complejidad (Chile), 2 - Universidad de Chile (Chile)

SCIENCE EDUCATION AND THE UNDERSTANDING OF EMBODIMENT IN LANGUAGE: SCALE,
SIZE AND REPRESENTATIONS IN LEARNING ABOUT WATER PHENOMENA
Ivan Salinas[1]   **12:00**
1 - Universidad de Chile (Chile)

ORAL PRESENTATIONS SATURDAY AFTERNOON

SPATIAL SIMULATION OF PERCEPTUAL MODALITIES
Laura Speed[1], Asifa Majid[1,2,3]   **13:30**
1 - Radboud University (Netherlands), 2 - Max Plank Institute for Psycholinguistics (Netherlands),
3 - Donders Institute for Brain, Cognition and Behaviour (Netherlands)

BILATERAL MOTOR CORTEX CONTRIBUTES TO FIGURATIVE LANGUAGE PROCESSING: A
TMS-MEP STUDY OF METAPHORIC AND IDIOMATIC SENTENCE COMPREHENSION
Elena Kulkova[1], Yury Shtyrov[1,2], Matteo Feurra[1], Andriy Myachykov[3,1]   **14:00**
1 - National Research University Higher School of Economics (Russia), 2 - Aarhus University (Denmark),
3 - Northumbria University (United Kingdom)

ASYMMETRICAL TIME AND SPACE INTERFERENCE IN TAU & KAPPA EFFECTS
Martín Lleras[1], Camila Alviar[2], Florencia Reali[3]   **14:30**
1 - Universidad de Los Andes (Colombia), 2 - Universidad Nacional de Colombia (Colombia),
3 - Universidad de la República (Uruguay)

LISTENER AGE MODULATES EMOTION AND ACTION EFFECTS IN SITUATED LANGUAGE
PROCESSING
Katja Münster[1], Pia Knoeferle[1]   **15:00**
1 - Humboldt-Universität zu Berlin (Germany)

ORAL PRESENTATIONS SUNDAY MORNING

EMBODIED SEMANTICS IN THE UNDERSTANDING OF INTERPERSONAL RELATIONSHIPS OF
APPROACH AND AVOIDANCE IN EVERY ACTIONS: BEHAVIORAL AND
ELECTROPHYSIOLOGICAL STUDIES
Mabel Urrutia[1], Hipólito Marrero[2], David Beltrán[2], Elena Gámez[2], José Miguel Díaz[2]   **09:00**
1 - Universidad de Concepción (Chile), 2 - Universidad de La Laguna (Spain)

ROLES AND ACTIONS IN SITUATED LANGUAGE COMPREHENSION: EVIDENCE FROM THE
VISUAL WORLD
Katharina Wendler[1], Michele Burigo[1], Thomas Schack[1], Pia Knoeferle[2]   **09:30**
1 – Bielefeld University (Germany), 2 - Humboldt-Universität zu Berlin (Germany)

DOES PROSODY INFLUENCE THEMATIC ROLE ASSIGNMENT DURING REAL-TIME SPOKEN
LANGUAGE COMPREHENSION?: CHILDREN VS. ADULTS
Julia Marina Kröger[1], Katja Münster[2], Pia Knoeferle[2]   **10:30**
1 - Bielefeld University (Germany), 2 - Humboldt University, Berlin (Germany)

COSTS AND GAINS OF USING VISUAL CONTEXT FOR REFERENT PREDICTION
Mirjana Sekicki[1], Christine Ankener[1], Maria Staudte[1]   **11:00**
1 - Saarland University (Germany)

THE COGNITIVE COSTS INVOLVED IN TALKING WITH SOMEONE WITH ALZHEIMER´S
DISEASE
Miguel Ibaceta[1], Ricardo Morales[1], Francisco Villalón[1], Óreon Wisniewski[1]   **11:30**
1 - Pontificia Universidad Católica de Chile (Chile)

REFERENTIALLY UNEXPECTED EYE MOVEMENTS DURING SPATIAL LANGUAGE
COMPREHENSION
Michele Burigo[1], Pia Knoeferle[2]   **12:00**
1 - CITEC, University of Bielefeld (Germany), 2 - Humboldt University (Germany)

POSTER PRESENTATIONS: Session 1 FRIDAY 3:30 PM

1. REFERENTIALLY UNEXPECTED EYE MOVEMENTS DURING SPATIAL LANGUAGE COMPREHENSION

Michele Burigo[1], Pia Knoeferle[2]
1 - CITEC, University of Bielefeld (Germany), 2 - Humboldt University (Germany)

2. ROSEMARY AND RAIN: COMPARING EMBODIMENT OF SOUND AND SMELL WORDS

Laura Speed[1], Asifa Majid[1,2,3]
1 - Radboud University (Netherlands), 2 - Max Plank Institute for Psycholinguistics (Netherlands), 3 - Donders Institute for Brain, Cognition and Behaviour (Netherlands)

3. SENTENCE COMPLEXITY AND FIGURATIVE LANGUAGE IN A SAMPLE OF COLOMBIAN CHILDREN´S NARRATIVES

Florencia Reali[1], Danna Aristizabal[2]
1 - Universidad de la República (Uruguay), 2 - Universidad de Los Andes (Colombia)

4. AN ATTENTIONAL APPROACH TO STUDY MENTAL REPRESENTATIONS OF DIFFERENT PARTS OF THE HAND

Germán Gálvez-García[1,2], Javier Albayay[1], Javiera Peña[1], Leonardo Lagos[1]
1 - Laboratorio de Neurociencia y Ergonomía. Departamento de Psicología. Universidad de la Frontera (Chile), 2 - Département de Psychologie Cognitive & Neuropsychologie, Institut de Psychologie, Laboratoire d'Étude des Mécanismes Cognitifs, Université Lyon 2, Lyon, France (France)

5. ATTENUATION OF TOUCH IMPLICATES FORWARD MODELS IN ACTION UNDERSTANDING

Mark Scott[1]
1 - Qatar University (Qatar)

6. SITUATED LEARNING OF MAPUCHE LANGUAGE AND CULTURE: AN ETHNOGRA-PHIC CASE STUDY OF A COMMUNITY SCHOOL IN THE ARAUCANÍA REGION (CHILE)

Laura Luna[1]
1 - Pontificia Universidad Católica de Chile (Chile)

7. QOM LANGUAGE ACTIVISTS: RECONSTITUTING QOM LANGUAGE INTERGENE-RATIONAL TRANSMISSION IN COLONIA ABORIGEN, CHACO

Lucia Montero[1], Simona Mallo[2]
1 - Alguna Universidad de Argentina (Argentina), 2 - Pontificia Universidad Católica de Chile (Chile)

8. SPEAKING OF SPACE: LINGUISTIC EXPRESSIONS IN RURAL ELEMENTARY STUDENTS OF TEMUCO.

Rebeca Muñoz[1], Viviana Herrera[1], Paula Alonqueo[1]
1 - Universidad de La Frontera (Chile)

9. THE EARLY PREDICTION OF READING COMPREHENSION OF CHILEAN CHILDREN

Macarena Silva[1], Carmen Julia Coloma[1]
1 - Centro de Investigación Avanzada en Educación, Universidad de Chile (Chile)

10. CONTEXTUAL DISSEMINATION IN CONCRETE AND ABSTRACT WORDS

Florencia Reali[1]
1 - Universidad de la República (Uruguay)

11. PRIMING ON PROCESSING HORIZONTAL EVENTS WHEN THEY ARE FUTURE

Roberto Aguirre[1], María Noel Macedo[1]
1 - Universidad de la República. CIBPsi (Uruguay)

12. SOLVING AN EQUATION IS LIKE BALANCING A SCALE: CULTURE AND EMBODIMENT IN THE CONSTRUCTION OF THE NOTION OF EQUATION IN EDUCATIONAL SITUATIONS

David Silva[1], Carlos Cornejo[2]
1 - Centre de Linguistique Anthropologique et Sociolinguistique - Institut Marcel Mauss (France), 2 - Pontificia Universidad Católica de Chile (Chile)

13. THE SOCIAL EXCLUSION IN LANGUAGE COMPREHENSION: A CROSS-CULTURAL STUDY

Mabel Urrutia[1], Nicolás Araneda[2], Manuel De Vega[3]
1 - Universidad de Concepción (Chile), 2 - Universidad de Concepción (Chile), 3 - Universidad de La Laguna (Spain)

14. LADIES FIRST: GENDER STEREOTYPES DRIVE ANTICIPATORY EYE-MOVEMENT DURING INCREMENTAL SENTENCE INTERPRETATION

Ernesto Guerra[1], Jasmin Bernotat[2], Hector Carvacho[1], Gerd Bohner[2]
1 - Pontificia Universidad Católica de Chile (Chile), 2 - Universität Bielefeld (Germany)

15. LANGUAJE OF THE BODY ON MINDFULNESS PRACTITIONERS: A SCIENTIFIC DILEMMA ON EMBODIED COGNITION APPROACHES

Roberto Aristegui[1], Claudio Araya[1], David Martínez[1]
1 - Universidad Diego Portales (Chile)

POSTER PRESENTATIONS: Session 2 SATURDAY 3:30 PM

16. DIAGRAMMATIC ICONICITY IN EL HABLA DE MONTERREY: FROM THE STREET TO THE CLASSROOM

Xitlally Rivero[1]
1 - Tecnólogico Monterrey (Mexico)

17. MENTAL MODELS ON SPATIAL REPRESENTATION OF SPANISH VERB FORMS

Roberto Aguirre[1], Olga Soler[1]
1 - Universidad de la República. CIBPsi (Uruguay)

18. AFFECTIVE AND EMBODIED ASPECTS OF A COMMON NEURAL SUBS-TRATE FOR MELODIC AND SEMANTIC PROCESSING

Nicolás Araneda Hinrichs[1]
1 - Universidad de Concepción (Chile)

19. THE PRODUCTION AND PERCEPTION OF MANDARIN TONES BY MANDARIN-SPEAKING COCHLEAR IMPLANT USERS

Lu Liu[1]
1 - University of Florida (United States)

20. COMPREHENSION OF EFFORT´S SENTENCES IN YOUNG AND OLDER ADULTS FROM EMBODIMENT THEORIES

José Luis Salas-Herrera[1,2]
1 - Universidad Católica de la Santísima Concepción (Chile), 2 - Universidad de Concepción (Chile)

21. THE BOI EFFECT IN PARKINSON'S DISEASE

Paulina Valenzuela-Garrido[1,2]
1 - Universidad de Concepción (Chile), 2 - Hospital Clínico Herminda Martín (Chile)

22. THE RELATION BETWEEN METACOGNITIVE SKILLS AND NARRATIVE LISTENING COMPREHENSION IN PRESCHOOLERS

Piedad Albornoz[1], Macarena Silva[1]
1 - Centro de Investigación Avanzada en Educación, Universidad de Chile (Chile)

23. A-BOOK: A FEEDBACK-BASED ADAPTIVE SYSTEM TO ENHANCE META-COGNITIVE SKILLS DURING READING

Guido Mellado[1], Ernesto Guerra[1]
1 - Pontificia Universidad Católica de Chile (Chile)

24. SPEAKING, POETRY AND ARTS: A PROPOSAL FOR THE EARLY STIMULA-TION OF THE COMMUNICATIVE SKILLS OF THE CHILDREN AT A DISAD-VANTAGE SITUATION

María Marqués[1],Fabiola Molina Hernandez[1], Rosario Oyanedel Frugone[1]
1 - Pontificia Universidad Católica de Chile (Chile)

25. EFFECTS OF COLLABORATIVE WORK MEDIATED BY PORTABLE TECHNOLOGY IN READING COMPREHENSION

Gricelda Oyarzún[1], Miriam León[1]
1 - Universidad de La Frontera (Chile)

26. THE DICHOTOMY BETWEEN WHAT CHILDREN WRITE AT SCHOOL AND AT HOME

Elvira Jéldrez[1], Gabriela Gómez[1], Carmen Sotomayor[1], Percy Bedwell[2], Ana María Domínguez[2]
1 - Centro de Investigación Avanzada en Educación (Chile), 2 - Fundación Educacional Arauco (Chile)

27. WORDS THAT MOVE US. THE EFFECTS OF SENTENCES ON BODY SWAY

Fernando Marmolejo-Ramos[1], John F. Stins[2], Femke Hulzinga[2], Eric Wenker[2], Rouwen Cañal-Bruland[2]
1 - Stockholm University (Sweden), 2 - Vrije Universiteit Amsterdam (The Netherlands)

28. DIFFERENT EFFECTS IN TACTILE ATTENTION BETWEEN THE THUMB AND ITS METACARPUS AND THE PALM

Javier Albayay[1], Javiera Peña[1], Leonardo Lagos[1], Germán Gálvez-García[1,2]
1 - Laboratorio de Neurociencia y Ergonomía. Departamento de Psicología. Universidad de la Frontera (Chile), 2 - Département de Psychologie Cognitive & Neuropsychologie, Institut de Psychologie, Laboratoire d'Étude des Mécanismes Cognitifs, Université Lyon 2, Lyon, France (France)

29. A HEBBIAN NEURAL NETWORK MODEL OF THE STROOP EFFECT

Vadim Kulikov[1]
1 - University of Helsinki (Finland)

30. NAMING AND DOMINATING: INTERPERSONAL DYNAMICS AND PATTERNS OF LEXICAL CHOICES IN CONVERSATIONAL REFERENCE

Edmundo Kronmüller[1], Karen Urrejola[1]
1 - Pontificia Universidad Católica de Chile (Chile)

31 . DISCOVERING NOUN AND VERB PRECURSORS DURING LANGUAGE ACQUISITION

Cristina Jara[1], Marcela Peña[1]
1 - Pontificia Universidad Católica de Chile

ESLP 2016 ORAL PRESENTATIONS

MENTAL MOTOR IMAGERY SKILLS PREDICT WORD-DEFINITION PROFICIENCY IN CHILDREN

Tatjana Nazir[1], Coralie Rotival[1], Yves Paulignan[1]

1 - Institute for Cognitive Sciences - Marc Jeannerod (France)

In the past many studies have convincingly shown that modality specific brain structures can beactive during the processing of words that refers to perception and action (Binder and Desai, 2011).While this striking fact was initially interpreted as evidence for the contribution of these structures to the elaboration of word meaning (e.g. Hauk et al. 2004), results from ensuing studies progressivelydampened the excitement: for the same word, induced activity in modality specific structures is not always present. Despite this "flexibility" (Wilhelm & Casasanto, 2011), it seems unlikely though that the recruitment of modality specific brain structures by language has no substantial function. To advance our understanding of the role of these structures in language processing, the present study focuseson theirfunctionwhen language is not involved.

In the domain of motor controlit is established that the execution of an action involves a covert stage that represents the outcome of the action (Jeannerod, 1994; 2001; 2006). This covert stageincludesthe representation of the goal of the action, the means toreach it, and its consequences on the organism and theexternal world.Based on psychophysical and neurophysiological evidence Jeannerod (2001) proposed that such covert actions are equivalent to real actions except for the fact that they are notphysically executed.The primary function of suchcovert stage is toprepare theexecutionof the action and to provide information aboutits feasibility. In other terms, it serves to anticipate and predict the outcome of an action(c.f. "forward internal modeling" or "predictive motorcontrol"; see Wolpert, 1997).Given that a covert action does not necessarily turns out into an overtaction,the termneural or"mental simulations" of actionhas established (Jeannerod, 2001).

Although rarely explicitly stated, when the term "mental simulation" of word content is used in the literature on embodied cognition, it refers to such covert stages used in motor control (see Kosslyn for its equivalence in the visual domain).If language processingwereindeedto take advantage of structures that serve internal modeling, we should find parallels betweenthe aptitude for mentally simulating actionsand those formentally simulating language content. The present study aimed at testing this hypothesis. Thirty children aged between 11 to 15 yearsperformed amental motor imagery tasks (c.f. Frak et al., 2001),and a worddefinition task that included definitions for high and low imageable words. Data analysis confirmed that mental motor imagery scores correlates with scores in the word definition task.Critically, this correlation was particularly elevated for high imageable words. In line with its function in motor control, we suggest that "mental simulations" induced by language serves to anticipateadequate (re-)actions in communication.Given that mental imagery can evolve with training, improving motor skills might benefit theacquisition of vocabulary.

QUALITY OF PRESCHOOL TEACHER LANGUAGE IS CONSTRAINED BY THE ACTIVITY BEING CARRIED OUT IN THE CLASSROOM

Katherine Strasser[1], Michelle Darricades[1], Gabriela Barra[2], Susana Mendive[1]

1 - Pontificia Universidad Católica de Chile (Chile),
2 - Universidad Alberto Hurtado (Chile)

Introduction and Goals

We seek to determine whether the activity being carried out in the preschool classroom constrains the quality of the language that teachers produce. Studies with families have shown that activity influences parental language, specifically its lexical density, syntactic complexity, use of low frequency words, and use of behavior-controlling language (Hoff-Ginsberg, 1991; Weizman & Snow, 2001). In the classroom, Dickinson, Hofer, Barnes & Grifenhagen (2014) showed that teacher language varied according to the size of the group involved, and for book-sharing activities. These findings are relevant since: (a) teacher language influences children's oral language development (Mascareño, 2014; Dickinson & Porche, 2011; Dickinson et al;, 2014); (b) oral language development predicts school success (Cain & Oakhill, 2006, 2012; Ouellette, 2006; Verhoeven & Van Leeuwe, 2008); and (c) professional development to improve the language used by preschool teachers is expensive and not always effective (Dickinson, 2011; Mashburn, Downer, Hamre, Justice, &, Pianta, 2010; Pianta, Mashburn, Downer, Hamre, & Justice, 2008). In Chile, the rapid growth of preschool coverage underscores the need for cost-effective interventions to improve the language that teachers use in the classroom. To complement extant research on teacher language in the preschool classroom, we seek to identify activities that produce more complex, varied, and sophisti-cated language input by teachers. We hypothesize that structured activities that require planning and materials will prompt teachers to produce more sophisticated language.

Method

Participants were the teachers, aides, and children in 18 public preschool classrooms serving 3-year old children in Santiago de Chile. One morning shift was audio-recorded in each class. Recordings were transcribed using CHAT (MacWhinney, 2000) and coded in two successive stages. In the first stage, three structured activities and four unstructured activities were identified by trained coders (Structured activities: Greeting, Learning Experience, Book Sharing; Unstructured activities: Breakfast, Lunch, Free Play, Transition). In a second stage, teacher utterances within each activity were analyzed in two ways. On one hand, measures of lexical density and syntactic complexity were calculated with the CLAN program (MacWhinney, 2000). On the other hand (still in progress) each teacher utterance was coded by trained coders (blind to the identity of the segments and the hypotheses of the study) into one of four categories: Control, Conceptual Teaching, Language Stimulation, or None. Teachers' language during structured and unstructured activities was compared with t-tests.

Results

A total of 128 activity segments were analyzed, containing 76,469 teacher utterances. Preliminary analyses indicate that during unstructured activities teacher's utterances were shorter, and their vocabulary was less varied. Future analyses will include the use of Control utterances, Conceptual Teaching utterances, and Language Stimulation in structured and unstructured activities. Preliminary results suggest that providing a structured curriculum may increase the quality of the language that 3-year olds are exposed to, indepen-dently of teacher professional development.

RECONSTRUCTION OF IMPLICIT THEORIES REGARDING PRIMARY TEACHER STUDENT WRITING SKILLS: TOWARDS UNDERSTANDING THEIR DISCURSIVE-ENUNCIATIVE ATTITUDE ABOUT THEIR WRITING PROCESSES

María Constanza Errázuriz[1], Paula Aguilar[2]

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Academic writing is a basic skill in the development of quality learning in teacher training; however, based on the evidence, teacher training student's performance is lower than expected (INICIA test, 2013). This research is aimed at analyzing implicit theories of writing (Hernández, 2012; Makuc, 2012; Villalón and Mateos, 2009) of Primary Teacher Students in the only University at Región de los Ríos, Chile, offering said programme. There are different types of implicit theories; on one hand, the reproductive theory, characteristic of novice writers, marked by reproducing knowledge without attempting to establish a dialogue between different positions or questioning the content and; on the other hand, the deep-level theory, inherent to experienced writers, characterized by transforming knowledge and establishing a dialogue between different actors (Hernández, 2012; White & Brunnig, 2005).

This study used a qualitative methodology and the corpus is comprised of three focus groups, totaling 30 students. The proceeding is the discursive analysis at a lexical-semantics level. The axiologisation and enunciative modalization (Kerbrat-Orecchioni, 1997, 2009), discursive strategies that make it possible for an individual to reconstruct such representations allowing to configure a mental explanation regarding certain aspects of knowledge and that influence on behavior (Pozo et al., 2006), since there is a direct impact of conceptions on writing quality (Baaijen et al., 2014).

The results show that students show both implicit theories simultaneously: the reproductive as well as the elaborative theories, but with the predominance of the former, which is consistent with their low results in their texts.

CHILDREN'S USE OF DEPICTION IN AUTOBIOGRAPHICAL AND FICTIONAL NARRATIVES

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We present an analysis of children's narratives focussed on depiction as discussed by Clark (2016). Clark proposes staging theory as a means of incorporating depiction into a more holistic analysis of language processing and communicative strategies. In this paper we focus on a description of children's story that do or do not include depiction. Demir et al. (2014) explored the role of gesture in children's narrative and show that 5-year-old children who produce iconic gestures that adopt the character's viewpoint produced more complex verbal narratives at age 8 but not at age 5. Following Clark, we examine the use of depiction in both speech and gesture, and focus on older children's use of spoken quotations "and she's like 'well, I'll try'", reports of a character's action "the bird went like this <smash gesture>", and iconic gesture <arms wrapped around an airplane>. We predict that stories that use depiction in speech and gesture will be more complex (as measured by length and story grammar) than stories that do not use depiction. We expect that fictional narratives will be longer and more complex than autobiographical narratives (Allen et al., 1994).

We use story grammar (Demir et al., 2014; Stein & Albro, 1997) to assess story complexity based on the inclusion of temporal and causal event sequences, goals, obstacles to their achievement, and the presence of an ending. We coded the presence of reported speech and reported action of a character marked in speech (Emmorey & Reilly, 1998; Tannen, 1982). Finally, following McNeill (1991) and Parrill (2010) we coded iconic gestures for the use of character viewpoint. We analysed 170 stories (116 autobiographical, 54 fictional) told by 30 children aged 8-11 years (14 female). Autobiographical stories were elicited by 8 story stems. Fictional stories were retellings of 2 Pink Panther cartoons. Based on reported speech, action or the use of gesture, we grouped stories into two categories: those that used depictions (n=106) and those that did not (n=64).

As expected, fictional stories were significantly longer (M = 231.9 words) than autobiographical stories (M = 79.3 words), and were more likely to include complex story grammar (a goal and an obstacle, 33/54) whereas autobiographical stories were most likely to provide an answer that was not a story (59/116). Regardless of story type (autobiographical vs. fictional), stories with depiction were also significantly longer (M = 170.7 words) than stories without depiction (M = 56.6 words). Children who used depiction told stories with higher complexity (with depiction, including goal and obstacle 72/106; than those who did not use depiction, who tended to give answers that were not stories (43/64).

Our results demonstrate that depiction does interact with the way that children tell stories. Stories with depiction are longer and more complex with respect to story grammar. Children were also more likely to use various gestural means of depiction in fictional compared to autobiographical stories, though their use of depiction in speech did not differ across story types. The link between depiction and children's cognitive processing for narrative is further explored using Clark's staging theory.

A RHETORICAL APPROACH TO SOCIAL COGNITION: SOCIAL IDENTIFICATION EFFECTS ON MEMORY AND JUDGEMENT

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The paper reports an experiment concerning how speakers implicitly modulate the way they feel, think, and express themselves in adjustment to the rhetorical value of shared information. The study explores models of social cognition situated in a collective memory context. Chilean participants were to judge a pre-tested set of statements about the military coup of September 11th 1973.

We assume that memories of controversial past events are psychologically produced in a dynamic interaction between the processes involved in the construction of knowledge judgements and those involved in being a member of a social group. In particular, the experiment to report concentrates on demonstrating the interaction between the social context of a given social memory and the ideological position of the individual.

The general hypothesis was that a dominant identity at any given moment makes more accessible those memories about the coup that are expected to be relevant for the social comparison dimension at which the identity is defined. The notion guiding this general hypothesis implies that the predicted accessibility effect should be particularly, if not only, true in the case of polemical memories, because polemical pieces of knowledge are assumed to be the most relevant for the social comparison dimension on which the left-wing (right-wing) identity is defined.

The experiment employed a priming approach to knowledge accessibility with the aim of testing the hypotheses. The basic property of each statement was the truth-value given by Chilean young people to a series of statements about September 11th, obtained through a questionnaire set up on the Internet in a previous study. The purpose was to explore the influence of priming social categorisation processes on the accessibility of social memories. Accessibility of truth-judgements is studied as a function of social categorisation processes. Identification was induced through a category-commitment manipulation, in line with the motivational view of identification. The prime was a social categorisation process and the target of judgement was a piece social memory. Accessibility of the judgement was assessed using response times.

Participants: Eighty-four Chilean people between 17 and 32 years old successfully completed the session through the Internet.

Design: 2 (sharedness of target) x 2 (congruity of target) x 3 (type of prime) factorial design —the two first factors manipulated within-subjects and the last factor manipulated between-subjects.
Results: It was observed that a superordinate-identity prime inhibits judgement of consensual statements less than judgement of polemical statements, and that an ingroup-identity prime slightly inhibits judge-ment of consensual statements only. In addition, the superordinate prime, compared to all other conditions, systematically inhibited judgements of a controversial theme irrespective of their sharedness.

Conclusion: The general hypothesis of the study was that the subjective salience of a social identity tends to facilitate or inhibit collective memory judgements as a function of their argumentative relevance. Although not all predictions were corroborated, the fact that personal-identity and ingroup-identity primes had a relative facilitation effect, and the superordinate-identity prime a relative inhibition effect, gives partial support to the hypothesis. Social categorisation at a relevant superordinate level facilitates, in relative terms, the generation of shared memories among groups, and inhibits non-shared memories.

Discussion: Models of feature matching predict that memories positively associated with a social category label, or to the corresponding stereotype, ought to be more accessible than those unrelated or negatively related. However, no such main effect of congruity was found. Observations are consistent with the hypothesis that the processes of memory judgement and of social categorisation influence each other in terms of argumentative relevance and not in terms of feature matching. Memory judgements are expected to be facilitated or inhibited because of the pragmatic function they may fulfil in a given social categorisation context, and not because of the semantic link with the active social category or stereotype.

THE EXPRESSIVE ASPECTS OF BODILY COORDINATIONS AND REMEMBERING

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In this research, we investigate qualitatively and quantitatively the relationship between expressive aspects of interpersonal coordination and personal remembering using video-data. Investigation considered two phases: interaction phase and interview phase. For interaction phase of the study 26 dyads of persons separately answered a protocol that includes questions about general topics (for example, studies, professional interest and hobbies). Participants were randomly assigned to two experimental conditions: a spontaneous condition, in which participants interact with counterpart to listen and speak with counterpart about topics freely and spontaneously. In a second condition, called suspicious condition, participants interact are oriented to interact reflectively, i.e. maintaining the focus of their own consciousness divided in listening the counterpart and trying to determinate the honesty behind his or her lived related experience.

For analysis purpose, we code each participant response during interaction about one topic of conversation. Following the distinction between expressive and representational functions of language (Bühler, 1934/2011), we distinguish two kinds of interpersonal coordination. First, coordinations where emotional-expressive aspects are salient. Second, coordination based on representational aspects, associated with thematic or ideational aspects of meaning construction process. Additionally, we code gaze contact when phenomena appear with absence of coordinated movements depicted for both participants. Some examples of categories will be presented.

In a second phase of study, the 52 participants of this study were interviewed separately and immediately after the interaction. For analysis we design a code scheme based from Henri Bergson's phenomenological approach. Specifically, we code two main organization forms of remembering: subjective organization, in which remembering is guided by emotional-expressive aspects; and objective organization, in which remembering immediate experience is guided by thoughtful processes, for example, through enumerations of events. We code a third category named transitional events as well, when subjective and objective aspects are mixed in ways that results impossible to distinguish more salient aspects (subjective or objective) in the personal experience of person.

Results of data analysis using markov chains demonstrate statistically differences between conditions during interaction phase of the study: In spontaneous condition is more probable that transition events during interaction remains in the emotional- expressive coordination. Findings are similar in interview phase of the study, showing more probability that personal remembering experience remain in emotional-subjective organization.

Findings invite to discuss about the importance of expressivity for understand interpersonal phenomena of coordination and personal phenomena of remembering. Expressivity allows not only coordinating movements or gestures; also creates a deep sense of holistic intersubjective experience in which we share our experience with others. This shared experience based in expression generates a particular visible continuity in our subjective experience of remembering.

BRINGING A NARRATIVE TO LIFE: MANIPULATING THE OBSERVABLE INDICES OF NARRATIVE TRANSPORTATION

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In listening to or telling a story, people can become transported to the story world, experiencing events as if they were there. Narrative transportation occurs when imagery, attention, and emotional resources are simultaneously recruited to support the narrative journey (Green & Brock, 2000). Most previous research on transportation has focused on the experience of readers or listeners of stories. In the present study, we extend this research to storytellers. The goal of this study was to test the feasibility of some possible observable indices of narrative transportation, namely gesture production, the use of the present tense, and story length. We hypothesized that all three of these variables correspond to the degree of narrative transportation experienced by an individual. Previous research has linked all three of these variables to imagery. Gesture production increases when people talk about concrete, imagistic concepts rather than abstract ones (Wesp et al., 2001). Similarly, people can recount past events in the present tense when the events are particularly imagistic and/or emotionally salient (Pillemer, 1998). As for story length, previous research has shown that when stories are presented in images (e.g., cartoon format), they tell longer stories than if the same stories are presented as text (Hostetter & Skirving, 2011), and therefore if we manipulated one of these variables, we should affect a storyteller's narrative transportation, thereby affecting the other indices.

In Study 1, we manipulated narrative tense and gesture production. We manipulated narrative tense by randomly assigning participants to read a text either in the past tense or the present tense. We manipulated gesture production by random assignment to one of three conditions: gestures restricted (by wearing ski gloves with the fingers sewn together and velcroed to the chair's armrest), gestures encouraged, or no instruction given about gestures. We found that when gestures were restricted, participants told shorter stories and used more past tense than participants in the other conditions. These results were especially true of the male participants. Some previous studies have shown that males outperform females on measures of visuospatial ability. One possible interpretation, then, of the gender effects in Study 1 is that manipulation of our target indices is particularly disruptive of transportation in individuals with high visuospatial abilities.

In Study 2, we addressed whether this gender difference could stem from differences in visuospatial abilities. Males outperformed females on standardized visuospatial shortterm and visuospatial working memory assessments. Among males, visuospatial working memory was a significant predictor of total verbs used when gestures were restricted but not when they were free to move. Additionally, male participants were more likely to relay a narrative in the past tense when their gestures were restricted than when they were free to gesture. The results from these studies highlight tense, story length, and gesture use as important indices of narrative transportation These results are consistent with our hypothesis that gesture production, present tense usage, and narrative length all reflect narrative transportation of a storyteller. We discuss some of the implications of these results for real world events, such as assessing knowledge in educational settings.

USE OF L1 GLOSSES IN FOREIGN LANGUAGE READING: AN EYE-TRACKING EXPERIMENT

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The cognitive influence of the learners' first language (L1) on second or foreign language (L2 henceforth) learning has been clearly established by a robust body of research, which acknowledges the cognitive advantages of using the learners' L1 during the processing of the L2 and is in line with recent research on bilingualism according to which a bilingual's two languages are both active during online speech production and comprehension (Anton & DiCamilla, 1999; Butzkamm, 2003; Butzkamm, and Caldwell, 2009; Cook, 2008;Grosjean, 1989; Kroll, Dussias, Bogulski, and Valdes Kroff, 2012; Kroll and De Groot, 2005;Levine, 2011; Storch and Aldosari, 2010; Swain and Lapkin, 2000; Turnbull and Dailey-O'Cain, 2009). In an attempt to test this cognitive advantage, the present study investigates L1 use in the form of access to L1 glosses and its relationship to L2 reading comprehension from a lexical processing perspective using eye-tracking technology. Reading research approaches that use eyemovement recording methods assume that eye movements are linked to attention and, therefore, to cognition and that these movements can signal cognitive processing difficulties (Rayner, 1998; Reichle, Rayner & Pollatsek, 2003). Eye-tracking data are therefore of utmost value in order to gain a better and more comprehensive understanding of the moment-to-moment cognitive processes involved in reading comprehension (Rayner et al., 2006; Rayner, 2009; Rayner & Reingold, 2015) and in L2 processing (Roberts & Siyanova-Chanturia, 2013; Winke, Godfroid & Gass, 2013). In this experiment, it was hypothesized that access to L1 glosses facilitate cognitive processing and comprehension of L2 texts of a high level of difficulty for FL learners with a low level of language proficiency (B1 level, CEFR) and that attention to glosses (i.e., fixation times) result in better reading comprehension scores. Twenty-five university students in their first semester of a teaching English as a foreign language (TEFL) program were asked to read four different short expository passages in four different conditions: low level of difficulty/L1 gloss, low level of difficulty/no gloss, high level of difficulty/L1 gloss, high level of difficulty/no gloss. After each text, participants answered reading comprehension questions, which tested attention to the glossed words and comprehension of the text. Participants' eye movements were recorded using a Tobii TX300 eye tracker. Findings point to a more comprehensive understanding of the strategies (such as L1 use) that L2 learners employ in trying to process and comprehend L2 texts. This knowledge has the potential to not only provide support for second language acquisition theories, but also to inform FL policies and teaching strategies that translate into best classroom practices to facilitate language acquisition, especially in FL contexts.

OBJECT MANIPULATIONS AND GESTURES CAN ENHANCE STEM LEARNING

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Human hand actions, such as object manipulations and gestures, have been primordial for the survival of our species. As such, our mind has evolved an embodied bias that allows contemporary humans to learn manipulations and gestures with relative ease. The limitations of our main learning processor, working memory, seem to be reduced when human hand actions are shown. An instructional implication is that we can benefit from the use of hand actions when teaching difficult materials. Educational research on Science, Technology, Engineering, and Mathematics (STEM) topics and visualizations has shown learning improvements by incorporating human hand actions. This strategy is particularly effective when showing challenging STEM visualizations, such as animations and videos, which may contain transient information that is difficult to process in working memory. In addition to showing hand actions, there are other cognitive abilities that help circumvent the limits of working memory, such as spatial ability, which are also effective assets in learning STEM topics and STEM visualizations. Moreover, spatial ability tasks can also benefit from human hand actions. The relationship between human hand actions, STEM, and spatial ability is presented in the next figure.
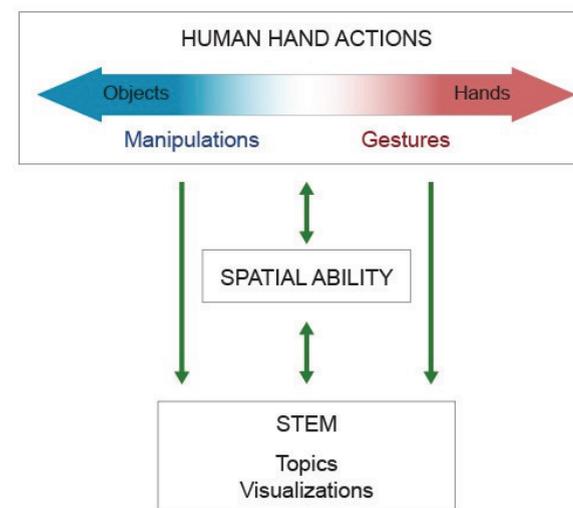
This presentation is based on an earlier Springer book chapter with a more focused and current approach. We begin with a review of the problematic nature of learning from dynamic visualizations (animations and video) that contain transient visual information. Next, we present research showing the benefits of learning manipulative tasks and gestures via these dynamic pictures, mainly for STEM disciplines. Then, we show the relationship between hand actions, STEM, and spatial ability. To conclude, we discuss the main points and provide a number of implications for teachers and instructional designers.

DOING MATHEMATICS: CONTENT AND PRACTICES IN SITUATED ABSTRACTION

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Understanding the meaning of, expression of, and learning of abstract, symbolic subject matter such as mathematics and logic in embodied or situated terms has long proven difficult. Whereas the language of everyday pursuits, culture, arts, or natural science can be—and to some extent each of these has been—grounded in the practices of embodied agents situated in the human world, the resilience with which mathematics and logic resist this grounding in situated practice, the apparent inexorability with which these "abstract" subjects lend themselves to a priori, internalist, rationalist, even Platonist characterizations has been often noted. In recent decades, researchers from an array of traditions—philosophy, cognitive science, linguistics, education, sociology, anthropology—have begun to consider and advocate alternatives to these characterizations, but these alternatives have suffered from at least two challenges inherited from the collection of disciplines addressing the issue. First, although there has been a significant amount of work which examines the actual practices of mathematics, especially in math education and the sociology of science, devoted to showing how easily overlooked the situated aspects of the activities of mathematics are, and how important these situated, embodied elements are to learning and doing mathematics, these research programs have not always made a clear distinction between the claim that these situated elements are enabling conditions for learning and doing mathematics and the claim that these situated elements are constitutive of mathematics itself. Even the most doctrinaire subscriber to rationalism and Platonism can unproblematically acquiesce to the former, but the latter, that the very meaning of mathematical expressions is grounded in situated practices, is a bolder thesis, deserving of careful attention. The second challenge is inherited from neighboring and complementary disciplines: studies in the philosophy of mind—as well as cognitive science and linguistics—have also examined the possibility of an alternative and situated characterization of abstract cognition and discourse, taking their lead from antecedents in the history of philosophy. Philosophers attend more carefully to distinctions between conditions and constitution, but philosophy, as a discipline, less frequently and less materially engages with the actual practices of mathematics in the human world—and this kind of engagement is made particularly difficult by the fact that, unlike anthropology or sociology, philosophy provides few guidelines for attending to human practices. This lacuna leaves philosophers who would situate abstract cognition and language with a difficult task. This project is an attempt to elucidate, and to begin to respond to, both of these challenges: through observation and perspicuous demonstration of the actual practices of mathematics, we investigate whether the doing of mathematics, situated among embodied, human agents, can be a suitable candidate for the bolder claim that the very concepts of mathematics are grounded in situated practices, whether the gap between the content and the form of these practices can be thus closed. We identify a number of difficulties for treating mathematical practices as such, but argue that these difficulties are not insurmountable.

MATHEMATICAL LANGUAGE ACQUISITION AND CREATIVITY: AN ENACTIVE APPROACH.

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A growing body of research coming from embodied and situated perspectives on cognition and child development suggests that comprehending numerical or abstract descriptions of the world relies, first of all, on an internal action simulation of the described abstraction. When humans communicate, in different ontogenetic periods with or without verbal language acquisition, they gesture. Gesture, the motor body involvement, can play a central role in communication and thought formation and cognitive development at many timespans. In this talk we sketch an embodied, situated and enactive cognition approach and discuss some of the implications for mathematics language acquisition and creative problem solving through education. In other words, how abstract math symbols become meaningful through grounding in perception, action, and emotional systems in different ontogenetic periods. We present evidence drawn from teachers' and learners' gestures in different ontogenetic periods to make the case that mathematical knowledge is embodied and situated (Soto-Andrade, 2014; Alibali, & Nathan, 2012). We argue that mathematical cognition is embodied and situated in 2 senses: It is based in perception and action (sensorimotor cycles) from the beginning, and it is grounded in the contextual physical environment dependent on creativity problem resolution in different timespans. Therefore mathematical language acquisition and creativity in problem solving emerge through: (i) enactive gestures that reflect the grounding of cognition in the physical and contextual environment for each child development period; (ii) motor gestures manifesting mental embodied simulations of action and perception cycles, and (iii) some cognitive semantics tools including embodied metaphors and metaphoric gestures reflecting body---based conceptual blending. Our theoretical stance suggests that enacting should have a dramatic effect on the emergence of new and creative ideas and metaphoring in the context of problem solving, leading to meaningful insights on problems usually solved by rote calculation with scant understanding. Encouraging gesture, as a reflect of human thoughts and a way of thinking and reasoning, thus can serve as a window into cognition and has the potential to change how children and students think about a problem to solve and modify their course of learning. The goal of this talk is to understand the contribution that these embodied and situated gestures make to how we communicate and learn to think mathematically, develop creativity in problem solving and enact abstract from concrete in metaphoring. Experimental evidence supporting our hypotheses is provided by various case studies involving prospective secondary math teachers, in service primary and secondary math teachers, as well as primary and secondary students, and university students majoring in social sciences and humanities or mathematics.

SCIENCE EDUCATION AND THE UNDERSTANDING OF EMBODIMENT IN LANGUAGE: SCALE, SIZE AND REPRESENTATIONS IN LEARNING ABOUT WATER PHENOMENA

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This is a study about ways in which language represents embodied phenomena in the context of learning science. Recent science education researchers suggests that understanding of science needs to be embodied (e.g., Fuchs, 2009, 2010; Niebert, Marsch, & Treagust, 2012). This conclusion is informed through the analysis of language framed under precepts of cognitive linguistics.Cognitive linguisticsis an approach to the understanding of cognition that assumes that language organization and use reflect patterns of the human cognitive system(Evans & Green, 2006; Geeraerts, 2006; Lee, 2001; Sinha, 2007; Ungerer & Schmid, 1996).Cognitive linguistics assumed the idea of embodiment: the deep link between the possibilities of conceptualizationgiven the limited perceptual and sensorimotor properties of the human body (Lakoff & Johnson, 1980, 1999).Therefore, what language reveals in terms of cognition can also be a reflection of embodiment or embodied experience.

Science educators regard size and scale as influential in explaining scientific phenomena. Size and scale are areas of reasoning closely tied to representations. In this study, I report upon an exploration of the links between embodiment and conceptions of scale and size through students' language. In particular, I asked the question:What embodied experiences do students bring to understanding scale, size and representations?

I studied 268 sixth-grade students' written responses to two open-ended questions about water phenomena. I examined students' choices of lexical items for reference entities (landmarks) in order to understand their projective scales(Montello, 1993). I classified landmarks according to emergent categories, which I later associated to projective scales.I also explored the links between embodiment and representations by examining the geometrical properties of these reference entities as informed by linguistic markers(Evans & Green, 2006).For this, I relied on the use of prepositions, used in studies of language and spatial cognition (Herskovits, 1986).

This work contributes some insights about the use-based relationship of meaning established between embodied experiences and students' linguistic references to scale, size and representations. One insight is that object manipulation, visual perception, and visual perception with locomotion seem to be influential patterns of embodied experience that provide some conceptions of scale and representations that are productive for understanding scales that are beyond stationary perception. This is a relevant conceptual development for scientific understanding of phenomena that are inferred given indirect perception or through help of magnifying or modeling devices (e.g. micro to atomic-molecular scales, landscape and global phenomena).Another insight is inferential:students tend to attribute geometric properties to entities depending on the entity's projective scale. Entities larger than the body and perceivable with locomotion are attributed tri-dimensional properties, while entities much larger than the body and requiring extensive locomotion are mostly represented as dots.

This research provides some relevant features of possible embodied experiences that are relevant for organizing design principles for teaching science -particularly scale, size and representations- in more productive forms.

SPATIAL SIMULATION OF PERCEPTUAL MODALITIES

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When we understand words we perceptually simulate their referents and this includes spatial information. On reading the word "sun" for example, we simulate it as being high in space. This spatial simulation is based on real-world experiences with objects and their typical location. Another way in which objects can relate to space is in terms of perceptual modality. We experience objects with our five major senses: vision, audition, touch, gustation and olfaction. The way we interact with these senses in terms of space differs. Things that need to be touched, tasted or smelled are typically close to the body, in proximal space. In comparison, things that we can see or hear are further from the body, more distal. Based on the spatial information of perceptual modalities, do we mentally simulate distance for nouns with strong modality associations? We selected words that strongly reflected one of the five modalities and tested for spatial simulation using a lexical decision task with words presented as "near to the body" or "far from the body". Participants were presented with words on screen, once in a near position and once in a far position (see Figure 1). Response time data was analysed using linear mixed effects models with subjects and items as random effects, and word frequency and length as covariates. There was an interaction between dominant modality and presentation distance such that words dominant in olfaction were responded to faster in the "near" position than the "far" position, but all other modalities were responded to faster in the "far" position. Results suggest that the way we dominantly experience referents can affect perceptual simulation, with referents experienced through olfaction behaving differently to referents experienced dominantly in the other modalities.
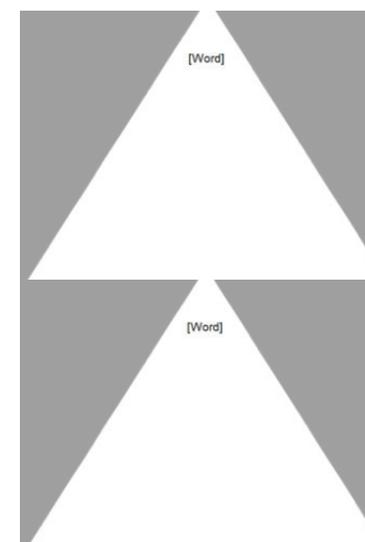

Figure 1. Near and far presentation of words in lexical decision task.

BILATERAL MOTOR CORTEX CONTRIBUTES TO FIGURATIVE LANGUAGE PROCESSING: A TMS-MEP STUDY OF METAPHORIC AND IDIOMATIC SENTENCE COMPREHENSION

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An embodied cognition view postulates that concrete words and sentences denoting actions activate motor and premotor cortices (Aziz-Zadeh et al., 2006; Pulvermüller 2012; Desai et al., 2013). However, it remains unclear whether processing of abstract non-literal language relies on sensory-motor activations as well (Cacciari et al., 2010; Raposo et al., 2009; Boulenger et al., 2012; Cacciari and Pesciarelli, 2013).

Here, we used bilateral Transcranial Magnetic Stimulation (TMS) and Motor Evoked Potentials (MEPs) to investigate whether motor activation accompanies processing of both literal and figurative language. Russian native speakers read literal, idiomatic, and metaphoric sentences incorporating hand-related action words as well as control abstract sentences. To test the sensitivity of cognitive mechanisms of sentence processing and engagement of neural networks to both the word meaning per se and the context, we delivered single-pulse TMS (1) at the action verb, before figurative or literal meaning is disambiguated and (2) at the end of the sentence. The participants' MEPs were continuously recorded and MEP differences between conditions and TMS stimulation sites were analysed.

The analysis of MEPs changes, normalised as the ratio between action-verb sentences and abstract ones, revealed that motor cortex excitability during literal and figurative sentence processing in the limited context was comparable across all types of stimuli. When broader disambiguating context was provided (i.e. complete condition), motor activation increased for literal sentences and decreased for figurative ones. This pattern suggests a correlation between the level of motor cortex excitability and the proportion of the basic verb meaning, preserved in the semantics of the verb, which becomes significant in the broad context. Furthermore, the results suggest that the differences in the degree of conventionalization and involvement of various cognitive mechanisms result in the variability of motor cortex excitability for idioms and metaphors (larger activation for the latter). Finally, bilateral implementation of TMS suggests that motor areas of both hemispheres are involved in figurative language processing.

ASYMMETRICAL TIME AND SPACE INTERFERENCE IN TAU & KAPPA EFFECTS

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How are space and time related in the mind/brain? Two theories with opposite predictions have motivated a discussion around the nature of this relationship: A Theory of Magnitudes (ATOM; e.g., Walsh, 2003) and the Conceptual Metaphor Theory (CMT; e.g, Casasanto, 2010). According to ATOM, space, time and quantity are represented by a common analog magnitude system and processed as a common magnitude or neural metric. On the other hand, CMT suggests that abstract concepts result from metaphorization of more concrete concepts. According to CMT, time may be constructed in our minds through the metaphorization of space domain. ATOM´s and CMT´s predictions differ in whether space/time interference should be symmetric (ATOM) vs. asymmetric (CMT). Since symmetry of interference could be hard to demonstrate experimentally, bidirectional interference has been often taken as evidence in favor of ATOM (Lourenco & Longo, 2011). The "Tau and Kappa phenomenon" is an example of this (e.g., Jones & Huang, 1982). In a classic experiment, participants are asked to compare the duration/distance of two spatiotemporal intervals defined by three horizontally aligned light bulbs that flash in succession. When participants are asked to compare the duration of both temporal intervals, the temporal judgments increment in function of the spatial separation of the light bulbs (Kappa effect). In a similar way, when they are asked to compare the distance between the light bulbs, the spatial judgments increment in function of the temporal duration between light bulbs (Tau effect). The Tau effect – where time (the target domain according to CMT) affects space (the source domain) – has been interpreted as evidence against CMT. However, as noted by CMT proponents, bidirectionality is not ruled out by CMT, symmetry is. Moreover, Tau and Kappa effects might be mediated by other factors besides domain interference (Bottini & Casasanto, 2013). For example, the human tendency to impute uniform motion to discontinuous displays (Imputed Velocity Hypothesis; Jones & Huang, 1982) might partially explain the Tau and Kappa effects. We recreated the original Tau and Kappa experimental design in a computer environment while manipulating the effect of imputed velocity. According to Anstis and Ramachandran (1987) the imputation of velocity vanishes when the light bulbs don't flash and stay on (static) and always visible. Consistently with CMT prediction of asymmetry, the Kappa effect was observed both when the light bulbs were flashing and static, but Tau effect was only observed when dots were flashing as in typical paradigms. The finding of interference asymmetry in Tau and Kappa effects under conditions in which imputation of velocity is perturbed, provides evidence in favor of CMT accounts of representation of time and space.

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LISTENER AGE MODULATES EMOTION AND ACTION EFFECTS IN SITUATED LANGUAGE PROCESSING

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In natural language comprehension, we do not only make use of referents, such as depicted actions denoted by a verb in order to anticipate who-does-what-to-whom, but likely also exploit many other contextual cues. Social cues such as the facial expressions of a speaker, in particular, could have a powerful effect given their central role in face-to-face communication. Yet, the effects of social cues and especially the effect of a speaker's emotional facial expressions on real-time language processing are still under-examined. How do different cues (e.g., referents versus facial expressions) compare in their effects on language comprehension? One possibility is that social cues are central for communication, and if so, their effects might be stronger than those of other cues (e.g., depicted actions). Alternatively the key determinant for context effects is the nature of the link between context cue and language. If so, we should see stronger effects of direct referential cues (a verb referenced by an action revealing who-does-what-to-whom) than of more subtly associated cues (e.g., a smile cued by an adverb such as happily, cueing a smiling target agent). Moreover, how age groups other than young adults (e.g., children and older adults) exploit a rich social context is unclear. We present results from three visual-world eye-tracking studies comparing (a) referential cues (depicted actions) with more subtly associated cues (a speaker's emotional facial expression);; and (b) three listener age groups.

Methods: Children (4-5 years, N= 40), younger (18-30 years, N= 40) and older (60-90 years, N= 40) adults were primed with a natural dynamic positive emotional facial expression (vs. a negative expression). Following this they inspected a target scene depicting two potential agents either performing or not performing an action towards a patient. This scene was accompanied by a positively-valenced German Object-Verb-Adverb-Subject sentence describing the scene (e.g.: (1) The ladybug(accusative object, patient) tickles happily the cat(nominative object, agent).). Of interest was how rapidly and to which extent participants would be able to exploit the depicted action and the positive emotional prime face. For depicted actions we should replicate previously observed effects during the verb or postverbal adverb. For facial expressions, we would also expect to see effects around this time (e.g., the positively valenced adverb could be linked to the recently seen facial expression and in the event of valence congruence, boost comprehension). Differences in the effects of the different cues as well as age-related differences – if present – should emerge in how much and how quickly listeners shift their attention to the target agent (the cat). In line with previous findings we expected delayed context effects for the children and older adults relative to the young adults.

Results: Both of the adult age groups anticipated the target agent more when actions were (vs. weren't) depicted. However, older adults did so to a lesser extent and later (during happily, see (1)) than younger adults (during tickles, (1)). Moreover, even though both adult groups integrated the positive facial expression, face effects emerged only during the cat for the older adults compared with during tickles happily for the younger adults. Children behaved like older adults regarding the integration of the depicted action, i.e., they integrated the action postverbally during happily while the younger adults exhibited action effects earlier, during tickles. However, unlike younger and older adults, children do not yet seem to reliably integrate the emotional facial expression into sentence processing. This on-line data is supported by accuracy results. All age groups answered comprehension questions for who-is-doing-what-to-whom more accurately when an action was (vs. was not) depicted. However, only younger adults used the emotional cue for answering the comprehension questions (but less than they used depicted actions). Overall, the direct referential non-linguistic cue, i.e., the depicted action seems to be a stronger cue than the more indirect social cue, i.e., the emotional facial expression for the integration into sentence processing and the assignment of thematic roles. Crucially, the time course and strength of the integration of these cues varies as a function of age.

EMBODIED SEMANTICS IN THE UNDERSTANDING OF INTERPERSONAL RELATIONSHIPS OF APPROACH AND AVOIDANCE IN EVERY ACTIONS: BEHAVIORAL AND ELECTROPHYSIOLOGICAL STUDIES

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Brain encoding of everyday actions would involve approach and avoidance direction towards a target distinguishing persons from things. We recorded electrophysiological activity of participants while they were reading approach/avoidance action sentences referred to things and persons as: "Petra accepted/rejected Ramón in her group" vs. "Petra accepted/rejected the receipt of the bank", and brain potentials time-locked to the target word. We found late negative ERPs modulated by approach/avoidance which were different to persons and things. For things, an ERP like N400 wave was more negative in avoidance than in approach sentences in right frontal area. For persons, a negative ERP (in a 545-750 time window) presented greater amplitude in approach than in avoidance sentences in left frontal area. ERP amplitude correlated with behavioral inhibition and approach traits. Implications of these results to a social and motivational understanding of action language are discussed.

Key words: approach/avoidance, language, action understanding, ERPs

ROLES AND ACTIONS IN SITUATED LANGUAGE COMPREHENSION: EVIDENCE FROM THE VISUAL WORLD

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Previous research has shown that eye movements towards absent objects on a blank screen occur closely time locked to the mention of these objects in overt speech and that they resemble language-mediated object-directed eye movements in a co-present scene (e.g. Altmann, 2004). These eye movements to object locations on a blank screen have been interpreted as reflecting that listeners access their visual representation of the objects (e.g. Spivey & Geng, 2001). We wanted to investigate whether these 'blank screen effects' are also observable for picture-sentence mismatches. Mismatches are arguably a common phenomenon in that language does not always perfectly match the visual context (speakers can refer to the past, make mistakes, or talk about hypothetical events). Furthermore, different types of mismatch might be processed differently, as evidence from eventrelated brain potentials suggests. Specifically, we know that there is a difference between the integration of roles and actions. To gain more insights into these processes, we extended the previous EEG findings by using eye movements as a behavioral measurement of visual attention.

Our study was carried out as a picture-sentence verification study, in which we recorded participants' eye movements. We manipulated picture visibility (copresent vs. blank screen, blocked design), action, and role congruence within participants. This enabled us to directly compare a) blank screen with co-present scene conditions, and b) role and action matches with mismatches. We hypothesized that if the blank screen and the co-present conditions do not affect how people interrogate the scene, we should see identical eye movements in both of these conditions (Altmann, 2004). If eye movements play a functional role for sentence understanding and participants use locations of objects as a pointer to object representation (Spivey & Geng, 2001), we predicted longer fixations towards scene areas depicting a mismatch because of an aggravated integration of the sentence with a mismatching working memory representation. We also expected to see a difference in gaze behavior between role mismatches and action mismatches due to different timing in the processing of these mismatches. We observed that indeed role mismatches and action mismatches affected gaze behavior in different ways. Looks towards the location of previously depicted characters in the blank screen condition indicated that participants rapidly exploited the prior locations of objects to process sentences. In addition, we observed a clear difference between gaze in the blank screen and in a corresponding co-present scene, highlighting the effects of visibility on processes in situated language comprehension.

Although we observed significant differences for role matches versus mismatches, it is not clear whether these effects are due only to referential gaze behavior or whether they reflect the incremental syntactic and thematic processing of the sentence including thematic role assignment. Furthermore, since there was always an action involved in the pictures, it is not clear to what extent the depicted action drives the eye movements of the participants. This is why in a follow-up study we are currently investigating the impact of the depicted action on role assignment.

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DOES PROSODY INFLUENCE THEMATIC ROLE ASSIGNMENT DURING REAL-TIME SPOKEN LANGUAGE COMPREHENSION?: CHILDREN VS. ADULTS

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In sentence processing different cues, among them prosody, can help listeners to assign thematic roles. Using eye-tracking, Weber et al. (2006) showed that prosody rapidly influences young adults' thematic role assignment in locally structurally ambiguous German subject-verb-object (SVO) and object-verb-subject (OVS) sentences. Five-year-old children are eventually also able to assign thematic roles with the help of prosody (Grünloh et al., 2011). However, whether they are able to use prosody in the same way and at the same time in the sentence as the adults is unclear since Grünloh et al. used a video-pointing task. This task largely measures behaviour post-comprehension and does thus not reveal real-time effects in spoken language comprehension. Additionally, we know from offline data (Dittmar et al., 2008), that children at the age of five tend to interpret the first noun phrase of a sentence as the subject, i.e., the agent according to the canonical SVO sentence structure in German. However, in Dittmar et al.'s study, prosody as a cue was not enough to eliminate children's strong bias towards the SVO order. Other means of modulating the assignment of grammatical function and thematic roles (e.g., cleft structures that focus constituents) do not appear to be rapidly used by 5-year-olds (Voss et al., 2015).

The present study hence examined whether young adults and 5-year-old children can rapidly recruit prosodic cues for incremental thematic role assignment in structurally unambiguous German sentences. We manipulated the word order (SVO vs. OVS) and the prosodic structure (biasing vs. even) for each sentence. In comparison to the sentences by Weber et al. (2006) for which case marking was ambiguous and for which the only cue to thematic role assignment was prosody, case marking unambiguously identified the thematic role relations in our study. We emulated the SVO- and OVS-biasing prosodic contours reported by Weber et al. (2006). We created 24 sets of stimuli containing three animal characters each. Two of them were role fillers for the sentential noun phrases, whereas the third character was a distractor character. Two characters were depicted as performing the same action (e.g. for the verb 'photographs', fotografieren, the two characters were depicted with a camera in their hands) such that the actions provided a context but did not give away the correct thematic role assignment. The sentence-initial noun phrase was always masculine since case marking on masculine noun phrases unambiguously signals either OVS or SVO sentence structure.

For the adult participants (N=24) the results reveal that prosody does not influence thematic role assignment when case marking is present. However, the results did corroborate a significant effect of constituent order. In other words, in SVO sentences adults began to look at the patient of the sentence from the verb region onwards. By contrast, in OVS sentences they started to look at the agent of the sentence from the verb region onwards. For young adults, case marking can thus be seen as a stronger cue for thematic role assignment than prosody in unambiguous German SVO and OVS sentences.

The child data (N=24) reveals that children at the age of five do not yet recruit case marking for incremental thematic role assignment. The results show that there is no statistically significant effect of word order early on in the sentence. Thus, children interpret OVS sentences as SVO sentences (i.e. they anticipate the patient more often than the agent during the verb). Time Course Data reveals that children look more at the patient in OVS sentences during the verb and adverb region when prosody is marked (vs. when it is even) and compared to the SVO sentences. A more fine-grained analysis of this particular region (4500-5800ms: verb/adverb region) shows a marginal effect of prosody (p=0.066). In other words, children do make use of prosody, however, they mistakenly exploit the marked prosody for OVS sentences to increase their SVO bias in the interpretation.

COSTS AND GAINS OF USING VISUAL CONTEXT FOR REFERENT PREDICTION

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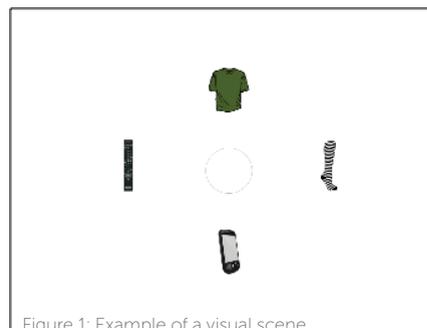
1 - Saarland University (Germany)

Figure 1: Example of a visual scene.

Comprehension difficulty is known to be relative to the predictability of a word in a given context (Rayner & Well, 1996; Kutas et al., 2011). When examining the process of prediction making, we often focus on the previous linguistic context while neglecting the importance of visual cues. Aiming to quantify the role that visual context plays in creating predictions about linguistic items, we conducted two eye-tracking studies. Next to using eye-movement data to detect patterns of anticipation, we used the Index of Cognitive Activity (ICA), which captures pupil jitter and has been linked to cognitive load and predictability (Demberg et al., 2013). Using ICA, we can thus measure cognitive load induced by a prediction being (dis)confirmed. Our first study (Audio) included only auditory linguistic stimuli. Yet, eyemovements were tracked in order to extract ICA values. Our second study (Visual) included the same linguistic stimuli in combination with visual scenes related to the linguistic content. The main manipulation in our linguistic stimuli included restrictive (1) and non-restrictive (2) verbs, inducing stronger or weaker predictions. Next, we selected inanimate target nouns of approximately same frequency, but differing in cloze-probability and plausibility scores. Thus, t-shirt would be more predicted than sock after iron (restrictive), but equally predicted after describe (non-restrictive). In the Visual study, noun predictability was additionally modulated by the number of visual competitors. As shown in Figure 1, the scenes included four images presenting two ironable objects and four describable objects.v

Stimulus example: The woman (1) irons / (2) describes soon (a) the t-shirt. / (b) the sock. Cognitive load (ICA) was overall higher in the Visual study (p < .001), showing that the integration of multiple modalities requires higher cognitive effort. In addition, both studies reveal lower cognitive load on the noun in (1a) compared to (1b), suggesting that after iron, t-shirt was more predictable, and hence easier to process, than sock (p < .05). More importantly, the Visual study showed that higher cognitive load was induced in the verb region by iron compared to describe (p < .05). Since, in the Visual study, iron allowed for active selection of only two ironable targets, we conclude that the selection of two out of four objects induces higher cognitive effort than processing describe where all four objects remain equally plausible. Conversely, in the noun region, lower cognitive load was induced following iron than describe (p < .05). Here the target had only one ironable competitor vs. three describable competitors. Figure 2 illustrates this finding, showing similar overall amount of cognitive load differently distributed for the two verbs, in a manner conforming to the Uniform Information Density Hypothesis. The eye-tracking data revealed that t-shirt was more likely to be the first inspected object during the verb iron in comparison to describe (p < .001). No such effect was found with inspections to sock. This suggests that the restrictive verb immediately directed attention to the most plausible object. Finally, the same measure for the two distractors showed that describe induced more inspections both during the verb (p < .05) and noun (p < .01), suggesting that the restrictive verb mainly excludes the distractors from consideration. The current study comparison illustrates the importance of visual context in language processing. In addition to the two presented studies, we are currently examining the role of gaze cues as additional information that potentially further affects the distribution of cognitive load during sentence processing
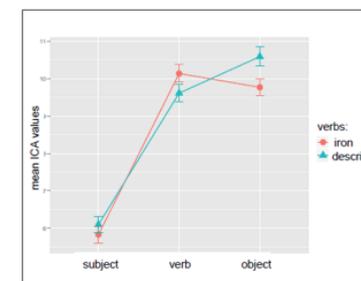

Figure 2: Cognitive load distribution (with standard error bars).

THE COGNITIVE COSTS INVOLVED IN TALKING WITH SOMEONE WITH ALZHEIMER´S DISEASE

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In dialogue, listeners guide their interpretation of definite references based on speaker's consistency in their naming patterns. In general, speakers tend to re-use an expression when referring repeatedly to the same entity, and introduced new expressions when referring to a nameless entity. One way listeners exploit this consistency is by interpreting a re-used expression as referring to a named entity and a new expression as referring to a nameless one (For a meta-analysis on this topic, see Kronmüller & Barr, 2015). This pragmatic expectation of consistency is justified most of the times: there is no apparent reason for why a speaker would behave inconsistenly. However, in some few cases, consistency is not guaranteed; one such case is communication with patients with Alzheimer's disease, where one of the mostly conspicuous symptom is the impairment of the capacity to retain new information (Grober, et. al., 2008). The goal of this study is to explore the way on which listener's interpret referential expressions--that require relying on pragmatic expectations--in cases when such expectations do not hold: when the speaker is a patient with Alzheimer disease. We designed an experiment where referential ambiguity can only be resolve by means of relying in speaker's consistency. In a referential communication task, listeners (60 undergraduate students) hear negated referential expression of the sort "not the key" (in Spanish: "no la llave"), and had to select, from a computer screen, one object among three strange-looking objects--for which there is no convetional name in spanish. We manipulate two variables: identity of the speaker (inconsistent and consistent) and the named status of the potential referents (either mentioned and not mentioned). The consistent speaker corresponds to an older man's voice and the inconsistent speaker corresponds to an older man's voice with early sings of Alzheimer disease, which prevented him—some times--to name the same entity with the same expression. The named status of the objects was implemented by having three types of objects on each screen: the negated alternative ("not the key"); an unmentioned alternative which had never been name; and a critical alternative. What happens to this last type configured the two levels of the named status: it was mentioned before, so had a name, or it was not (see Figure 1 for a schematic of the design). We hypothesized that, for the consistent speaker, upon hearing "not the key", listeners would select the unnamed object in the mentioned cases (had the speaker wanted to refer to it, he or she would have used the name given before); however, in the not mentioned cases, the unnamed and the critical are not named, so the speaker could be referring to either of them. For the inconsistent speaker, in contrast, because one cannot rely on his or her ability to remember names, the mentioned cases should be as uncertain as the not mentioned cases. Figure 2 shows the mean proportion selection for the unnamed object in all conditions (for the first 18 trials out of 24 due to learning) and confidence intervals. As predicted, when interacting with an inconsistent speaker because of Alzheimer, listeners suspend their pragmatic expectations, not benefiting from consistency, and considering both objects (unnamed and critical) as nameless, resulting in equal probability of choosing either of them (eye-movements and reaction times were also collected but not yet analyzed).
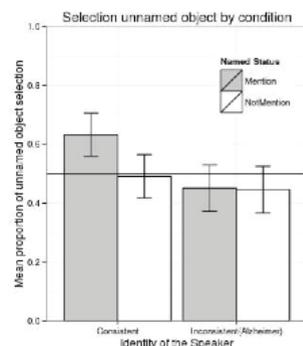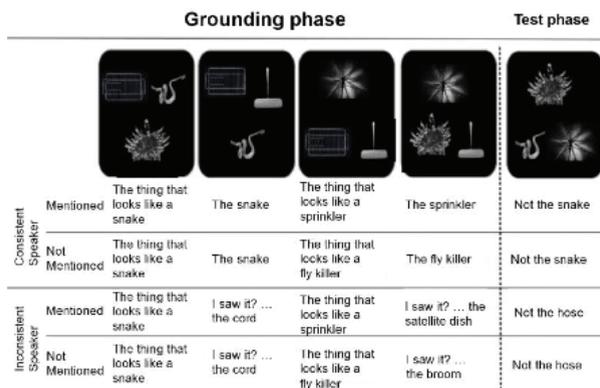
REFERENTIALLY UNEXPECTED EYE MOVEMENTS DURING SPATIAL LANGUAGE COMPREHENSION

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There is considerable evidence showing that during on-line language comprehension people incrementally inspect objects as they are mentioned (but also anticipatea potentialreferent) (e.g., Altmann&Kamide, 1999; Allopenna et al., 1998; Knoeferle& Crocker, 2007; Tanenhaus et al., 1995) suggesting that this process followsrobust referential mechanisms. However, eye movements during the on-line comprehension of a spatial sentence such as in "The box is above the sausage"do not exclusively seem to follow these referential mechanisms (Burigo &Knoeferle, 2015). Burigo and Knoeferle observed that participants mostly inspected the box as it was mentioned, followed byanticipatory inspections towards the sausage when they heard "above". After hearing"the sausage", they were already looking atthe sausage and according to the referential mechanisms people should keep their attentionon that object. Surprisingly a few inspectionswere directed back to the box after hearing "the sausage". According to the evidence showing that processing spatial language (Carlson & Logan, 2005; Logan, 1994) and spatial relations (Franconeri et al. 2012) requires attentional mechanisms, it is possible that these unexpected inspections reflect the attentional process necessary to apprehend the spatial relation used in the description. This attentional shift has been formalised in Regier and Carlson's model (2001) for which the authorspostulate thatthecomprehensionof the "above" spatial relation in asentence such "The box is above the sausage", requires people toshift their attention from the sausage to the box. If this is the case the uncoupled inspections observed in Burigo and Knoeferle (2015) should only occur for spatial language. Thus,inspections to the box as subjects hear "sausage" should not occur when sentences convey either non-spatial relations as in "The box is bigger than the sausage" or no relation between the objectsas in"There is a box and there is a sausage". We recorded eye movements while people listened to spatial descriptions and verified whether the sentence matched (vs. didn't match) the picture (e.g., Fig 1-right). We analysedlog-gaze inspection probability for the matching picture-sentence pairs.The results reveal that people followed referential mechanism until they heard the NP2("the sausage"). Butafter one inspection to the sausage, participantslooked back to the box(grey area in Fig. 1). These uncoupled inspections occurred for almost half of the correctly answered experimental trials(47.5 %). This pattern of inspections is not predicted by any referential account. Arguably then the inspections back to the box during "sausage" relate to the processing of object and noun relations beyond spatial configurations.
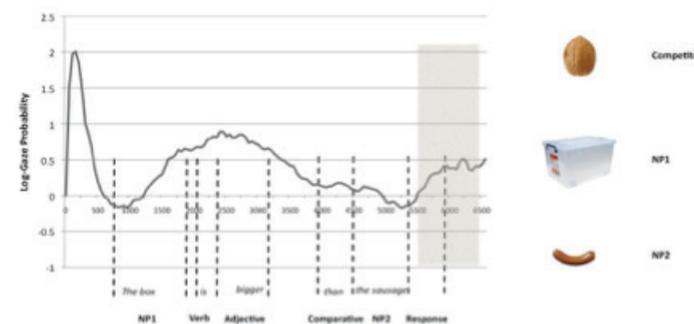

Figure 1: Mean log gaze probability ratios (positive values indicate a preference for the box while negative values a preference for the sausage) probability during the comprehension of the sentence "The box is bigger than the sausage" (left) and a scene example (right).

ESLP 2016 POSTER PRESENTATIONS

ROSEMARY AND RAIN: COMPARING EMBODIMENT OF SOUND AND SMELL WORDS

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Olfaction is thought to be weakly linked with language, yet odour words are shown to activate primary olfactory cortex. We sought to investigate this finding by testing how specifically odour words activate odour processing regions of the brain. Participants had to keep a word in mind whilst they sniffed and rated the intensity of an odour (e.g. peach). The word either matched the odour (e.g. peach), was a close match to the odour (e.g. mango), mismatched the odour (e.g. oregano), or was a non-odour word (e.g. circle). Later, participants completed a recognition task for odours and rated them on pleasantness and familiarity. A separate group of participants completed a sound version of the experiment. Participants had to keep a word in mind whilst they heard a sound clip and rated its intensity (e.g. applause). The word either matched the sound (e.g. applause), was a close match to the sound (e.g. drum), mismatched the sound (e.g. elephant), or was a non-sound word (e.g. ladder). Again, participants later completed a recognition task for sounds and rated them on pleasantness and familiarity.

In the sound experiment, words were recalled more slowly when the word mismatched the sound, compared to all other conditions. Thus, the sound interfered with the retention of the word. In addition, sounds paired with mismatching words had lower recognition accuracy than those in the match and near match conditions, but not neutral condition. So matching and near matching words facilitated sound recognition. There were no comparable differences for word recall or odour recognition in the odour experiment. However, differences in intensity and pleasantness ratings were observed in the odour experiment but not the sound experiment. Odours presented in the match and near match conditions were rated as more intense than odours in the mismatch and neutral conditions. Similarly, odours presented in the match and near match condition were rated as more pleasant than odours in the mismatch and neutral conditions. It is possible that presenting a matching and near matching odour word with an odour makes the odour and its features more salient, thereby increasing perceived intensity and pleasantness.

In both experiments there was no difference between match and near match conditions, suggesting embodied effects for both odours and sounds may be at a coarse category level. There are, however, important differences between the two experiments. Mismatching words affected word recall and sound recognition in the sound experiment, but affected only intensity and pleasantness judgments in the odour experiment. Since these judgments can reflect more conscious decisions, it could suggest that embodied effects for odours may be weaker, or occur at a higher level, than embodied effects for sounds. On the other hand, pleasantness and intensity have been argued to be primary dimensions along which odours are perceived. This result supports the claim that olfaction is weakly, or less specifically, linked to language, at least in Western societies.

SENTENCE COMPLEXITY AND FIGURATIVE LANGUAGE IN A SAMPLE OF COLOMBIAN CHILDREN´S NARRATIVES

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Accumulating work has shown that metaphors shape lexical representation and conceptualization. From the field of cognitive linguistics, it has been proposed that abstract thought depends on metaphorization of more concrete, perceptually accessible, concepts and multiple empirical studies have provided evidence that metaphor and analogy shape basic cognitive processes such as memory and perception (see Bergen, 2012, for a recent review). Reaction time studies have shown that words with multiple meanings have a processing advantage in lexical decision tasks. Interestingly, such ambiguity advantage effect appears to be associated with metaphorically and metonymically polysemous words while homonymous ambiguous words do not show such an advantage (Klepousniotou & Baum, 2007). Literature from the field of education argues that metaphors are tools for learning complex notions, acting as "discourse transplants" that link different conceptual contexts, facilitating understanding of abstract concepts and mathematics (Sfard, 2009). In historical linguistics, it has been proposed that metaphor and metonymy play a crucial role in the semantic shift involved in grammaticalization – the process in diachronic language change by which content words transform into grammatical markers (Sweetser, 1990).

The purpose of this study is to explore whether the use of metaphor and metonymy in children´s discourse is accompanied by lexical and grammatical gains. We address this question for the case of written language, focusing on narratives produced by 10 and 11 year-old Colombian children. Given the importance of metaphor and metonymy in diverse lexico-grammatical processes, an observable correlation between the use of figurative language and lexico-grammatical measures was hypothesized. We collected 36 narratives produced by children following the instruction of writing about a particular biographical situation. Based on previous work in written language development (e.g., Johanssen, 2009) a number of lexical and grammatical measures were taken, including: 1.lexical diversity (the number of different words types normalized by number of tokens in the text), 2.lexical density (number of content words normalized by the number of tokens), 3.number or total and subordinated clauses per terminal units and, 4.number of words per terminal units. Additionally, the use of figurative language was quantified by counting the number of metaphors, metonymies and idioms in the texts. Correlation analyses show that the frequency of use of figurative forms (normalized by narrative length) correlates positively with measures of language diversity (N=36; r= .50; p<.001) and measures of grammatical complexity based on the number of subordinated clauses (N=36; r=.33; p=.05).

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AN ATTENTIONAL APPROACH TO STUDY MENTAL REPRESENTA-TIONS OF DIFFERENT PARTS OF THE HAND

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The aim of this study is to investigate whether the fingers are represented separately from the palm. An exogenous spatial orientation paradigm was used where participants had to detect a tactile stimulus that could appear on the palm, the middle finger or the ring finger of the left hand. The tactile target was preceded by a nonpredictive cue using different stimulus-onset asynchronies (SOA). We observed a Facilitation Effect in the palm and Inhibition of Return (IOR) for fingers using a short cuetarget SOA, whereas the IOR was found in fingers and palm in long cue-target SOA. Also we observed a 'Cue above Target' effect (facilitation effect when the Cue had appeared distal to the target location in a vertical line) at the long SOA. Together, we suggest that the general pattern of results supports the proposed hypothesis about the different mental representation of fingers and palms, but with a considerable and hierarchical interrelation between them.

ATTENUATION OF TOUCH IMPLICATES FORWARD MODELS IN ACTION UNDERSTANDING

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1 Introduction

A central claim of many embodied approaches to cognition is that understanding others' actions is achieved through one's own motor system. This claim is supported by the vast literature on the mirror neuron system. For example, it has been shown that observing the actions of others facilitates actions in one's own motor system, as revealed by MEPs (Fadiga et al. 1995). In terms of language processing, a similar finding is the Action-sentence Compatibility Effect in which reading about other's actions primes similar actions in the reader (Glenberg and Kaschak 2002). If observing or reading about the actions of others does trigger our own motor system to 'mimic' those actions and thereby understand them, then this may involve forward models. These are components of the motor system which predict the sensory consequences of our own actions. The hallmark of forward models is that they attenuate the apparent intensity of self-produced sensations in comparison to sensations caused by an external source (Cullen 2004) – thus, when speaking our voice seems quieter to us than it really is. This experiment looks at whether such attenuation can be shown, not when a person performs an action, but when they observe another person performing the action. This would support the mirroring approach to the understanding of others and also show that such mirroring involves forward models.

2 Methods

Participants viewed two videos, one "active" and one "passive". The active video showed a left hand with outstretched fingers moving towards a stationary ball, and touching it. The passive video showed the inverse – a ball rolling (at the same speed as the hand movement in the active video) towards a stationary hand and touching the outstretched fingers. Participants rested the fingers of their left hand on a "bass shaker" that delivered a tap at the moment of contact between ball and finger in the video. Their task was to adjust the intensity of this tap until it felt equal between the videos. The prediction is that the active video would engage forward models that will attenuate the perceived intensity of the tap; but the passive video would show no such attenuation.

3 Results As predicted, participants adjusted the intensity of the tap to be less intense when accompanied by the passive video in comparison to the active video. This indicates that they perceived the tap to be less intense in the active video. This supports the hypothesis that forward models are engaged when viewing others' actions and that accompanying sensations are thus attenuated by these forwards models.

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SITUATED LEARNING OF MAPUCHE LANGUAGE AND CULTURE: AN ETHNOGRAPHIC CASE STUDY OF A COMMUNITY SCHOOL IN THE ARAUCANÍA REGION (CHILE)

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The preoccupation for a culturally-relevant education has been in the agenda of different countries during the last decades with the attempt to respond to the educational needs of culturally and ethnically diverse population. In Latin America, despite advances in this respect, a plurality of voices have risen both from indigenous movements and from experts who point at the limits of intercultural and bilingual education public policies and programs, which were not able to stop processes of cultural assimilation and loss of both linguistic heritage and community social capital of indigenous people. Several authors have pointed to the perpetuation of a colonial model of education and knowledge which does not allow a genuine valorization of local knowledge in the school context (Gasché 2010; Quilaqueo et al. 2014). Particularly, attention is called to the lack of participation of communities and indigenous people in school education and the detachment of the cultural knowledge transmitted in school from children's and families' lives (Quintriqueo y Torres, 2012). Within this frame, it seems relevant to analyze those educational experiences which foster a knowledge "situated" in the socio-cultural context of indigenous communities.

This paper discusses the ethnographic case of a mapuche school of the Araucanía region which implements educational practices rooted in the social and environmental context of the community. These practices are the materialization of an approach that takes situated cognition and more generally, learning, as a form of participation in a community of practice (Rogoff 1984; Brown et al. 1989; Lave y Wenger 1991; Gee, 2004). Pedagogically, this means the creation of authentic living experiences for learning both within school walls and outside them, which offer real challenges to students and reproduce community social practices (Gallegos 2008; García Rivera 2008). In the mapuche community-based school We Newen, teaching of mapuche culture and language neither takes place with the support of school books nor is confined to specific subjects (Luna y Caniguan 2014; Luna 2015). On the contrary, culture and language are transmitted in socially relevant situations and, at the same time, are designed for the functional use of language. Furthermore, they impregnate school life because of the local community support to the school educational project and the participation of community agents both in the planning and in the execution of school activities. School labor is significant to children since it is positioned as a form of participation in a community of practice which expands towards their most familiar settings.

QOM LANGUAGE ACTIVISTS: RECONSTITUTING QOM LANGUAGE INTERGENERATIONAL TRANSMISSION IN COLONIA ABORIGEN, CHACO

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This paper draws on data from part of an ongoing project to map new uses and modes of transmission of the Guarani, Quichua, Qom, Moqoit and Wichi languages in the Corrientes, Chaco and Santiago del Estero provinces of Argentina (PICT 2013- 2283). This study focuses on the Colonia Aborigen area, Chaco province, where prior research has documented varying degrees of language vitality among indigenous languages (UNESCO-FUN PROEIB Andes, 2009). The Qom people who live in the periurban area of Colonia Aborigen either do not know, or know little of, the Qom language (Aliata, 2013), and therefore expresses interest in its revitalization.

The paper examines the case of a Qom family from Colonia, whose members display a range of linguistic skills in Qom and Spanish. The mother and daughter are teachers trained at the Centro de Investigación y Formación para la Modalidad (CIFMA) who have developed several projects to rebuild intergenerational language transmission and strengthen young people's Qom identity. By working together with this family, we hoped to understand speakers' perspectives, as well as the meaning that passing on their language acquires for them.

We analyzed data produced through semi-structured group interviews with members of three different family generations. The interviewer herself belongs to the third and last generation. Following a sociolinguistic, ethnographic perspective (Codó Patino Santos, and Unamuno, 2012) we draw on interviews and narratives (De Fina and King, 2011), presenting the first results of the analysis, and discussing methodological aspects of this sociolinguistic approach.

Key words: language activists, intergenerational transmission, Qom language

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SPEAKING OF SPACE: LINGUISTIC EXPRESSIONS IN RURAL ELEMENTARY STUDENTS OF TEMUCO

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Nowdays, there is significant evidence that the representation of space, time and number culturally change, and these differences are expressed in speech and cognition (Fuhrman & Borodistsky, 2012; Levinson, 2003; Nuñez, Cooperrider & Wassmann, 2012). In the case of spatial representation, the concept of representation refers to an implicit coordinate system, around which the objects are located and which involves setting the coordinates in a vertical plane (up - down) and horizontal (front - back, left - right). Speakers express this coordinate system according to their specific language characteristics (Levinson & Wilkins, 2006).

The present study have as an objective to describe the linguistic expressions used by rural elementary school mapuche students and non-mapuche elementary school students to refer to spatial dimensions. In this study participated a total of 21 children (10 not- mapuche students and 11 mapuche students), between 9 and 10 years old, which are part and live in rural communities near Temuco. A suitable task was applied, about elicitation of spatial language which consisted in a description of the route from school to the child's home. A morphosyntactic analysis was made about the linguistic terms used to refer to space and also about expressions used to give different context of Spatial Reference. The results showed that both cultural groups the conventional abstract expressions Associated to space (eg, left and right) are barely used, predominating linguistic expressions linked to the context or encoding geographical environment characteristics. At the same time, it emphasizes the use of deictics that complement the description of the trajectory. The conceptual implications discussed underlying the use of contexts relative and absolute.

THE EARLY PREDICTION OF READING COMPREHENSION OF CHILEAN CHILDREN

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To read and understand a text requires the mastery of decoding and listening comprehension (Hoover & Gough, 1990) and both elements are underpinned by different skills (Cain, Oakhill, & Bryant, 2004). Thus, comprehension will not emerge necessarily as a byproduct of decoding alone. Previous research has looked at the contribution of oral language skills to reading comprehension. However, this work has typically focused on lower-level oral language skills (i.e. vocabulary and grammar). The current study investigated the contribution of lower- and higher-level oral language skills on reading comprehension in beginner readers concurrently and longitudinally.

Method

Participants: One-hundred-and-forty-six children from seven Chilean public primary schools participated in this study. Signed parental consent was obtained for the participants. All children spoke Spanish as their first language and were aged around 5 years old at the beginning of the study, which correspond to kindergarten. Ninety-nine of them were tested one year later (Year 1).
Design and materials: All children were tested individually on the following skills at both times: Nonverbal IQ (Raven matrices);; Short-term memory (forward digit span);; Working- memory (backward digit span);; Receptive Vocabulary (TEVI);; Inference generation task (the child answers a series of questions after hearing a brief story). In addition, reading comprehension was assessed at the end of Year 1.
Procedure: each child was assessed in three separate sessions that lasted no longer than 15 minutes.

Results
Hierarchical regression analyses showed that, after controlling for age and non-verbal IQ and memory, vocabulary and inference skills in kindergarten made a shared contribution to children's reading comprehension in Year One1. Concurrently, working memory (β = .23, p = .03), receptive vocabulary (β = .23, p = .01) and inference skills (β = .26;; p = .007) made unique significant contributions to reading comprehension.

Discussion
Results show that the role of oral language on reading comprehension is important from an early age, and at different levels. Not only vocabulary contributes significantly to early reading comprehension, but also the ability to make inferences, highlighting the complexity of the process and the need to develop teaching strategies focused on promoting complex oral language skills, even before formal instruction of reading starts2. 1 The relation between memory, vocabulary and inference skills will be further explored to be presented at the conference (it is currently under analysis). 2 The relation between memory, vocabulary and inference skills will be discussed.

CONTEXTUAL DISSEMINATION IN CONCRETE AND ABSTRACT WORDS

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Concrete words are processed faster and remembered better than abstract ones. Another reported "concreteness effect" is that it is easier for people to generate contexts for concrete words, an empirical finding known as the context availability effect (e.g., Altarriba, Bauer & Benvenuto 1999). The reason behind this phenomenon is not clear. Schwanenflugel (1991) proposed that concrete words are more readily mapped to specific contexts because they may be used in a smaller variety of semantic contexts than abstract words. Previous corpus-based work have put this idea to the test but the results are mixed. Audet and Burgess (1999) used the context density measure, defined as the proportion of non-zero elements in a word's co-occurrence vector. They found that abstract words in their sample co-occurred with more lexical items than concrete words. However, their measure is problematic because it also reflects frequency, and then, higher context density could simply be due to larger frequency. In a subsequent study, Liebscher and Groppe (2003) measured the entropy of words´ co-occurrence distribution while limiting the sampling to counter the effect of frequency. They found the opposite pattern: abstract words appear to be more contextually constrained. However, their sample consisted mostly of nouns, and, as they noted, contextual constraints could depend on part of speech. Here we measure the number of lexical items that co-occur with concrete and abstract words in a large corpus using a modified version of the context density measure that controls for frequency. It is based on recently developed measures of dissemination in texts constructed to implicitly control for a word´s frequency (Altmann, Pierrehumbert & Motter, 2011). We define contextual dissemination (cD) as the number of the non-zero elements in a word's co-occurrence vector (using a 4 word window) normalized by a baseline value. More formally, cD of the ith word (wi) is defined as $C_i/C´_i$, where C_i is the number of non-zero elements in its co-occurrence vector, and $C´_i$ is the number of non-zero elements in its co-occurrence vector constructed after shuffling all words in the corpus while maintaining punctuation. Thus, the denominator estimates the baseline number of words expected to co-occur with wi given its frequency. We used SUBTLEXUS, a corpus of assembled subtitles taken from films and episodes with a total of 51 million words (Brysbaert & New, 2009). Concreteness ratings were taken from Brysbaert, Warriner and Kuperman (2014). Correlation analyses showed that contextual dissemination is positively related to concreteness in adjectives (N=200; r=.32; p<.001) and nouns (N=200;r=.17;p=.019), but negatively related in verbs (N=200,r=-.19;p=.008) and prepositions (N=38;r=-.37;p=.022), indicating that contextual constraints correlate differently to words´ concreteness depending on their part of speech. The more abstract verbs and prepositions are, the less contextually constrained. However, concrete nouns and adjectives co-occur with a larger variety of lexical items than abstract ones, contrarily to previous proposals and findings (Audet & Burgess, 1999; Schwanenflugel, 1991).

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IMAGINISTIC REPRESENTATIONS OF INTRINSIC AND EXTRINSIC FEATURES OF EVENTS

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Research on internal (e. g., RUNNING as horizontal motion and WAKING UP as vertical event) and external features (e. g. time as an attribute of RUNNING or WAKING UP) of events shows space as a powerful ground domain on representing semantic of events. The differences on task demands suggest individuals would choose processing only one events competing feature (internal or external) by grounding it on space domain. However, when task demands claims for processing time of the events on a lateral mental timeline, future would become primed for horizontal but not vertical events. On the aim of testing this priming, on a forced-choice task (Scheme Task), participants chose a spatial scheme (horizontal or vertical) for motion verbs and, after a pause, categorized (Temporal Task) the same event as past or future. The congruency effect on the form left-past right-future was registered the same for horizontal and vertical events. Mainly of our interest, on the Temporal task the scheme-time interaction had shorter latencies for horizontal events on future than on past. These results suggest a matching between the prospective profile of the future and the lateral mental timeline for Spanish speakers. Additionally, the results suggest a strong role of task demands and working memory on manipulating the events internal-external features interaction.

Keywords: Events, Space, Time, Task Demands, Working Memory

SOLVING AN EQUATION IS LIKE BALANCING A SCALE: CULTURE AND EMBODIMENT IN THE CONSTRUCTION OF THE NOTION OF EQUATION IN EDUCATIONAL SITUATIONS

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A frequent image used in algebra's initial teaching likens the solving an equation to the balancing a scale. This phenomenon has generally been studied as a metaphor that draws an analogy between the equation and the balance, discussing in some cases its real educational impact and its status as a metaphor. As to its educational impact, it is only one possible imaginary to understand what an equation is, and, furthermore, is useful for only certain types of equations. Concerning the comparison's status as a metaphor, it has been argued that the equation historically presupposes the balance, as well as the social experience of using this instrument. As the reception of the embodied mind thesis in educational contexts has warmed, the idea that an equation is like a balance has been revalued pedagogically, as it implies a relationship between the body-experience of students to an abstract or general idea. From the perspective of the anthropology of knowledge, the teacher not only shows, in this kind of teaching strategy, how solving an equation is linked to the bodily experience of balance, but two cultural artefacts – the balance and the equation – are also presented as imbricated social instances.

In the present study, we examine the role of a cultural artefact (the balance) on the one hand, and on the other, the role of the body and of gesture (equilibrium) in the construction of knowledge about the equation and its solution. To this end, we describe, analyse and discuss a set of cases where this phenomenon appears: 1. Teaching and learning situations in Chilean mathematical classes, 2. Explanations on YouTube regarding the notion of equation, and 3. mathematical and pedagogical texts that use this type of imagery.

We used a qualitative methodology based on case studies. Every time the image of the balance was used, we identified, first, which aspect of the notion of equation was themed, and, secondly, the specific manner in which this aspect was presented through verbalization, gesture, and the use of materials.

Starting with this distinction between "what is explained?" and "how is it explained?", the analysis of the above-mentioned videos and texts led to a set of preliminary results:
- There are different ways to use this image in educational contexts, from a mere general statement of a relationship, to the building a network of relationships between equations and balances in equilibrium and imbalance. The interaction between verbalization, gesture and materials is essential for more elaborate uses, even allowing the elaboration of algebraic language from the relations between balance and equation.
- In some cases, the teachers had to explain the device "balance-beam scale" and then explain how to solve an equation. The relevance of this image in contemporary educational contexts is debatable, because the type of scale in this set-up is increasingly scarce, and therefore unfamiliar to some students.
- In some cases, the notion of "equilibrium" founded the concept of mathematical equality not only in the plane of bodily experience as a place for the representation of abstract and general concepts. With the introduction of the tension between "equilibrium" and "disequilibrium", the equation also appears in the plane of the experience of the lived body. We discuss how the concept of equation is presented through a tension with deep emotional and praxeological implications in the form, meaning and value of the activity "solving an equation".

THE SOCIAL EXCLUSION IN LANGUAGE COMPREHENSION: A CROSS-CULTURAL STUDY

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In many languages there are metaphors to express the feeling of social exclusion such as pain ("It hurts when you ignore me", "your coldness hurts my feelings", etc.). Moreover, some words may induce feelings of social exclusion in others ("You are excluded", "You are fired"). The close relationship between exclusion and pain has been confirmed by neuroimaging studies, which have found that the exclusion induced by the experimenter activates the neural circuitry of the emotional component of physical pain. However, neuroimaging data are merely correlative. In this behavioral study a group of participants from Spain and one from Chile received words of social exclusion (e.g. rejected) or social inclusion (e.g. accepted) superimposed on visual stimuli that showed a painful or not painful action, applied on the muscle first dorsal interosseous (PDI) of the right hand, considering the perspective of the participant. The results showed that the priming of exclusion and social inclusion modulated reaction times and also errors differently in the Spanish group and the Chilean group. The results are explained according to the cultural differences and support the thesis that understanding the language of exclusion involves a bodily process associated with physical pain.

LADIES FIRST: GENDER STEREOTYPES DRIVE ANTICIPATORY EYE-MOVEMENT DURING INCREMENTAL SENTENCE INTERPRETATION

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Contextual information and world knowledge allow comprehenders to anticipate incoming language in real time. We tested the novel hypothesis that attitudes influence how people make predictions during sentence processing. In an eye tracking experiment, participants listened to passive-voice sentences (e.g., The wood is being cut by the florist) expressing gender-stereotypical actions while observing displays containing both female and male characters. Gaze patterns reflected that participants used gendered information to predict who was agent of the action. Most critically, these effects were larger for female-biased (vs. male-biased) contextual information. These novel results suggest that attitudes (about gender) are involved in predictive processing of sentences, which is relevant for accounts of prejudice and of prediction in language.
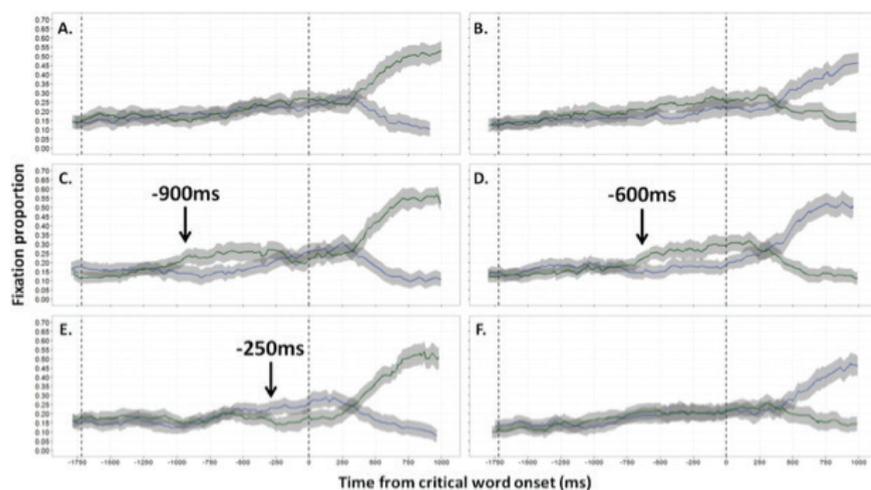

Figure 1. Time course graphs for the critical time window in all experimental conditions. Panels on the left present female-biased visual contexts and panels on the right show male-biased visual contexts. Panels on top, middle and bottom show neutral, female-biased and male-biased sentences, respectively. In all panels, blue lines represent proportion of fixations toward the female character while green line represents fixations toward the male character. Grey areas around the main lines represent corresponding 95% CIs between participants adjusted for within-subjects designs. The first vertical dashed line represents the average onset of the critical verb, and second vertical dashed line shows the onset of the critical determiner.

LANGUAJE OF THE BODY ON MINDFULNESS PRACTITIONERS: A SCIENTIFIC DILEMMA ON EMBODIED COGNITION APPROACHES.

Roberto Aristegui

Universidad Adolfo Ibáñez

During the last two decades, embodied cognition views have shown important development regarding how the body, the context, and the brain interact among themselves, so cognition can happen. Nevertheless, and paradoxically, advances on the embodied cognition perspective, produces an unusual fact: some empiric results contradict or refute other findings related to the practice of mindfulness. This phenomenon can be found on interception studies that have been performed between novel meditators (weeks of practice), experimented ones (decades of practice), and nonmeditators. Even though meditative practice (mindfulness) is by definition the perception of internal body signs (interoception), current scientific evidence doesn't reveal any differences regarding the capability of perceiving neither the heart, nor and breathing between meditators and inexperienced people.

Besides, in those same studies, meditators introspective reports showed that when it comes to observe internal body sensation, meditators perceived their performance better than nonmeditators, despite the fact that the study data do not evidence that difference.

The absence of differences on the results of interoceptive perception between meditators and nonmeditators, in relation with interoceptive perception, results contradictory, both in terms of brain activity studies and in terms of theories that explain how cognition comes from the body experience.

Regarding brain studies, it has been proven that meditation practitioners tend to activate more intensely, brain areas related to interoception (somatosensory and insular cortex). Also, they present an increase of grey matter volume at both insular and parieto-temporal areas, which are both related to interoceptive perception.

In terms of the therapeutic effects of meditation, theories such as James-Lange's, Damasio's somatic marker, or Niedenthal's embodying emotion would explain how the increase on the ability to objectively perceive the body enhances homeostatic regulation, emotional regulation, decision making and people's behavior.

From our point of view, the absence of a difference in terms of body perception between meditators and nonmeditators lies in the research method used on those studies.

This method could be summarized in a physical quantification of all the studies variables (environment, body, and brain), and the rejection of phenomenological data. The method used by those studies do not distinguish any differences between introspective and phenomenological mind; in other words, their research questions answer what's in the conscience, not how it appears. In conclusion, current research methods on interoception and mindfulness practitioners reduce cognition into mere introspection. This method causes that valuable data derived from the person's conscious experience are lost. A plausible alternative to overcome this dilemma is to apply Francisco Varela's Neurophenomenology program. This methodology, would allow to integrate data that comes from both biology and the conscious experience, thus giving answer to how meditators and nonmeditators differ when they perceive internal body signals.

DIAGRAMMATIC ICONICITY IN EL HABLA DE MONTERREY: FROM THE STREET TO THE CLASSROOM

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This poster presents an approximation to diagrammatic iconicity (Taylor, 2002; Müller, 1999; Freeman, 2011) in oral narratives from the corpus El Habla de Monterrey-PRESEEA (Rodríguez Alfano, 2010), that is, texts which syntactic structure gives information about time sequence, speaker's purpose and some guidelines to the message's interpretation, once that the order is understand as the manifestation of a grammatical metaphor (Panther & Thornburg, 2009).

As metaphors, grammatical metaphors are analyzed from the blending theory (Turner & Fauconnier, 2002), which generic space requires us to identify the image schema shared by the phonological structure and the semantic structure (Langacker, 2008). Thus, the construction is viewed as a formal-conceptual integration.

Furthermore, I discuss some guidelines to use these examples of the El Habla de Monterrey-PRESEEA in classroom, in order to go through an undergrad student perception of Spanish grammar as something arbitrary and prescriptive to a perception of an embodied grammar of its first language.

MENTAL MODELS ON SPATIAL REPRESENTATION OF SPANISH VERB FORMS

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Usually, scholar books and Spanish teachers use timelines and comic sequences on teaching Spanish verb forms contrast (e. g., Imperfect Past Indicative vs Perfect Past Indicative). Would space domain provide modal mental models on representing time? This study evaluate whether Spanish speakers map well detailed features from space to temporal, mood and grammar aspect information of Spanish verb forms. We proposed a set of spatial dimensions grounded on the standard and stereotypical grammar definitions of three Spanish past verb forms and contemporary cognitive linguistic approach. In two choice-forced tasks, participants read complete well formed and uncomplete non-well formed phrases. Then, they were asked to categorize the spatial features of each verb form by choosing as preferred one of two spatial schemes at each spatial dimension. For complete well-formed phrases the results show speakers have preferred spatial schemes in the most of the proposed spatial dimensions for each verb form. Opposite to it, for uncomplete non-well formed phrases the speakers only show the spatial preference for one of the proposed spatial dimensions. Mainly of our interest, the preferred spatial schemes are in line to the standard and stereotypical grammar definitions of the three Spanish past verb forms involved in this study. These results suggest amodal grammar descriptions of verbs forms go well with modal spatial representations of them. This double-path on representing verb forms would give language learners a worthy flexibility on learning grammar topics.

Keywords: Spatial Schemes, Spanish Verb Forms, Mental Models, Semantic Memory

AFFECTIVE AND EMBODIED ASPECTS OF A COMMON NEURAL SUBSTRATE FOR MELODIC AND SEMANTIC PROCESSING

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A structural interdependence of semantic processing and harmonic-melodic expectation is suggested by account of a series of experiments, involving both healthy individuals and ones that fit a specific section of the neurophysiological disorder known asamusia. This neurocognitive overlap, to be indexed through both behavioral measures and by the N400 component of the event-related brain potential (ERP), would be mainly given by emotional aspects. Mental representations of words are formed through linguistic and experiential knowledge; nonetheless, while concrete concepts are strongly associated with sensory-motor experience, abstract ones are grounded mostly based on affective and emotional content. It is expected that the latter word category will report a facilitating effect in healthy individuals, if their emotional valence is similar to that of rhythmic-melodic patterns presented simultaneously to each read item, as opposed to congenital amusic individuals who report reduced sensitivity to emotional prosody [2] (and, therefore, would be impaired to perceive the dis-/alignment of emotional valences of each word-sound pair). Concrete words would be expected to behave similarly, but in a less pronounced fashion, as their mental representations only contain reduced emotional grounding in comparison to their abstract counterparts. In particular, the N400 component of the ERP would be expected to reflect the cognitive cost involved in "fitting" a given word into its implicit structure, when aided –or not- by emotionally congruent melodies. As pointed out, the study will involve both healthy subjects and individuals that suffer from congenital amusia, a neurological disorder that has a worldwide prevalence of at least 4%. It affects musical functions that manifests as a selective deficit in normal tonal, rhythmic, timbric and emotional processing; it can extend towards singing, as well as musical memory and recognition. The position in the spectrum of said disorder of the volunteers will be assessedusing the Montreal Battery of Evaluation of Amusia, and every participant will be examined with the Kit of Advanced Measures of Music Audiation.The possibility that amusic individuals will process several unobserved prosodic aspects differently than expected in regards to the experimental assumptions has to be considered.

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THE PRODUCTION AND PERCEPTION OF MANDARIN TONES BY MANDARIN-SPEAKING COCHLEAR IMPLANT USERS

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Objective: The present study aims to investigate the production and perception of Mandarin tones by Mandarin-speaking cochlear implant (CI) recipients using experimental phonetics methods.
Methods: Three experiments were designed to investigate the production and perception of Mandarin monosyllabic tones, and the perception of tonal continua by CI recipients. In Experiment I, we recorded participants' pronunciation of 80 Mandarin monosyllables, and asked normal hearing native Mandarin speakers to indicate the tones they perceived from each pronunciation of the CI participants. Their pronunciations of tones were also phonetically compared with those of normal hearing speakers. In Experiment II, CI recipients listened to the same 80 monosyllables recorded by a normal hearing native Mandarin speaker, and indicated the tone of each syllable through an E-prime presentation. Experiment III investigated whether CI participants showed evidence of categorical perception when listening to three tonal continua (Tone 1 – Tone 2, Tone 1 - Tone4, and Tone 2 – Tone 3), comparing with the normal hearing control group.
Results:
Experiment I:
1) The production accuracies of Mandarin monosyllabic tone by CI recipients are as follows: Tone 1 (74.44%) > Tone 4 (53.33%) > Tone 3 (21.48%) > Tone 2 (9.81%). This shows that Tone 1 is the least difficult one for the CI participants to produce, whereas Tone 2 is the most difficult one.
2) CI recipients' lower limits of their pitch range are generally higher than those of normal hearing participants; the higher limits are basically on the same level as normal hearing participants or are significantly higher. Specifically, the lowest points of Tone 3 and Tone 4 produced by CI users were significantly higher than those of normal hearing participants. In other words, CI users have difficulty producing tones that require low frequencies.
3) There are five types of tone production patterns for CI participants, in the order of frequency of occurrence: 0 (no-tone pattern), 14 (Tone 1 - Tone 4 tone pattern) and 134 (Tone 1 - Tone 3 - Tone 4 tone pattern), 13 (Tone 1 - Tone 3 tone pattern) and 1234 (Tone 1 - Tone 2 - Tone 3 - Tone 4 tone pattern).
Experiment II:
The perception accuracies of Mandarin monosyllabic tone by CI recipients are as follows: Tone 3 (57.78%) > Tone 4 (55.56%) > Tone 1 (34.44%) > Tone 2 (27.78%). Tone 1 is difficult to perceive but easy to produce; Tone 2 is hard both for perception and production; Tone 3 is easy to perceive but hard to produce; Tone 4 is relatively easy to produce and perceive. In terms of perception and production, for CI recipients, Tone 4 is the easiest, followed by Tone1, and Tone 3. Tone 2 is the hardest one.
Experiment III: There is no evidence of categorical perception for the CI recipients tested. However the tonal continuum perception score shows that the Tone 1 – Tone 2 continuum is the most difficult one for CI participants, followed by the Tone 2 – Tone 3 continuum; the Tone 1 – Tone 4 continuum is the least difficult one.
Conclusion: Generally speaking, the closer CI participants' tone production is to the norm, the closer their tone perception will be to the norm, and vice versa. However, when each tone is investigated respectively, there is no such evidence. For CI recipients, the learning of Mandarin tones and the rehabilitation training on tones should be designed according to the tone patterns of their production and perception.

Key words: Cochlear Implant, Mandarin tones, Production, Perception

COMPREHENSION OF EFFORT´S SENTENCES IN YOUNG AND OLDER ADULTS FROM EMBODIMENT THEORIES

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(Chile)Embodiment theories allow a new perspective around the relationship between body, context and language. This is shown by the increasing empirical evidence generated in behavioral and neurocognitive studies (e.g. Urrutia & De Vega, 2012). However, such research focuses on young obviating stages as old age. For embodiment theories they can be considered theories of human cognition and language need to be explored throughout the entire life cycle. At the same time, the elderly population represents a favorable context of testing due to concomitant changes in sensory perception and motor skills. Predictions derived from these theories involving direct interactions between body declines and sensori-motor simulations of language (Barsalou, 1999; Glenberg & Robertson, 2000). Based on the above, these predictions will be tested by tasks of language comprehension of motor and mental action in factual and counterfactual expressions, by a presentation paradigm masked sentences in groups of old and young. The manipulated variable is the semantic content of sentences, which are high and low effort because the ability to perform tasks effort is a dimension sensitive to age.
These results could support (or not) the validity of the embodiment to other stages of development. In parallel, the findings allow producing new hypotheses for the application of embodiment theories in cognitive stimulation programs for older adults.

Keywords: Embodiment, aging, effort.

THE BOI EFFECT IN PARKINSON'S DISEASE

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The BOI (Body-Object Interaction) concept was coined by Siakaluk et al. (2008a, 2008b). According to Sialakuk, BOI measures the ease with which a human body can physically interact with the referent of word.
Several studies have suggested that there is a facilitator effect of high BOI word ratings both for processing and semantic retrieval tasks (Siakaluk et al., 2008a, 2008b; Tillotson & Siakaluk, 2008; Bennette et al., 2011; Hargreaves et al., 2012; Newcombe et al., 2012, Tousignant & Pexman, 2012).
A factorial experimental design will be used to determine if motor difficulties caused by Parkinson's disease (PD) affect semantic processing. In order to assess this, a BOI rating for trisyllabic words will be measured by means of an experimental task in both an experimental group and a control group. Specifically, both groups will have to assess a list of given words using a rating scale from 1 (low body-object interaction) to 7 (high body-object interaction).
A list of words with high and low BOI ratings given by the subjects will be obtained from the experiment along with respective reaction times. Expected results are that the PD group will show a lower BOI rating as well as longer response times for less manipulable words in comparison to the control group. These results are also expected to contribute to consider high BOI ratings as a possible semantic facilitator in populations with motor impairment and this have potential therapeutic applications on the field of Speech and Language Therapy.

Keywords: Body-Object Interaction, Embodiment, Parkison's disease

THE RELATION BETWEEN METACOGNITIVE SKILLS AND NARRATIVE LISTENING COMPREHENSION IN PRESCHOOLERS

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Introduction

Reading comprehension is an integrative and constructive process through which the reader is able to extract meaning from the text and to construct a mental model (Cain, 2012). Different skills influence this process, one of them, is the ability to evaluate and reflect upon one's understanding: comprehension monitoring (Cain & Oakhill, 2012). Metacognitive monitoring allows assessing our level of understanding (Oakhill, Hartt, & Samols, 2005). Some studies have suggested that young children would not be able to properly monitor their performance because they are not able to integrate information when making predictions, which would lead generally to overestimate their performance (Flavell, et al. 1970, in Destan & Robers, 2015).

However, several authors have documented the existence of metacognitive monitoring skills at an early age, mainly in tasks of perceptual identification (Paulus, Proust, & Sodian, 2013), and memory tasks (Destan, Hembacher, Guetti, & Roebers, 2014). Regarding preschoolers listening comprehension, it has been found that they are able to detect and name inconsistencies presented in stories (Skarakis- Doyle, Dempsey, & Lee, 2008).

Thus, the current study aims to describe the metacognitive skills of preschool children and how these are related to their listening comprehension skills. More specifically, we assess the children's ability to evaluate their own listening comprehension through a self-report, and relate that with their actual listening comprehension skill.

Method

Participants: 390 kindergarten children (5-6 years) from 13 schools in the Metropolitan region participated in the study. They were evaluated individually.

Materials:

-Listening comprehension: children were read a story and asked 10 comprehension questions.

-Comprehension monitoring. After hearing the story and before answering the questions, the examiner presented the child a print depicting three faces showing different degrees of certainty (very sure, more or less, not sure) (adapted from Coughlin et al., 2013). Then s/he was asked to indicate which picture represents better their level of understanding.

-Vocabulary: receptive vocabulary was assessed using a Picture Vocabulary Test (TEVI-R).

Results and Discussion

Descriptive statistics showed that 302 children felt very sure about their understanding, whereas, only 19 feel unsure. Spearman's correlations were run and no significant associations were found between metacognitive skills and listening comprehension, nor vocabulary. Only working memory was related to children's positive perception of their understanding. Results showed that the ability to judge their own understanding is not an indicator of the current comprehension, thus, it is not a reliable measure of the actual comprehension in preschool children. The relation between working memory and positive perception of understanding suggests that the difficult to integrate information might be not related to performance monitoring.

A-BOOK: A FEEDBACK-BASED ADAPTIVE SYSTEM TO ENHANCE METACOGNITIVE SKILLS DURING READING

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Metacognitive strategies (e.g., inference making, comprehension self-monitoring, text structure knowledge) are critical for text understanding. We implemented an automatized feedback-based software called a-book, designed to provide theoretically motivated user-based feedback during reading and to strength metacognitive strategies in primary school students.

The system has three modes. In the training mode, it presents the user with pseudo-randomized questions, and appropriate feedback is given after their responses. In the adaptive mode, the system is flexible enough to change the kind of questions based on the user's profile. For instance, if the child's accuracy in inference making question is poor, then the system will present more inference making questions and feedback. Instead, if the accuracy of the child is high on inference making questions, the system will present less questions of that kind. In the control mode, these questions will also be presented but followed by accuracy feedback only.

We predict that both the training and adaptive modes will produce better comprehension accuracy scores relative to the control mode. Similarly, we predict that the adaptive mode will produce better score over time compared to the training mode. Preliminary data from 90 children from 4°, 5° and 6° grades will be presented and discussed.

SPEAKING, POETRY AND ARTS: A PROPOSAL FOR THE EARLY STIMULATION OF THE COMMUNICATIVE SKILLS OF THE CHILDREN AT A DISADVANTAGE SITUATION.

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At present, early education tries to develop a reading and writing attitude from the very beginning in children, especially in those from vulnerable sectors. Reading activities are mainly used such as the literary texts of the narrative genre and the meaningful and functional non-literary texts (Bigas and Correig, 2001; Goikoetxea and Martínez, 2015; Shonkoff, 2007) which are done by expert adults; keeping the poetic texts and the artistic and plastic expression (Errázuriz, 1994) into the background, but sometimes they do not even exist in the preschooler classrooms, disregarding its esthetic, educative and formative value (Bettelheim, 1977). When reading poetry the children interact with the poetic text incorporating their experiences, memories and family experiences by means of playing and the ability to imagine and create a visual representation. In this context, to promote a meeting between the visual arts and poetry through comprehension, games, expression, and creation results in a space of integrated arts. The construction of strategies of the integrated arts on a curricular level is relatively new (Bunaford et al, 2007), and there are no systematized studies related to the impact of these strategies in the cognitive and emotional development of the learners. Therefore this study turns to be the initial point for assessing the impact of the pedagogic strategies of the integration of the arts in the preschool education.

The qualitative methodology is framed in a research design of practical action. This modality comes from the hermeneutical interpretative paradigmatic approach and it has a practical interest (Bogginoy Rosekrans, 2004).

The research was made with a group of twelve children from 4 to 6 years old in a rural school placed at the south of Chile. An action plan was designed from the diagnoses of reality and the interests of the children, in order to develop then a series of action cycles (Pérez, 1990), planification (preparation of the didactic sequence), execution (implementation of reading comprehension experiences, games, and artistic creation), and assessment (pedagogic reflection about the implementation) which lead to new and improved experiences of artistic creation.

The experience allowed the development of communicative competences in the preschool learners consolidating speaking through the integration of the semantic, syntactic and pragmatic aspects of language, processes which were developed from the need to express since the meeting with the poetic texts. So they become involved in complex discussions about some topics suggested in the literary conversation, in order to project then their comprehension on game activities and plastic and pictoric expression, representing with images an idea, an extracted concept, a situation, or an imaginary figure that the children expressed from the text analysis. This creative process was intrinsically interweaved with the development of the oral language because during the development of their work they expressed what they were doing; socializing with their peers, remembering important ideas of the artistic experience (text, ludic and existential experience) consumables which gave shape to their creation.

The experience improved the communicative interactions -speaking and reading comprehension- among the children, turning into a social space for dialogue, meeting, participation and respect for others. The poetic genre awakened in the children a way to express their fears, dreams, hopes and fantasies with freedom, in an atmosphere of trust which allowed them to make public their opinions and experiences. This space given in the classroom considered that the contribution made by each of them allowed the creation of a shared learning zone.

EFFECTS OF COLLABORATIVE WORK MEDIATED BY PORTABLE TECHNOLOGY IN READING COMPREHENSION

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In this presentation it will be released a study developed in the IX Region of Araucania, whose objective was to determine the effects on teaching and development of reading comprehension through the incorporation of the methodology of collaborative learning with portable technology in teachers and students participants of the project " Collaborative Links". The research was conducted through quantitative methodology supported by qualitative techniques because it had a high degree of integration or combination of approaches, which are intermingled in the research process. In the quantitative aspect, there was implemented a quasi-experimental design with pre post test control group. The sample was composed by 191 students in the experimental group and 187 in the control group of 4th grade. All the participants belonged to schools of the IX Region.

In relation with the qualitative field, the technique implemented was focus group with seven teachers involved in the project "Portable Technology in the Classroom" in the learning subject called "Language and communication". This project belonged to the "Collaborative Links" program, whose purpose was to assign uses of mobile technologies in the classroom in order to support student learning process through measurement tools and new forms of collaborative intervention, as well as teaching management.through measurement tools and new forms of collaborative intervention, as well as teaching management. This program was led by the research center EDUINNOVA of the Universidad Católica de Chile, supporting its implementation the Computer Education Institute of the Universidad de La Frontera.

As results it was observed an increased of 11% in reading comprehension performance in the experimental group, compared to 6% in the control group, with statistically significant differences in favor of the experimental group, $t(228) = 4.06$, $p < .001$, 95% CI [2.26, 6.51].

In the classroom observations, it became evident that teachers appropriated the teaching guidelines suggested in the "Collaborative Links" program, incorporating mobile technology in their activities. Meanwhile, in focus group, teachers group, teachers noted that the use of technology in the classroom, mediated by a collaborative methodology, became a highly motivating resource for students, providing them, besides, evaluation process of the educational contents.

This study shows the relevance of implementing innovative educational models, where students become builders of knowledge and technology is used as a facilitating tool improving reading comprehension and a vector showed that enhances positive interactions within groups collaborative work.

Keywords: Reading comprehension- Collaborative work - Digital Technologies.

THE DICHOTOMY BETWEEN WHAT CHILDREN WRITE AT SCHOOL AND AT HOME

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Writing is a fundamental ability to participate in our society, but learning to write is a long and complex process that does not occur naturally (Alamargot & Fayol, 2009; Álvarez, 2010; Bazerman, 2013; Graham & Harris, 2000; McCutchen, 2006, 2011). In this process, schools play a key role, not only because it is the place where teaching takes place, but also because school is a place for literate culture, where students are surrounded with different conceptions and functions of writing (Cook-Gumperz, 2006; Graham & Harris, 2013; Kalman, 2005; Lerner, 2001; Street & Street, 1991). Despite its importance, there is little evidence of daily activities developed by Chilean students in their homes and the potential impact these activities might have in the development of this ability.

The aim of this research was to identify teaching practices of writing in schools and its relationship with writing activities developed and valued by sixth grade students in their daily lives. Through multilevel models six schools with high results in a national assessment of writing (SIMCE 2013) were selected. The teaching practices and conceptions about writing were studied through classroom observation and interviews with teachers. To analyze the activities and beliefs of sixth grade students, six focus groups were developed, each with five or six children, in which their views were collected through three playful activities.

The results show that there is a great dichotomy between the activities developed by children in the classroom and the ones developed at home. The first ones are seen as mechanical and of little relevance, whereas students declare to write frequently at home, especially through the use of technology, and see these activities as relevant because of the creative and expressive opportunity they provide. Schools, in turn, do not know nor value children's personal writing. This dichotomy represents a major loss of opportunities for learning, since the real writing practices of children are central to their daily lives. These findings underscore the importance of improving the dialogue between personal writing practices and teaching activities in the classroom. By ignoring what students do and care about, teachers lose key opportunities for a more meaningful instruction of writing that could position this ability not only as a technique, but also as a culture in which they could participate.

WORDS THAT MOVE US. THE EFFECTS OF SENTENCES ON BODY SWAY

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Background
Embodiment theory states that cognition is grounded in the sensory-motor system. There is evidence that the processing of linguistic items (words, sentences) is coupled to postural control. We studied whether reading sentences semantically referring to high effort motor activities would induce more postural sway, compared to sentences referring to low effort activities.

Methods
Thirty one Dutch speakers stood on a force plate, and read high effort (e.g., pushing a heavy object) or low effort (e.g., pushing a light object) or control sentences. The sentences were adopted from a database that had been used in a previous fMRI study, and which reliably activated motor cortex.

Results
High effort sentences induced more body sway than low effort sentences, but only in the mediolateral direction and not in the antero-posterior direction. Surprisingly, control sentences (no effort) also yielded more sway than low effort sentences.

Conclusion
The results seem to provide some evidence favouring the notion that language processing is grounded in postural control. It could be that reading high effort sentences resulted in partial reactivation of relevant motor systems, yielding more body sway.

DIFFERENT EFFECTS IN TACTILE ATTENTION BETWEEN THE THUMB AND ITS METACARPUS AND THE PALM

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The aim of the second study is to establish whether the thumb is represented independently of the palm. An exogenous spatial cueing paradigm was used, where participants had to detect a tactile stimulus that could appear on the proximal and distal phalanges or metacarpus of the thumb (thenar area; Experiment 1) and the metacarpus of the thumb or hypothenar area of the palm (Experiment 2) of the left hand. Our results suggest the thumb and its metacarpus share the same mental representation, which is distinct from the representation of the palm.

A HEBBIAN NEURAL NETWORK MODEL OF THE STROOP EFFECT

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Abstract

This work can be seen as modelling of a cognitive phenomenon (the Stroop effect) on the one hand, or as an application of a philosophical view on the mind on the other. The classical Stroop effect is that the reaction time (RT) to name the ink colour of a printed word is longer, if this word denotes a conicting colour. Over the last 80 years there have been many variations of the experiment revealing various mechanisms behind semantic, attentional, behavioural and perceptual processing. Semantic interference theory says that the incongruent word interferes with the colour already at an early recognition stage before the response is generated. This is supported by studies showing that even if two different colours require the same response, the RT's are longer when there is semantic incongruency. However, if the word is also response-incongruent, then the RT's are even longer. The Stroop task is known to exhibit asymmetry. Reading the words out loud is hardly dependent on the ink colour. However, naming the ink colour is significantly influenced by the incongruent words. This asymmetry is reversed, if instead of naming the colour, one has to point at a corresponding colour patch. Another debated aspect is the notion of automaticity. It has been shown that it is not a one- or-zero phenomenon, but that there is a continuum of strength of automaticity. There are many models and theories in the literature explaining these findings which will be discussed in the presentation. None of them, however, seems to capture all the findings at once. Below a computational model is proposed which is based on the philosophical idea developed by the author that the mind operates as a collection of different information processing modalities such as different sensory and descriptive modalities which produce emergent phenomena through mutual interaction and coherence. Even single neurons can be thought as a special case of such a modality. The idea is to generalise the concepts of perspective, "point of view" and modality to a single notion. This notion is then used to explain the emergence of semantics. This, in turn generalises the idea of embodied semantics. In the latter meaning is grounded in sensorimotor modalities, but in this theory meaning can be grounded in other modalities as well, such as narratives, formalisms, affections and other descriptive frameworks. The computational model described below can be seen as a simple application of this way of thinking. In the long run, the author hopes to realise larger scale architectures and develop models based on this philosophically inspired approach. The model is an artificial neural network (ANN) which consists of a number of blocks of neurons (de- pending on which experimental setup is modelled), each block corresponding to one modality. In the simplest case there are four modalities: visual colour processing, text reading, speech production and attention selection. In experiments where button pressing or pointing is required, a corresponding block is added. In the beginning the weights of the ANN are mostly set to zero. The network is trained using Hebbian learning to establish connections between these differ- ent modalities. The amount of data fed into the net- work is supposed to mimic the amount of practice a human encounters; it is assumed e.g. that convert- ing written text into spoken words is more practised than converting visually perceived colours into spoken colour-names. After the training, the network performs the Stroop task. The RT's are measured in a canonical way as the ANN is a continuous time recurrent ANN. The above described aspects of the Stroop phenomenon along with many others are replicated. The model is similar to some existing connectionist models but as will be discussed in the presentation, has many advantages: it predicts more data, the architecture is simpler and biologically more plausible.

Key words: Connectionism, Hebbian learning, Artificial neural networks, Philosophy of mind, Stroop

NAMING AND DOMINATING: INTERPERSONAL DYNAMICS AND PATTERNS OF LEXICAL CHOICES IN CONVERSATIONAL REFERENCE

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The lexical choices people make when referring to entities in the context of referential communication are not determined only by the conventional meaning of the words, but also by complex interpersonal dynamics that organize social interaction. Traditionally, studies on language use during dialogue, either from pragmatics, sociology or psychology, have described these interpersonal dynamics under the assumption that conversation is a collaborative activity on which interlocutors act together to achieve a common goal (Clark and Wilkes-Gibbs, 1986). Under this assumption, the lexical choices reflect cooperation inasmuch as partners generate their contributions in order to facilitate mutual understanding. However, there are other factors, such as power and domination (Dunbar and Burgoon, 2005; Dunbar, 2011), that could influence the interaction and eventually the lexical choices people make. In this context, we aim to examine the relationship between interpersonal dynamics of power and domination that take place in conversations and patterns of lexical choices. Based on Clark and Brennan (1996) design, we conducted a study on which participants had to generate novel names for unconventional objects that lack names in Spanish, in order to give directions to a partner on how to organize these objects. Therefore, to complete the task, it was necessary for participants to generate names that could be understood and shared by both interlocutors. Bases on both, a detailed analysis of the dynamics of power and a comprehensive record of the patterns of the interlocutors' lexical choices, we found an effect of power hierarchies on how objects are named. Consistent with our hypotheses, participants that displayed more domination used less frequently the name and expressions proposed by participants that exhibit a lesser degree of domination. The figure below shows the proportion of use of partner's names for each dyad, represented by a point. If the point falls above the line, it means that the non-dominant partner repeated more times the names given by the dominant partner. Even though the difference is small (73% vs 78%), it is statistically significant (Estimated beta = 0.3107; z = 1.997; p = 0.0459). We conclude that the dynamics of dominance in conversation influence naming patterns.
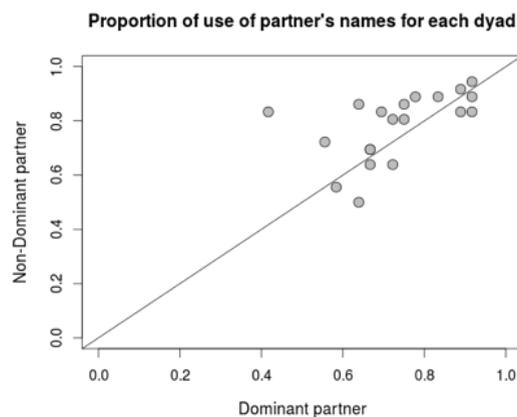
Proportion of use of partner's names for each dyad

DISCOVERING NOUN AND VERB PRECURSORS DURING LANGUAGE ACQUISITION

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We explored whether and how 4-6 months old infants may discover words associated to objects and actions, from a series of continuous audio-visual streams where some labels systematically co-occurred with static face (for noun-like label) while others co-occurred with moving face (for verb-like label). Preliminary results show that infants were able to learn noun-like labels referred to static faces, but they did not learn labels referring verb-like labels referred to moving faces.

We conclude that from very early age infants can exploit systematic association between what they hear and what they see in order to have a 'rudimentary knowledge of grammatical categories'. Shed lights on this question will contribute to a deeper understanding of how infants develop an early recognition of grammatical categories.

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