

**7th INTERNATIONAL
MORPHOLOGICAL
PROCESSING CONFERENCE**

JUNE 22ND – JUNE 25TH, 2011

DONOSTIA – SAN SEBASTIÁN

BASQUE COUNTRY, SPAIN

PROGRAM SUMMARY

Thursday, June 23rd	Friday, June 24th
<p>08:00 - 08:50 Registration & Coffee</p> <p>08:50 - 09:00 Opening remarks</p> <p>09:00 - 10:30 Symposium 1: Rob Fiorentino [S-1.1], [S-1.2], [S-1.3], [S-1.4] & Discussion</p> <p>10:30 - 11:00 Coffee break</p> <p>11:00 - 13:00 General Talks 1 [GT-1.1], [GT-1.2], [GT-1.3], [GT-1.4] & [GT-1.5]</p> <p>13:00 - 14:00 Lunch</p> <p>14:00 - 15:00 Poster Session 1</p> <p>15:00 - 16:00 Keynote Lecture: William Marslen- Wilson</p> <p>16:00 - 17:00 Discussion, Marcus Taft</p> <p>20:30 - Conference dinner</p>	<p>10:00 - 11:30 Symposium 2: Harald Clahsen [S-2.1], [S-2.2], [S-2.3], [S-2.4] & Discussion</p> <p>11:30 - 12:00 Coffee break</p> <p>12:00 - 14:00 General Talks 2 [GT-2.1], [GT-2.2], [GT-2.3], [GT-2.4] & [GT-2.5]</p> <p>14:00 - 15:00 Lunch</p> <p>15:00 - 16:00 Poster Session 2</p> <p>16:00 - 18:00 General Talks 3 [GT-3.1], [GT-3.2], [GT-3.3], [GT-3.4] & [GT-3.5]</p>
	Saturday, June 25th
	<p>09:00 - 10:45 Symposium 3: Ram Frost & Jay Rueckl [S-3.1], [S-3.2], [S-3.3], [S-3.4], Discussion</p> <p>10:45 - 11:15 Coffee break</p> <p>11:15 - 12:45 Podium Discussion: Alec Marantz vs. David Plaut</p> <p>12:45 - 13:45 General Discussion, Ram Frost</p> <p>13:45 - 13:50 Concluding Remarks</p> <p>13:50 - 15:15 Lunch - Pintxos</p>

WELCOME

7th INTERNATIONAL MORPHOLOGICAL PROCESSING CONFERENCE

The first International Morphological Processing Conference was held in Aix-en-Provence in 1999, organized by Ram Frost and Jonathan Grainger. The goal of the conference was to bring together researchers interested in the role of morphological processing during word recognition. It started as a small workshop with a few invited people. In that first meeting, we enjoyed not only an intensive workshop but also a memorable conference dinner, followed by drinks, which were memorable as well. The conference has continued to take place every other year in different locations, although Aix-en-Provence has played the role of “home” to return to, from time to time. So far there have been six meetings (Aix-en-Provence, 1999; Nijmegen, 2001; Aix-en-Provence, 2003; Cambridge, 2005; Aix-en-Provence, 2007; and Turku, 2009).

The field has benefited from Ram and Jonathan’s drive and initiative, and their launching of the publication of edited volumes based on the papers presented at the Morphological Processing Conference, depending of course on meticulous peer-review. The morphological processing community has thus produced the following edited volumes that contain very interesting papers on various aspects of morphological processing:

- Frost, R. & Grainger, J. (2000). *Cross-Linguistic Perspectives on Morphological Processing*. Special Issue of *Language and Cognitive Processes*. Hove, UK: Psychology Press.
- Baayen, R. H. and Schreuder, R. (2003). *Morphological structure in language processing*. Berlin: Mouton
- Frost, R., Grainger, J. & Rastle, K. (2005). *Current Issues in Morphological Processing*. Special Issue of *Language and Cognitive Processes*. Hove, UK: Psychology Press.
- Frost, R., Grainger, J. & Carreiras, M. (2008). *New directions in Morphological Processing*. Special Issue of *Language and Cognitive Processes*. Hove, UK: Psychology Press.
- Bertram, R., Hyona, J., & Laine, M. (2011). *Morphology in language comprehension, production and acquisition*. Special Issue of *Language and Cognitive Processes*. Hove, UK: Psychology Press.

The current conference attempts to address, via papers, posters, and debates put forth here, the hot theoretical issues in morphological processing. As our field advances forward and novel questions can be investigated with novel experimental methods, we will be able to outline the future directions of the field. Finally, we will also celebrate the official retirement of William Marslen-Wilson, who made very important and long lasting contributions to the field. While celebrating his achievements we still look forward his future insightful contributions.

I hope you will greatly enjoy the conference and your stay in beautiful Donostia-San Sebastián.

Manuel Carreiras, BCBL Director.

WELCOME

ORGANIZING COMMITTEE

Manuel Carreiras, Joana Acha, Joana Cholin, Jon Andoni Duñabeitia, Andrea Martin, Philip Monahan & Pawel Kuszelewski

ACKNOWLEDGMENTS

- We wish to thank the following sponsors for their support:
 - Spanish Ministry of Science and Innovation
 - Government of the Basque Country
 - SEPEX: Spanish Society of Experimental Psychology
 - The University of the Basque Country – Summer Courses Committee
- We would like to thank all the researchers that have submitted their abstracts to the conference. We received a total of 90 abstracts.
- We are also grateful to the organizers of previous Morphological Processing conferences for their valuable advice.
- Finally, we thank the Miramar Palace for their help and generosity in helping us host the conference.

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CONFERENCE PROGRAM - THURSDAY, JUNE 23RD

08:00 - 08:50 **Registration & Welcome coffee**

08:50 - 09:00 **Opening remarks.** Manuel Carreiras, BCBL Director

09:00 - 10:30 **Symposium 1: *Morphology and Cognitive Neuroscience*,
Rob Fiorentino.**

09:00 - 09:10 [S - 1.1] Investigating morphological constituency and combinatorics: A cognitive neuroscience perspective. *Robert Fiorentino*

09:10 - 09:35 [S - 1.2] Converging evidence for early automatic, orthographic form based decomposition of regular and irregular allomorphs. *Linnaea Stockall*

09:35 - 10:00 [S - 1.3] Neurocognitive contexts for morphological complexity: Dissociating inflection and derivation. *Mirjana Bozic, Lorraine K Tyler & William Marslen-Wilson*

10:00 - 10:25 [S - 1.4] How the brain processes compound words: Insights from ERPs and fMRI. *Dirk Koester*

10:25 - 10:30 Discussion

10:30 - 11:00 **Coffee break**

11:00 - 13:00 **General Talks 1 [GT - 1]**

11:00 - 11:20 [GT - 1.1] Seeing stems everywhere and being blind to affixes. *Davide Crepaldi, Kathleen Rastle, Colin Davis & Stephen Lupker*

11:20 - 11:40 [GT - 1.2] Processing Verbal Morphological Agreement in L1 and L2: Language experience, working memory and linguistic effects. *Nuria Sagarra, Nick Ellis & Jacqueline Gauthier*

11:40 - 12:00 [GT - 1.3] Association between word accents and suffixes in on-line processing of Swedish. *Mikael Roll & Merle Horne*

12:00 - 12:10 Break

CONFERENCE PROGRAM - THURSDAY, JUNE 23RD

12:10 - 12:30 [GT - 1.4] When men and women disagree in syntax: The effect of speaker's identity on syntactic processing. *Adriana Hanulíková, Doug Davidson & Manuel Carreiras*

12:30 - 12:50 [GT - 1.5] Asymmetric meaning assembly for semantically transparent and opaque complex verbs in German. *Eva Smolka & Carsten Eulitz*

13:00 - 14:00 Lunch

14:00 - 15:00 Poster Session 1 [PS - 1]

15:00 - 16:00 Keynote Lecture. CONFERENCIA SEPEX. William Marslen-Wilson. MRC Cognition and Brain Sciences Unit, UK

Title: "Human language and communication: Explanatory levels and neurobiological substrates"

16:00 - 17:00 Discussion, led by Marcus Taft

20:30 - Conference Dinner – Restaurante Ni Neu (Kursaal Congress Center)

CONFERENCE PROGRAM – FRIDAY, JUNE 24TH

10:00 - 11:30 **Symposium 2: Second Language Morphology**, *Harald Clahsen*.

10:00 - 10:20 [S - 2.1] Factors influencing morphosyntactic acquisition in L2. *Ruth de Diego-Balaguer*

10:20 - 10:40 [S - 2.2] Recognition of inflected words in early bilinguals: Behavioral and ERP evidence. *Minna Lehtonen, Annika Hultén, Toni Cunillera, Antoni Rodríguez-Fornells, Jyrki Tuomainen & Matti Laine*

10:40 - 11:00 [S - 2.3] Morphological and form priming in L1 and L2: Where do they differ? *Laurie Beth Feldman*

11:00 - 11:20 [S - 2.4] Word-formation and inflectional processes in native and non-native language comprehension: Evidence from masked priming experiments in Turkish. *Bilal Kırkıcı & Harald Clahsen*

11:20 - 11:30 Discussion

11:30 - 12:00 **Coffee break**

11:00 - 13:00 **General Talks 2 [GT - 2]**

12:00 - 12:20 [GT - 2.1] Using positional differences in letter transposition to gauge morphological decomposition. *Marcus Taft & Christopher Nilsen*

12:20 - 12:40 [GT - 2.2] Processing morphological information in the parafovea: What role does prediction play? *Zeynep ilkin & Patrick Sturt*

12:40 - 13:00 [GT - 2.3] When orthography and meaning are insufficient: a case of homonym suffixes. *Nina Kazanina*

13:00 - 13:10 Break

13:10 - 13:30 [GT - 2.4] Regular and irregular inflection in Arabic. *Sami Baudelaa & William Marslen-Wilson*

CONFERENCE PROGRAM – FRIDAY, JUNE 24TH

13:30 - 13:50 [GT - 2.5] Are root letters compulsory for lexical access in Semitic languages? The case of masked form priming in Arabic. *Manuel Perea, Reem Abu Mallouh, Carmen Moret-Tatay & Manuel Carreiras*

14:00 - 15:00 Lunch

15:00 - 16:00 Poster Session 2 [PS - 2]

16:00 - 18:00 General Talks 3 [GT - 3]

16:00 - 16:20 [GT - 3.1] Morphological boundaries are processing boundaries in spoken production. *Ariel Goldberg*

16:20 - 16:40 [GT - 3.2] The Hyphen as a Segmentation Cue in Triconstituent Compound Processing. *Raymond Bertram, Victor Kuperman, Harald Baayen & Jukka Hyönä*

16:40 - 17:00 [GT - 3.3] Processing of compound words by adult Korean-English bilinguals. *In Yeong Ko & Min Wang*

17:00 - 17:10 Break

17:10 - 17:30 [GT - 3.4] Morphological priming in visual word recognition in developing French readers: frequency effects. *Séverine Casalis, Pascale Colé & Stéphanie Ducrot*

17:30 - 17:50 [GT - 3.5] Morphological decomposition in early visual word recognition: A comparative masked priming study. *Hei Won Ahn, Kate Nation & Elizabeth Wonnacott*

CONFERENCE PROGRAM – SATURDAY, JUNE 25TH

10:00 - 11:45 Symposium 3: Morphological Systems and Theoretical Implications, Ram Frost & Jay Rueckl

09:00 - 09:20 [S - 3.1] Getting from Here to There: Limitations of Current Models of Morphological Processes in Word Recognition and Future Directions. *Jay Rueckl & University of Connecticut and Haskins Laboratories*

09:20 - 09:40 [S - 3.2] Morphological Constraints on Orthographic Processing: A Dual-Route Perspective. *Jonathan Grainger*

09:40 - 10:00 [S - 3.3] Cross-linguistic research on morphology: What does it tell us about how to construct (or rather NOT to construct) computational models of reading. *Ram Frost*

10:00 - 10:20 [S - 3.4] The acquisition of morphological knowledge: Should we care about it? How should we study it? *Kathy Rastle & Matt Davis*

10:20 - 10:30 Discussion

10:30 - 10:45 Discussion, led by Mark Seidenberg

10:45 - 11:15 Coffee Break

11:15 - 12:45 Podium Discussion: The Morphological Mind, Alec Marantz vs. David Plaut

12:45 - 13:45 General Discussion, led by Ram Frost, The Hebrew University of Jerusalem, Israel

13:45 - 13:50 Concluding Remarks

13:50 - 15:15 Lunch - Pintxos

CONFERENCE PROGRAM – POSTER SESSION 1

- [PS-1.1] Usage of clitics in Brazilian Portuguese. *Jessica Seid*
- [PS-1.2] The role of form and meaning in the processing of written morphology: A time course priming study in French developing readers. *Pauline Quemart, Severine Casalis & Pascale Cole*
- [PS-1.3] Morphology in ASD: Local processing bias and language. *Mila Vulchanova, Joel Talcott, Valentin Vulchanov & Margarita Stankova*
- [PS-1.4] Grammatical gender assignment in Spanish: All the nouns are not the same. *Olivia Afonso, David Morales, Carlos J. Álvarez & Alberto Domínguez*
- [PS-1.5] Morphological decomposition and second language proficiency. *Kira Gor & Scott Jackson*
- [PS-1.6] Morphology and grammatical class: Noun and verb stems in Italian complex words. *Davide Crepaldi, Lisa Saskia Arduino & Claudio Luzzatti*
- [PS-1.7] ERP-evidence from strong adjectival inflection in German supports morphological underspecification. *Andreas Opitz, Stefanie Regel, Gereon Müller & Angela D. Friederici*
- [PS-1.8] Morphological decomposition in recognition of Korean affixed words. *Say Young Kim & Min Wang*
- [PS-1.9] Lexical factors influencing processing of English inflectional morphology – Evidence from adult naming times and a connectionist model. *Marc F Joannis & Katelyn J Bryant*
- [PS-1.10] Is word processing sensitive to morphological cycles? *Alina Villalva & Paula Luegi*
- [PS-1.11] The processing of morphologically complex words in German: A simple combination. *Maria Bronk, Jens Bölte, Pinie Zwitserlood & Heidi Lüttmann*
- [PS-1.12] In case of CHAOS, can family help you out? - Morphological family size effects in bilingual word processing. *Kimberley Mulder, Ton Dijkstra & Robert Schreuder*

CONFERENCE PROGRAM – POSTER SESSION 1

[PS-1.13] German ver-prefixed verbs: Holistic representations but decomposed processing. *Judith Heide & Frank Burchert*

[PS-1.14] Producing hogwash using a dunky - Semantic priming effects in the production of transparent and opaque compounds. *Heidrun Bien & Pienie Zwitserlood*

[PS-1.15] The influence of the noun suffix in processing grammatical gender in Italian. *Sandy Caffarra, Francesca Pesciarelli & Cristina Cacciari*

[PS-1.16] Production of nominal and verbal compounds in Chinese fluent and non-fluent aphasic speakers. *Sam Po Law, Anthony Kong, Roxana Fung & Alice Lee*

[PS-1.17] Processing finite and non-finite inflected verbal forms of Italian. *Alessandro Laudanna, Maria De Martino & Francesca Postiglione*

CONFERENCE PROGRAM – POSTER SESSION 2

[PS-2.1] The effect of Base Frequency and affix productivity in Spanish. Miguel Lázaro

[PS-2.2] The effects of language experience and working memory on processing redundant morphological and lexical cues. Ryan LaBrozzi & Nuria Sagarra

[PS-2.3] Separate activation of form and meaning properties of morphemes during morphological decomposition: Evidence from French developmental dyslexia. Pauline Quémart & Séverine Casalis

[PS-2.4] Individual strategies of morphological processing. Victor Kuperman & Julie Van Dyke

[PS-2.5] Is morpho-orthographic decomposition an all-or-none process? Laurie Beth Feldman, Fermín Moscoso del Prado Martín & Patrick A. O'Connor

[PS-2.6] Working memory effects on processing L2 word order. Nuria Sagarra, Aroline Hanson Seibert, April Jacobs, Alexis Cherewka & Caroline Hauser

[PS-2.7] Divergence of negation morphology in Western Japanese dialects. Yo Sato & Hiroki Koga

[PS-2.8] Agent-initial processing preference in Basque: a visual-world eye-movement experiment. Iraia Yetano, Jon Andoni Duñabeitia & Itziar Laka

[PS-2.9] Oscillatory neuronal dynamics of morphological processing: a MEG/EEG study. Elisabeth Fonteneau, Mirjana Bozic & William Marslen-Wilson

[PS-2.10] Acquisition of perfect and passive in German as a foreign language: A corpus study. Denisa Bordag & Magdalena Sieradz

[PS-2.11] Spatiotemporal dynamics of the processing of spoken derived and inflected words. Alina Leminen, Miika Leminen, Minna Lehtonen, Päivi Nevalainen, Sari Ylinen, Lilli Kimppa, Christian Sannemann, Jyrki Mäkelä & Teija Kujala

CONFERENCE PROGRAM – POSTER SESSION 2

[PS-2.12] Influence of syllabic composition and lexical stress on decoding test: a comparison between dyslexic children and fluent readers. Anna Fratantonio, Gaetano Rappo & Annamaria Pepi

[PS-2.13] Grammatical class of base word and use of morpho-lexical representations in reading aloud derived nouns: a comparison between children with dyslexia and young skilled readers. Daniela Traficante, Marco Marelli, Cristina Burani & Claudio Luzzatti

[PS-2.14] Irrespective of meaning: the acquisition of morphological structure in German 11-12 year olds. Eva Smolka

[PS-2.15] Spatiotemporal dynamics of morphological processing as revealed by linear regression analysis. Caroline M. Whiting, Yury Shtyrov, Olaf Hauk & William D. Marslen-Wilson

[PS-2.16] The nature of early morphological segmentation: Which (sub)lexical properties predict the magnitude of masked morphological priming? Minna Lehtonen, Philip J. Monahan & Mathias J. Scharinger

ABSTRACTS

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Human language and communication: Explanatory levels and neurobiological substrates

William Marslen-Wilson^{1,2}

¹ Department of Experimental Psychology, University of Cambridge, UK.

² MRC Cognition and Brain Sciences Unit, Cambridge, UK.

I make the argument that human language and communication can only be understood in the context of their dual neurobiological substrates – a specialised left-hemisphere fronto-temporal system supporting core morpho-syntactic functions, and a more distributed bi-hemispheric ‘whole brain’ process supporting the mapping of sensory inputs onto internal representations as a basis for interpretation and action. Both substrates have their roots in the evolutionary history of our primate ancestors. At a second explanatory level, this basic neurobiological distinction provides the phylogenetic landscape within which different languages realise their specific neurocognitive systems for language and communication. Core cross-linguistic distinctions – for example, between the domains of inflectional and derivational morphology – can be reinterpreted within this dual neurobiological framework. At a third level of analysis, we come to grips with the electrophysiological patterns of neural activity underpinning these complex neurocognitive functions. These are only accessible at the necessary millisecond level of temporal resolution through combined MEG/EEG recording. Operating in MEG/EEG source space, that locates neural activity in a three-dimensional brain volume, we use searchlight-based multivariate analysis procedures to map out the specific neural processing procedures that support the primary operations of speech communication.

SYMPOSIUM 1 [S-1]

Symposium 1: Morphology and Cognitive Neuroscience, Rob Fiorentino

09:00 - 09:10 [S - 1.1] Investigating morphological constituency and combinatorics: A cognitive neuroscience perspective. *Robert Fiorentino*

09:10 - 09:35 [S - 1.2] Converging evidence for early automatic, orthographic form based decomposition of regular and irregular allomorphs. *Linnaea Stockall*

09:35 - 10:00 [S - 1.3] Neurocognitive contexts for morphological complexity: Dissociating inflection and derivation. *Mirjana Bozic, Lorraine K Tyler & William Marslen-Wilson*

10:00 - 10:25 [S - 1.4] How the brain processes compound words: Insights from ERPs and fMRI. *Dirk Koester*

10:25 - 10:30 Discussion

**Investigating morphological constituency and combinatorics:
A cognitive neuroscience perspective**

Fiorentino, R.

Department of Linguistics, University of Kansas

In this special session, we will bring together current research on morphology from a cognitive neuroscience perspective, exploring the application of imaging methodologies including fMRI, EEG, and MEG to the investigation of the nature and real-time processing of morphologically complex words. The presentations in this session engage issues in morphological processing in the domains of derivation, inflection and compounding, across comprehension and production, and across auditory and visual modalities. In my introductory presentation to this special session, I will outline some of the major themes emerging in this approach to the study of morphology in the mind/brain, and will briefly present some recent work from my laboratory, focusing on the segmentation, decomposition and composition of compound words using a cross-method, cognitive neuroscience approach. In particular, I will discuss a set of studies on the processing of visually presented novel compounds, utilizing electrophysiological methods (EEG/MEG) in tandem with priming, lexical decision, and passive reading paradigms. The results, both psycholinguistic and neurolinguistic, demonstrate the potential for tracking the segmentation, morphological activation, and post-decompositional combinatorics involved in complex word processing in real time, making possible the testing of alternative hypotheses regarding the precise nature of the morpheme-level route to lexical processing and its neural instantiation.

Converging evidence for early automatic, orthographic form based decomposition of regular and irregular allomorphs

Stockall, L. ^{1,2}

¹ School of Languages, Linguistics and Film

² Queen Mary, University of London

Two basic questions have dominated investigations on the processing of morphology for the past 30+ years: 1. are transparently morphologically complex words like 'teacher' and 'jumped' decomposed into their constituent morphemes at an early, automatic, form based stage of processing? 2. are irregular allomorphs like 'sang' and 'taught' processed using the same mechanisms as regulars, or by a distinct system? The first question has been conclusively answered by a string of experiments beginning with Longtin, Segui, and Hallé (2003) using a masked priming paradigm and comparing regular stemallomorph pairs with pseudo related pairs like 'brother-broth'. More than 20 experiments using this paradigm have now been reported (see Rastle & Davis 2008 for a partial review), and overwhelmingly the results support an early, automatic form based stage of morpho-orthographic decomposition for all strings that can plausibly be parsed into a stem and affix. This evidence from behavioral masked priming is further supported by a growing number of experiments using MEG to investigate single word reading. Zweig & Pykkänen (2009), Lewis, Solomyak & Marantz (in press), and Lewis & Marantz (under review) provide evidence for an evoked response peaking ~150ms after the onset of a visually presented word that indexes the morpho-orthographic decomposition stage that the masked priming data argues for. Crepaldi et al (2010), using behavioral masked priming, show that stem targets are rapidly primed by their irregularly inflected allomorphs, consistent with an early, automatic, form based parsing mechanism for irregulars too. I'll discuss a series of experiments investigating the processing of regular and irregular allomorphs using EEG (exp1) and MEG (exp2&3) and comparing masked priming (exp1&2) to single word reading (exp3). These experiments reveal that regular and irregular allomorphy are associated with equivalent early evoked responses in the 150-250ms time range (with interesting differences between EEG and MEG, and between priming and single word reading), thereby arguing for a single mechanism model for morphological parsing.

Neurocognitive contexts for morphological complexity: Dissociating inflection and derivation

Bozic, M.^{1,2}, Tyler, L. K.^{1,2} & Marslen-Wilson, W.^{1,2}

¹ MRC Cognition and Brain Sciences Unit, Cambridge

² Department of Experimental Psychology, University of Cambridge

Existing neuroimaging and neuropsychological evidence suggests that human speech comprehension engages two functionally distinct neurocognitive systems. One system, distributed over bilateral perisylvian regions, supports general processing demands associated with mapping whole words onto their lexical representations. The other is a specialised left hemisphere perisylvian system, which supports core decompositional and combinatorial processing of linguistically complex words. In two separate fMRI experiments and using a combination of univariate and multivariate analysis techniques, we tested how inflected and derived words (e.g. played, agreed vs bravely, darkness) engage these mechanisms. In both experiments we co-varied increases in perceptual, non-linguistic, complexity of spoken words (presence of an onset-embedded stem, e.g. claim/clay), with variations in their linguistic complexity (presence of a morphological suffix, e.g. play+ed). Perceptual processing complexity, generated by the on-line competition between the full word and its onset-embedded stem, was found to activate left and right perisylvian brain regions for both inflections and derivations. In contrast, linguistic complexity activated left-lateralised areas only. Furthermore, this left-lateralised effect was only observed for inflectional combinations (play+ed), and not for derivational combinations (brave+ly). The results suggest that only words that are inherently decompositional in nature (i.e., regular inflected forms) engage specialised grammatical computations in the left fronto-temporal system. In contrast, the processing of derived words, that are likely to be stored as whole forms, primarily engages the bilateral system which underpins whole-word, stem-based lexical access. These results imply that inflectional and derivational complexity in English present different challenges for the processing system, and underline the importance of a neural framework for understanding these mechanisms.

How the brain processes compound words: Insights from ERPs and fMRI

Koester, D. ^{1,2}

¹ Faculty of Psychology and Sport Science. Bielefeld University. Bielefeld, Germany

² Center of Excellence - "Cognitive Interaction Technology." Bielefeld, Germany

A long-standing debate in morphology revolves around the storage format of compounds; whether and, if so, how the brain represents internal word structure or whether it stores compounds as unitary elements. Other issues complicate the answer to this question such as the different modes of information reception in the visual and acoustic domain (more holistic vs. serial) or the divergent direction of information transmission in comprehension and language production. Furthermore, it is of interest whether morphological processes are qualitatively comparable for native speakers and (late) second language learners. In this talk I will present recent evidence from event-related potentials (ERPs), functional magnetic resonance imaging (fMRI) and behavioural studies to support the (de)composition view on compound processing in the domain of comprehension and production. (Under specific circumstances, it appears that compounds can be stored holistically.) In particular, ERP data suggest that compounds are decomposed morphosyntactically in auditory comprehension and, consistently, that compound constituents are semantically integrated in an incremental fashion. In contrast to comprehension, language production is more difficult to investigate with ERPs due to movement artefacts. However, when investigating the processing of internal word structure during overt language production, we could provide direct neurophysiological evidence for the time course of morphological encoding according to the Indefrey & Levelt model of speaking. fMRI data obtained with a similar paradigm point to the left inferior frontal gyrus (BA 47) as the associated functional neural correlate. Finally, I will report behavioural evidence to suggest that there are qualitative differences during compound reading between native speakers and second language learners regarding the decomposition of compounds depending on the compound word length. These findings may help to sketch the neural basis of compounding, an important mechanism in human verbal communication.

SYMPOSIUM 2 [S-2]

Symposium 2: Second Language Morphology, Harald Clahsen

10:00 - 10:20 [S - 2.1] Factors influencing morphosyntactic acquisition in L2. *Ruth de Diego-Balaguer*

10:20 - 10:40 [S - 2.2] Recognition of inflected words in early bilinguals: Behavioral and ERP evidence. *Minna Lehtonen, Annika Hultén, Toni Cunillera, Antoni Rodríguez-Fornells, Jyrki Tuomainen & Matti Laine*

10:40 - 11:00 [S - 2.3] Morphological and form priming in L1 and L2: Where do they differ? *Laurie Beth Feldman*

11:00 - 11:20 [S - 2.4] Word-formation and inflectional processes in native and non-native language comprehension: Evidence from masked priming experiments in Turkish. *Bilal Kırkıcı & Harald Clahsen*

11:20 - 11:30 Discussion

Factors influencing morphosyntactic acquisition in L2

de Diego-Balaguer, R.

ICREA, University of Barcelona

There is extensive evidence across languages with different morphological complexity that the retrieval of stems and grammatical features can be dissociated in functional and neuroanatomical terms. In second language acquisition these dissociations can also be observed. Morphosyntactic rules of a second language are particularly difficult to extract compared to L2 lexical acquisition. Aside from age of acquisition, other factors may have an effect in the extent of this difficulty. In this talk I will discuss the importance of two of these factors: the superficial similarity of the morphological transformations across languages and individual differences in the ability to orient attention to the relevant segments in speech. The first factor will be illustrated with a study with Catalan-Spanish bilinguals. Catalan and Spanish have a similar suffix (-o) for regular verbs and completely different alternations for irregular verbs. Two types of irregular verbs were studied (semi-regular verbs with a systematic diphthong alternation, *sentir-siento*, and verbs with idiosyncratic changes, *venir-vengo*). Regular verbs showed the same centro-parietal N400 priming effect in the second-language speakers (L2) as in primary-language (L1) speakers. However, differences between groups, in the ERP pattern and the topography of the N400 effect, were observed for irregular morphology. The importance of individual differences in attentional tuning will be illustrated with two event-related potentials experiments where we have been able to observe how this effect is specifically related to the generalisation of dependencies similar to morphological rules in comparison the word acquisition. We tracked the learning process recording electrophysiological changes while participants were learning an artificial language with non-adjacent embedded rules in the words (AXC: *puliku*, *pusaku*, *pubeku*) analogous to simple morphosyntactic rules (e.g. “is playing, is dancing, is talking”). The results indicated a functional dissociation between the brain responses associated to word and rule learning. While an increase in negativity (N400) in the central electrodes was related to word-learning, the development of a frontal positivity (P2) previously related to attentional modulations was correlated to rule-generalisation and accompanied by a synchronisation between frontal and parietal regions. The P2 modulation appeared only in those participants that learned the rule and even in the absence of external acoustic cues indicating its endogenous origin.

Recognition of inflected words in early bilinguals: Behavioral and ERP evidence

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Inflected words in the morphologically rich Finnish language typically elicit a processing cost, i.e., higher reaction times and error rates when compared to comparable monomorphemic words. This has been taken as evidence for morphological decomposition. At the same time, this processing cost may vanish in the very high frequency range, suggesting that the most common inflected Finnish word forms might possess (also) full-form representations. In early Finnish-Swedish bilinguals, however, inflected Finnish words elicit a processing cost indicative of decomposition throughout the frequency range (Lehtonen & Laine, 2003). In order to study the time-course and the neural underpinnings of these effects in bilingualism, we compared early, high-proficient Finnish-Swedish bilinguals to Finnish monolinguals in their ERP responses to high and low frequency inflected vs. monomorphemic Finnish words in visual lexical decision. A group of early Finnish-Swedish bilinguals (N=16) who had acquired both languages before the age of seven and had approximately balanced skills in them were compared to a group of Finnish monolinguals (only Finnish acquired before the age of seven; N=16) whose data has been separately published before (Lehtonen et al., 2007). The participants were to perform a visual lexical decision task with Finnish target words contrasted for frequency (high vs. low) and morphology (inflected vs. monomorphemic) while ERPs were recorded from the scalp. As earlier studies have found the N400 component to be sensitive to morphological structure (e.g., Lehtonen et al., 2007; Lavric et al., 2007), the analyses were focused on the N400 with four main time-windows of interest (250-350, 350-450, 450-550, and 550-650 ms). The behavioral results comparing inflected vs. monomorphemic words revealed a morphological processing cost for both participant groups, being larger for the low-frequency than for the high-frequency words. In ERPs, however, only the monolinguals displayed an interaction between frequency and morphology, i.e., in this group only the low frequency items showed a clear effect of morphology in the 450-550 ms time-window at particular electrode sites. Yet, for bilinguals this N400 effect was similar for high and low frequency inflected words. The results suggest that while decomposition is the primary way of processing inflected Finnish words, monolinguals may process some inflected words of high frequency as whole entities. Decomposition effects for bilinguals even in the high frequency range are likely to reflect lower amount of exposure to a given complex word than in monolinguals, as the language input of bilinguals is divided between two languages. The N400 has been suggested to reflect processes related to semantic memory (Kutas & Federmeier, 2000), such as lexical-semantic access (Lau et al., 2008), and the results thus support earlier findings (e.g., Lehtonen et al., 2007) indicating that the morphological processing cost stems from a later stage of decomposition where lexical representations are accessed and integrated.

Morphological and form priming in L1 and L2: Where do they differ?

Feldman, L. B.

Haskins Labs

We use patterns of priming for regularly inflected and form similar prime-target pairs to probe morphological processing in English as a first and as a second language. We contrast results from L1 speakers of Dutch, Serbian and Chinese as they perform a cross modal lexical decision task. Conditions allow a strict test of the claim that, because they lack the grammar (procedural knowledge) to analyze morphologically complex word forms, L2 users rely on lexical (declarative) knowledge to recognize and produce morphologically complex words. Further, the inclusion of three L1s with different morphological and phonological structures provides the opportunity to detect different patterns of interaction between L1 and L2. Thus, at comparable levels of L2 proficiency, we ask whether command of inflectional morphology as revealed by magnitudes of morphological facilitation in L2 differ as a function of L1. Consistent with the claim that particular dimensions of similarity between various L1 and L2 (poverty of morphological complexity in Chinese compared to Dutch or Serbian) can affect processing in L2, cross modal findings show variation in the magnitude of facilitation across L1 speakers of Chinese and Serbian when proficiency is controlled. Also novel is a finding that Dutch L1-English L2 speakers show more morphological facilitation relative to a form control when English primes are pronounced in an American than in a Dutch accent; our generally less proficient Chinese participants did not show this pattern. Similarities and differences between patterns of morphological facilitation in L1 and L2 are discussed.

Word-formation and inflectional processes in native and non-native language comprehension: Evidence from masked priming experiments in Turkish

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Whilst previous masked priming experiments with native (L1) speakers of English and other Indo-European languages revealed clear priming effects for both regular inflectional and productive derivational processes, studies comparing inflectional and derivational forms in non-native adult second language (L2) learners of English and German (Silva & Clahsen, 2008, Neubauer & Clahsen, 2009, Clahsen & Neubauer 2010) found no priming for inflectional and reduced priming effects for derivational forms. These findings suggest that L2 learners rely more on full-form storage and less on decompositional procedures than native speakers, particularly for inflectional processes. The present study investigates L1 and L2 morphological processing in a non-Indo-European language, Turkish, comparing regularly inflected Aorist verb forms with deadjectival (–ilk) derivational forms, both of which are highly frequent, productive and transparent, in Turkish. A series of masked priming experiments was carried out with groups of monolingual L1 speakers and proficient adult L2 learners of Turkish from different L1 language backgrounds. The SOA for all experiments was set at 50ms. Priming effects were determined by comparing target lexical decision times in the test condition to a control condition with unrelated primes that were neither morphologically, semantically or orthographically related to the targets. Experiment 1 tested Aorist inflection. The critical test primes were 3rd singular verb forms with the regular Aorist marker –Ar (e.g., sorar – ‘s/he asks’), and targets were the corresponding bare verbal stems (e.g., sor – ‘ask’). Experiment 2 had deadjectival nominalizations with the suffix –ilk (e.g., hastalık – ‘illness’) as test primes and corresponding bare adjectives (e.g., hasta – ‘ill’) as targets. Experiment 3 examined the role of purely formal (orthographic/phonological) priming effects. The critical prime-target pairs were morphologically and semantically unrelated, but were similar to those in experiments 1 and 2 in terms of their formal (orthographic/phonological) overlap (e.g., hapis ‘jail’ ◊ hap ‘pill’). Experiment 4 tested for potential semantic priming effects. The design, including an SOA of 50ms, was parallel to experiments 1 and 2, but this time the critical condition was made up of orthographically and morphologically unrelated but semantically highly related prime-target pairs (e.g., çabuk ‘quick’ ◊ acele ‘fast’), as determined by an offline synonymy pretest. Results. (1) For native speakers of Turkish, experiments 1, 2 and 4 yielded significantly shorter target response times in the test than the unrelated conditions, whereas experiment 3 did not show any priming effects. These results indicate that morphological priming effects can be dissociated from priming effects due to formal overlap. (2) For the L2 group, we obtained priming effects for –ilk derivations in experiment 2, but not for inflected Aorist verb forms in experiment 1. Moreover, experiments 3 and 4 did not reveal any formal or semantic priming effects in the L2 group. The discussion will focus on the L2 results. We argue that morpho-orthographic decomposition (independent of formal and semantic relatedness) can be found in L2 processing, but only for derived word forms. Inflected words, on the other hand, even fully transparent and productive ones, did not show any effects of morphological structure and appear to be processed differently in a non-native language.

SYMPOSIUM 3 [S-3]

Symposium 3: Morphological Systems and Theoretical Implications, Ram Frost & Jay Rueckl

09:00 - 09:20 [S - 3.1] Getting from Here to There: Limitations of Current Models of Morphological Processes in Word Recognition and Future Directions. *Jay Rueckl*

09:20 - 09:40 [S - 3.2] Morphological Constraints on Orthographic Processing: A Dual-Route Perspective. *Jonathan Grainger*

09:40 - 10:00 [S - 3.3] Cross-linguistic research on morphology: What does it tell us about how to construct (or rather NOT to construct) computational models of reading. *Ram Frost*

10:00 - 10:20 [S - 3.4] The acquisition of morphological knowledge: Should we care about it? How should we study it? *Kathy Rastle & Matt Davis*

10:20 - 10:30 Discussion

10:30 - 10:45 Discussion, led by Mark Seidenberg

**Getting from Here to There: Limitations of Current Models of
Morphological Processes in Word Recognition and Future
Directions**

Rueckl, J.

University of Connecticut and Haskins Laboratories

The development of explicit computational accounts of the role of morphology in word recognition has been slower than we might have hoped. I'll discuss three relevant sets of issues. First, what counts as a good theory? For example, how much intelligence are we willing to build in to our models? Second, what are the technical issues impeding progress on one class of computational models (connectionist models in particular). Third, what kinds of phenomena should the next generation of models address? I'll suggest several, including learning, cross-linguistic effects, and interaction of morphological factors with orthographic and phonological variables.

Morphological Constraints on Orthographic Processing: A Dual-Route Perspective

Grainger, J.

CNRS & Aix-Marseille University

Independent lines of research have led to dual-route accounts of various phenomena related to skilled reading. Here I will present a general architecture for single word reading that integrates dual-route accounts of phonological and morphological processing. The adoption of this general dual-route perspective begins by considering how the processing of orthographic information might be optimized during reading acquisition, with this optimization being constrained by prior knowledge of phonology and morphology. The resulting dual-route approach to orthographic processing draws a key distinction between a coarse-grained and a fine-grained processing route that involve two fundamentally different types of orthographic code. Processing along the coarse-grained route optimizes fast access to semantics by using minimal subsets of letters that are determined by the constraints imposed by letter visibility on the one hand, and by the relative diagnosticity of letter combinations on the other. Processing along the fine-grained route, on the other hand, is sensitive to the precise ordering of letters, as well as to position with respect to word beginnings and endings. This enables the chunking of frequently occurring contiguous letter combinations that form relevant units for morpho-orthographic processing (prefixes and suffixes) and for the prelexical translation of print to sound (multi-letter graphemes).

**Cross-linguistic research on morphology: What does it tell us
about how to construct (or rather NOT to construct)
computational models of reading**

Frost, R.

Department of Psychology, The Hebrew University

Computational models of visual word recognition are major tools in developing theories that have descriptive and explanatory adequacy with regard to the fundamental phenomena of reading. Hence, two main constraints should be considered for assessing their contribution: first, they should be universal, in the sense that they should reflect the common cognitive operations involved in treating printed language across different writing systems. Second, they must have a linguistic validity, in the sense that they should consider the full linguistic environment in which the cognitive operations take place. By drawing on evidence from morphological processing in Hebrew I will argue that most if not all recent reading models that focus on flexible letter-position coding, are severely impoverished and lack linguistic validity. These models focus on computing an orthographic code by mapping an input structure of letters to an output structure of word units, while disregarding the contribution of phonological, semantic, and especially morphological factors to the process. More importantly, they account for findings in reading that are not fundamental, reflect idiosyncratic properties of relatively morphologically-impoverished languages, and are therefore non-universal by definition. Languages differ with respect to the internal structure of words, which is determined by the systematic statistical co-occurrences of orthographic and phonological sublinguistic units (not necessarily contiguous), and by their specific patterns of correlation with semantic meaning. Native speakers and L2 learners detect these correlations and this shapes their processing routines. Therefore, only models that can “pick-up” and learn the statistical properties of the language can be both linguistic and universal.

The acquisition of morphological knowledge: Should we care about it? How should we study it?

Rastle, K. & Davis, M.

There is a broad consensus that readers recognize words through the analysis of morphological structure. Indeed, there is emerging evidence to suggest that the acquisition of morphemic knowledge may be a critical part of what it means to become a skilled reader. Yet, remarkably little is known about how individuals come to acquire the morphemically-structured lexical representations that allow them to undertake such an analysis. In this talk we first argue that this question represents an important new area for theory development. Besides the obvious significance of this question for building a complete theory of language processing, we believe that understanding how morphemic knowledge is acquired should permit deeper insight into the mechanisms that underlie online morphological decomposition. We then present a new laboratory method for investigating the acquisition of morphological knowledge in which adult participants are trained on novel suffixes (e.g., -nept) presented in novel word contexts (e.g. sleepnept) then tested immediately or some days after training. We show that results across several studies indicate that participants can acquire morphological representations in a laboratory context that are sufficiently robust to generalise to the online, speeded interpretation of novel untrained exemplars (e.g. sailnept), and thus argue that this method provides one way in which difficult questions about acquisition can be addressed in a highly-controlled setting. More generally, our studies motivate a dynamic and flexible account of a morphologically-structured lexicon, whereby form- and meaning-based generalizations can be readily extracted from a limited set of exemplars.

Seeing stems everywhere and being blind to affixes

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Recent evidence has shown that suffixes influence nonword processing only when they follow an existing stem (e.g., in SHOOTMENT, but not in MENTSHOOT), suggesting that their mental representation is position-locked (Crepaldi, Rastle & Davis, 2010). These results raise questions about the nature of morpheme position coding, an issue that has typically been neglected in morphological research; although it is clear that morphemes must be coded for position during word identification (otherwise we could not distinguish between words like OVERHANG and HANGOVER), even the most recent theoretical attempts (e.g., Crepaldi, Rastle, Coltheart & Nickels, 2010; Taft, 2006) have not addressed this issue. In the present experiments we asked whether prefix and stem identification is also sensitive to positional constraints (as suffix identification is). In Experiment 1 we showed that the rejection time of pseudo-prefixed nonwords (e.g., PREDRINK) is longer than that of matched control nonwords (e.g., PLEDRINK), which was not the case when the prefix followed the stem (e.g., DRINKPRE took as long as DRINKPLE to be rejected). This result suggests that prefix identification is position-specific. In Experiment 2 we showed that the rejection time of reversed compounds (e.g., MOONHONEY) is longer than that of matched control nonwords (e.g., moonbasin), indicating that HONEY and MOON were identified within MOONHONEY, and the representations of these morphemes then activated (at least partially) the word HONEYMOON. This result suggests that stems are coded in a position-independent fashion. This latter conclusion was strengthened by the results of Experiment 3, in which the masked presentation of reversed compounds (e.g., MOONHONEY) facilitated the identification of compound words (HONEYMOON). In contrast, monomorphemic control pairs did not produce a similar pattern (i.e., RICKMAVE did not prime MAVERICK), indicating that the effect for MOONHONEY pairs was not due simply to orthographic similarity.

**Processing Verbal Morphological Agreement in L1 and L2:
Language experience, working memory and linguistic effects**

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² University of Michigan

Processing a foreign language as an adult requires additional computation and activation, which in turn imposes an extra load on the already limited working memory resources (Ardila, 2003; Hasegawa, Carpenter & Just, 2002; Kormos & Safar, 2008) and forces learners to process L2 input selectively. Latin, Spanish and other morphologically rich languages can mark temporal reference lexically (adverbs) and morphologically (verbal inflections). In laboratory studies with a subset of Latin, Authors (2010, in press) found that learners attended to the cues on which they were trained (adverb, verb), that those without training focused more on adverbs, and that this adverb bias was augmented in L1s with no (Chinese) or impoverished (English) morphology. However, when linguistic complexity increased, learners were “adverbly” regardless of their L1. A question that remains open is whether these findings also apply to adult learners of a complete language. We present self-paced reading and eyetracking data with native speakers of an L1 with impoverished (English) or rich (Romanian) morphology learning a morphologically rich L2 (Spanish) and the corresponding control groups. The results revealed that: (1) beginning learners relied so heavily on adverbs that they were insensitive to adverb-verb tense incongruencies unless they had high working memory capacity, (2) intermediate learners were sensitive to tense incongruencies but still relied more on adverbs independently of whether their L1 had impoverished or rich morphology, and (3) advanced learners were sensitive to tense incongruencies but those with L1 English relied more on adverbs (like English controls) whereas those with L1 Romanian relied more on verbs (like Romanian and Spanish controls). These results suggest that earlier learned cues block the learning of later experienced ones and that learners start with the least effortful interpretation and later on recur to L1 transfer.

Association between word accents and suffixes in on-line processing of Swedish

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Central Swedish word accents are realized by a low (Accent 1) or high (Accent 2) tone on the word stem. However, the word accent depends on which suffix is attached to the stem. Thus, if the stem *mink-* is combined with the definite singular suffix *-en*, the resulting word *minken* 'the mink' has Accent 1, with a low tone on the stem. If instead the plural suffix *-ar* is attached to the same stem, the outcome is the Accent 2 word *minkar* 'minks,' which has a high stem tone. A much-discussed topic is whether word accents are associated with whole word forms in the mental lexicon or whether they are assigned through combinatory morphophonological processes. Another question is whether both word accents are associated with specific suffix classes in the mental lexicon, or whether e.g. Accent 1 is a post-lexical default accent. We used event-related potentials to compare effects of mismatch between word accents and inflectional suffixes with mismatches between stem and suffix in terms of declension class. Declensionally incorrect suffixes yielded an increase in the N400, indicating problems in lexical retrieval, as well as a P600 effect, showing reanalysis. High tone-inducing (Accent 2) suffixes combined with a mismatching low stem tone (Accent 1) produced P600 effects, but did not increase the N400. The P600 appeared both in declensionally correct and incorrect words. Suffixes co-occurring with Accent 1 did not yield any effects in words realized with the nonmatching Accent 2, suggesting that Accent 1 is a default accent, lacking association with any particular suffix. High tones on Accent 2 words also produced a P200 effect reflecting preattentive processing of the tone. The results indicate that high stem tones realizing Accent 2 activate a certain class of suffixes in online processing, whereas Accent 1 tones do not.

When men and women disagree in syntax: The effect of speaker's identity on syntactic processing

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An important property of speech is that it explicitly conveys features of the speaker's identity. Although previous studies have shown that speaker's identity affects semantic processing (Van Berkum et al. 2008), it is not clear how a speaker's identity will influence grammatical processing. Here we investigate subject-verb agreement in Slovak, when the agreement depends on the speaker's gender (as cued by his/her voice) compared to when it depends on the formal grammatical gender of the subject. In the Slovak past participle, for example, agreement in the 3rd person singular depends on the formally-marked grammatical gender of the subject (e.g., *žena išla domov* '(the) womanFEM wentFEM home'). However, in the 1st person singular, the agreement is based on the speaker's gender (e.g., *ja som išla domov* 'IFEM/MASC amFEM/MASC wentFEM home'). The personal pronoun *ja* 'I' is not formally marked for gender, it is the speaker's gender that determines the pronoun-verb agreement. In this study we compared the ERP response to verbs disagreeing with the formally-marked subject's gender (e.g., '(the) neighbours were upset because (the) mother-in-lawFEM *stoleMASC plums'), and to verbs disagreeing with subject's gender as conveyed by the speaker's voice (e.g., '(the) neighbours were upset because IFEM *stoleMASC plums'). Slovak native speakers (n=32) listened to 240 sentences spoken either by a woman or a man, and received 24 comprehension questions to draw their attention to the content. Gender disagreement between the formally-marked subject and the verb resulted in a P600 effect (larger for violations compared to controls) preceded by an anterior negativity (larger for violations). However, gender disagreement based on the speaker's voice did not elicit a P600, but rather a posterior negativity (larger for violations). We will discuss how checking or repair mechanisms might be different when agreement is mediated by the speaker's voice as compared to formally-marked syntactic features.

Asymmetric meaning assembly for semantically transparent and opaque complex verbs in German

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Given that in languages like English morphological facilitation occurs only if words are semantically transparent, current models on lexical representation are based on meaning compositionality: Morphologically complex words are represented via their base, only if they are semantically transparent, otherwise they must be represented as whole words. However, recent findings in German (similar to those in Hebrew and Arabic) have demonstrated morphological facilitation by complex words that are not semantically transparent (VERSTEHEN-stehen, 'UNDERSTAND-stand'), indicating that they, too, are represented via their base. The aim of this study was to examine (1) whether lexical representation in German is symmetrical, i.e., whether base verbs, semantically transparent and opaque derivations facilitate each other to the same degree, and (2) how the meaning of transparent and opaque words is assembled. Three cross-modal priming experiments were conducted to tap into lexical processing. Experiment 1 compared the priming (relative to form-controls) by semantically transparent (BEWERFEN, 'pelt') or opaque (ENTWERFEN, 'design') derivations to their base (werfen, 'throw'); Experiment 2 contrasted the priming by the base to its semantically transparent or opaque derivations; Experiment 3 examined the priming by semantically transparent to opaque derivations and vice versa. Most importantly, transparent and opaque derivations yielded priming in all three experiments, though priming patterns were not symmetrical. In Experiment 1, semantically transparent derivations induced stronger priming to the base than opaque derivations did. In Experiment 2, the base primed semantically transparent and opaque derivations to the same degree. In Experiment 3, semantically transparent derivations were more strongly facilitated by their opaque relative than vice versa. Altogether, these findings indicate that morphologically complex verbs in German are represented via their base regardless of meaning compositionality. However, meaning assembly is asymmetrical, with faster meaning assembly for semantically transparent than for semantically opaque words. A model of lexical representations in German is discussed.

Using positional differences in letter transposition to gauge morphological decomposition

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Lexical decision to a nonword formed through transposition of internal letters (e.g., HPAPY from HAPPY) shows greater interference relative to a non-transposed item (e.g., ORTPY) than does a nonword formed by transposition of initial letters (e.g., AHPPY). If a prefixed word (like UNHAPPY) were recognized solely through its stem, one might expect the positional difference in the transposition effect to be maintained when a prefix is added to the transposed stem (i.e., UNHPAPY > UNAHPPY). However, both show equal interference (relative to UNORTPY). While this might then suggest that prefixed words are accessed through whole-word representations, it is necessary to show that the same thing does not happen when a prefix that is inappropriate to the base stem is added instead (i.e., REHPAPY vs REAHPPY vs REORTPY, where REHAPPY has no lexical representation). Because strong interference is observed even for REAHPPY, it is concluded that the positional difference in the transposition effect arises at a perceptual level and, importantly, that decomposition is obligatory.

Processing morphological information in the parafovea: What role does prediction play?

ilkin, Z. & Sturt, P.

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We will examine to what extent syntactic prediction could influence eye movement behavior in reading. We will report two experiments where the morphology of the upcoming word was predicted from previous sentence context. We found preliminary evidence indicating that if the morphology of the upcoming noun (plural/singular) is predicted in advance then readers are more likely to skip that noun. In the first experiment we will investigate the fixation probabilities and durations on nouns (puppet/puppets) when there is an initial mismatch between the article and the subsequent noun in phrases like 'these/the green puppet creations' or 'these/the green puppets created'. If readers are more likely to access morphological information from the parafovea when this information is predicted, this should reflect it self in skipping rates and following fixation durations on the parafoveal word. The second experiment will investigate whether the readers are more likely benefit from the parafoveal information when the upcoming word had the typical form features of the expected syntactic category of that word. In a MEG study Rabagliati et al. (2010) showed that when a noun is predicted the typical form features that are associated with that category is also activated. They claim that there is sensitivity in the visual cortex for the expected typical information. We will compare processing of typical form features of the parafoveal noun, when there is a strong expectation for a noun then when there is not; in an eye tracking experiment. We will also manipulate the availability of the parafoveal preview information. If there is actually an early sensitivity to the typical features of the predicted syntactic category this should also influence the processing of the morphological information in the parafovea. We will discuss the implications of these results for models of lexical access in sentence processing and for the reading models.

When orthography and meaning are insufficient: a case of homonym suffixes

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Research Question. We examined whether an independent morphological dimension for lexical representations is redundant and reducible to a combination of orthography and meaning overlap, as proposed by the Convergence theory (e.g., Seidenberg & Gonnerman, 2000). Our study. The French suffix -eur is a homonym that can express agentivity (-eur1 as in briseur 'breaker' from briser 'to break') or property (-eur2 as in largeur 'width' from large 'wide'). In a masked priming task we investigated the effect of an -eur1 prime (e.g., amuseur1) on a target that ended in -eur1 (Same-suffix condition), -eur2 (Homonym-suffix condition) or a non-suffixal letter string 'eur' (Orthographic condition). Under a view that reduces morphology to the convergence between the orthographic and semantic codes, similar priming effects are expected in the Homonym-suffix and Orthographic conditions in which the prime and the target are semantically unrelated and share an identical amount of orthographic overlap (both factors were controlled). Method. A masked-priming task (500 ms mask, followed by 60 ms prime, followed by 500 ms target). 45 Canadian French speakers performed a lexical decision task to the target. Results. A significant facilitation (-19 ms) was found in the Same-suffix condition (i.e., the related prime amuseur1 significantly facilitated BRISEUR1 relative to souhait-BRISEUR1). No significant priming (5 ms, n.s.) was found in the Homonym-suffix condition, i.e., amuseur1 did not prime LARGEUR2. Finally, the suffixed prime amuseur1 inhibited targets like RUMEUR ending in a non-suffixal -eur (+18 ms). Discussion. Differential priming effects in the Homonym-suffix and Orthographic conditions suggest that orthographic and semantic considerations alone are insufficient to account for the interactions between lexical items, contrary to the central claim of the Convergence theory. We discuss relevance of our findings for theoretical models of homonym representation and access.

Regular and irregular inflection in Arabic

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In studies of English regular and irregular inflectional morphology, there is substantial evidence that regular inflection engages decompositional processes where suffixes are stripped off and stems are used to access the lexicon, while irregular inflection relies instead on whole-form access processes. The interpretation of these results as evidence for the critical role of regularity is undermined, however, by the several confounds intrinsic to the English contrast. Here we re-examine the role of regularity per se in the context of Arabic inflectional morphology, where the plural system allows novel and unconfounded contrasts between regular („sound“) plurals, irregular („broken“) plurals and regular „dual“ plurals“ applying to both sound plural and broken plural stems. In three priming experiments, using masked, cross-modal and intra-modal auditory-auditory tasks, regular stems (e.g., “fal~AH” farmer) were paired with (a) a plural prime “fal~AHuwn” farmers, formed using the regular plural suffix “uwn”, (b) a dual prime “fal~AHAn” two farmers with the regular dual suffix “An” , (c) a semantically related prime “ArD” land, and (d) a phonologically related prime “fulAn” individual. Similarly, a set of irregular stems (e.g. “Haris” guard) were paired with irregular “broken plural” primes (e.g., “Hur~As” guards); dual primes (e.g., “HArisAn” two guards), semantically related primes (e.g., “baw~Ab” door keeper) and phonologically related primes (e.g., “HAsuwb” computer). Mixed linear effects models show equally strong priming by dual primes, and plural primes regardless of regularity after partialling out semantic and phonological effects. This pattern of results was consistent across the three experiments suggesting that the regularity contrast per se does not invoke differential processing mechanisms. Instead both regularly inflected and irregularly inflected Arabic nouns undergo the same obligatory decomposition process into roots and word patterns to access the lexicon. This underlines the necessity for cross-linguistic investigations in determining the organising principles of lexical systems.

Are root letters compulsory for lexical access in Semitic languages? The case of masked form priming in Arabic

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Do Semitic and Indo-European languages differ at a qualitative level? Recently, it has been claimed that lexical space in Semitic languages (e.g., Hebrew, Arabic) is mainly determined by morphological constraints while lexical space in Indo-European languages is more affected by orthographic constraints (Frost et al., 2005, JEP:LMC). One of the key findings supporting this statement is the absence of masked form priming in Semitic languages. However, there is always some nonsignificant trend in the experiments. Here we present two masked priming experiments that examined whether masked form priming occur in a Semitic language (Arabic) in absence of one of the root letters. Specifically, one of the letters from the root was missing in the prime stimuli, either because it had been replaced by another letter (e.g., *Alb-TAlb; the root is T.l.b; Experiment 1) or because it had been removed (e.g., Alb-TAlb; Experiment 2). Results showed a significant masked form priming effect (around 16-19 ms), which is similar in magnitude to prior studies in Indo-European languages. Thus, the present data suggest that Semitic and Indo-European may differ more at a quantitative than at a qualitative level.

Morphological boundaries are processing boundaries in spoken production

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One issue that has received relatively little attention in the psycholinguistic literature is the question of how morphologically complex words are processed by the spoken production system. In this talk, I argue that phonological representations must be 'stitched' together from their component morphemes and the result is not identical to a monomorphemic representation. Specifically, I argue that phonological processing is more coherent for phonemes within morphemes than phonemes in separate morphemes. One source of evidence comes from the phoneme similarity effect, where speakers are particularly likely to make errors on sequences containing repeated/similar phonemes. This effect has typically been explained in terms of increased competition among phonemes co-activated via shared features. Using mixed-effects regression analyses of oral reading reaction times, I demonstrate that similarity has an inhibitory effect on RT (e.g., kick > sick) and that the similarity effect is weaker for phonemes in separate morphemes (e.g., socks), than for phonemes within the same morpheme (e.g., sex [seks]). This suggests that the spread of activation and the competition that results are stronger among phonemes within the same morpheme than in different morphemes. Another source of evidence comes from an analysis of an aphasic individual's speech errors. I show that while this individual makes insertion errors that systematically improve the sonority of coda clusters, these 'repairs' only occur in multimorphemic environments (walk+ed->[wakit]). This suggests that the phonemes of concatenated morphemes must be bound together and that if this 'glue' is weakened (e.g., via brain damage), the grammar may have an opportunity to express itself via phonological repairs. In both cases, processing is more coherent within morphemes than across--morphological boundaries are in effect processing boundaries. Processing theories that can account for this pattern of effects will be discussed.

The Hyphen as a Segmentation Cue in Triconstituent Compound Processing

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Inserting a hyphen in Dutch and Finnish compounds is most often illegal given spelling conventions. However, the current eye movement experiments on triconstituent Dutch compounds like voetbalbond (Eng: footballassociation) (Experiment 1) and triconstituent Finnish compounds like lentokenttätaksi (Eng: airporttaxi) (Experiment 2 + 3) show that inserting a hyphen at constituent boundaries does not have to be detrimental to compound processing. In fact, when hyphens were inserted at the major constituent boundary (voetbal-bond; lentokenttä-taksi), processing of the first part (voetbal; lentokenttä) turns out to be faster when it is followed by a hyphen than when it is legally concatenated. In addition, by the end of the experiments, both Dutch and Finnish compounds with hyphenation at the major boundary were read faster than their concatenated counterparts. In contrast, hyphenation at the minor constituent boundary (voet-balbond; lento-kenttätaksi) was detrimental to compound processing speed. The results imply that the hyphen is an efficient segmentation cue and that spelling illegalities can be overcome easily, as long as they make sense.

Processing of compound words by adult Korean-English bilinguals

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The purpose of the present study is to investigate how Korean-English bilinguals process compound words. The research questions are: (1) Does morphological information play an independent role in cross-language activation of the constituent morphemes irrelevant to the phonological and semantic factors? (2) How are the effects of morphological, semantic, and phonological factors different across prime durations? and (3) How is the magnitude of the priming effect different between L1 (Korean)-L2 (English) direction (Experiment 1) and L2-L1 direction (Experiment 2)? Two masked priming experiments were conducted with adult Korean-English bilinguals. In both experiments, cross-language prime-target pairs (Korean-English for Experiment 1 and English-Korean for Experiment 2), co-varying morphological ($\pm M$), semantic ($\pm S$) and phonological ($\pm P$) relatedness were presented. In Experiment 1, 5 (prime condition: -M-S+P vs. +M+S+P vs. +M-S+P vs. +M-S-P vs. +M+S-P) X 2 (prime type: related vs. unrelated) x 3 (prime duration: 36 ms vs. 48 ms vs. 100 ms) design was employed. In Experiment 2, 3 (prime condition: -M-S+P vs. +M+S+P vs. +M+S-P) X 2 (prime type) X 3 (prime duration) design was employed. In Experiment 1, at 36 ms, preliminary results revealed priming effects in both +M+S+P and +M-S+P conditions, but no priming effect in +M+S-P and +M-S-P conditions. At 48 ms and 100 ms prime durations, the priming effect was significant only in +M+S+P condition. Therefore, morphological information plays an independent role in the early stage of cross-language activation irrelevant to the semantic factor. However, morphological decomposition is constrained by semantic transparency in the later stage of cross-language activation. Across all of the prime durations, phonological information is needed for morphological decomposition. In Experiment 2, there were no significant priming effects in all conditions across all of the prime durations. Therefore, there is a clear asymmetry in masked cross-language priming between L1-L2 and L2-L1 directions.

Morphological priming in visual word recognition in developing French readers: frequency effects

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The study aims at examining whether and when morphological information is activated when French children read words. Although previous studies have indicated that children do use morphological structure, there is a need for clarity regarding when this information is activated in the word reading process. The priming paradigm, contrasting various prime durations associated with lexical decision, allows tracking activation of information. The aim of the present study is to testify whether and when morphological priming can be evidenced in child readers and in what extent it differs from orthographic priming. In the expert literature, the priming paradigm has been extensively used, especially with low frequency target words. In the child reading field, less is known about frequency effects. The second aim of the study is to compare time course of activation of both morphological and orthographic priming according to target frequency. Participants were 75 third- and 75 fifth-graders. They performed a lexical decision task with visual priming, with three prime durations: 55 ms, 80 ms, 250 ms. Targets were 45 base words. Targets were base words. Three kinds of primes were paired with each target item: morphological (collage-COLLE 'gluing-glue'), orthographic (college-COLLE 'college-glue'), control (seringue-COLLE, 'syringe-glue'). Three versions of the experiment were constructed, with items counterbalanced across conditions. Facilitation effects were observed in the morphological priming condition only, in the 80 and 250 ms prime duration conditions, and in both grade levels, without any effect of orthographic control priming. Morphological priming at 55 ms was observed only in a more advanced fifth graders subgroup. When considering separately priming for high vs low frequency targets, some significant differences raised, with a stronger quantity of priming for low frequency target words and a later morphological activation in high frequency target words.

Morphological decomposition in early visual word recognition: A comparative masked priming study

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Purpose: This study aimed to compare morphological decomposition in adults and children using masked priming. A well-established finding is the distinctly morpho-orthographic nature of morphological decomposition in the early stages of visual word recognition in adult readers. As the vast majority of findings are restricted to adults, this study aimed to investigate whether 1) there was evidence of morphological decomposition in children during early visual word recognition and 2) whether this decomposition was morpho-orthographic in nature. The focus of the study was restricted to the derivational -er suffix in order to ensure children were familiar with the suffix and its function. The derivational -er suffix was selected due to its high productivity (Bertram, Baayen, & Shreuder, 2000), frequency (Solomyak & Marantz, 2009), and finding that children as young as six are able to demonstrate epilinguistic and metalinguistic awareness of it in English (Duncan, Casalis, & Cole, 2009). **Method:** Forty 9-10 year old children and forty adults were run on a visual masked prime lexical decision task. All participants were native English monolinguals and typical readers. Test items were pre-piloted on children of a younger cohort and included in a post-test to ensure knowledge of each item. **Results:** Consistent with the adult literature, both adults and children demonstrated morphological decomposition of genuinely morphologically complex words, such as 'builder' into {build} and {-er}. Adults further showed morpho-orthographic decomposition in the parsing of pseudomorphologically complex words such as 'corner' into plausible morphemic constituents, {corn} and {-er}. In contrast, children failed to show morpho-orthographic decomposition. **Conclusion:** These findings suggest that 1) 9-10 year old typical readers have yet to acquire morpho-orthographic decomposition in early visual word recognition and 2) morphological decomposition is established prior to morpho-orthographic decomposition in the developing visual word recognition system.

Usage of clitics in Brazilian Portuguese

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This paper explores Brazilian Portuguese's use of clitics, which are grammatically independent morphemes in a language. A phenomenon that happens is how Brazilian Portuguese will omit their clitics, leaving a space within the sentence; this forces the listener to piece together what the clitic missing is, and what the omitted clitic was referring to. What usefulness does leaving a space have? Why create this space? This phenomenon is similar to languages that feature pronoun-dropping and is useful for further understanding language pragmatics.

The role of form and meaning in the processing of written morphology: A time course priming study in French developing readers

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Although children's ability to manipulate orally the morphological structure of words has been shown to play an important role in the acquisition of reading skills, little is known about whether and how developing readers process written morphemes when reading. As morphemes encode both form and meaning information, developing readers might rely on the sublexical orthographic properties of morphemes to develop mental representations for morphemes, or, alternatively, might learn to extract units that share systematically form and meaning properties. The aim of the study was to examine which properties of morphemes (form/meaning) drive developing readers' processing of written morphology. We conducted three visual priming experiments among French third, fifth and seventh graders and adults (as a control group) using three different prime durations (60 ms in Experiment 1, 250 ms in Experiment 2 and 800 ms in Experiment 3). Participants had to perform primed lexical decision tasks in which targets were preceded by morphological (singer – SING) pseudoderived (corner – CORN) orthographic control (turnip – TURN) and semantic control (tulip – FLOWER) primes. Across all groups, different patterns of priming were observed in both morphological and orthographic/semantic control conditions, suggesting that they all process morphemes as units when reading. In developing readers, the processing of written morphology is triggered by the form properties of morphemes, and their semantic properties are activated later in the time course of word recognition. In adults, patterns of priming were similar except that the semantic properties of morphemes were activated earlier in the time course of word recognition. Taken together, these findings indicate that French developing readers process both the form and meaning properties of morphemes when reading, and support a progressive quantitative change in the development of morphological processing over the course of reading development.

Morphology in ASD: Local processing bias and language

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In this paper we present results from a detailed study of two cases of linguistic talent in the context of autism spectrum disorder. We demonstrate that the individuals in our study display a specific strength at the level of morphology as well as syntax. Still, despite this grammar advantage, they find figurative language and inferencing based on context problematic. Such cases lend support to traditional structuralist models of language whereby language structure can be represented at different levels of granularity: starting from sound (phonology) through meaningful patterning between sound and semantics below the level of the word (morphemes), to word combinations (phrases). The morphology advantage that we report for Asperger's syndrome is consistent with the Weak Central Coherence (WCC) Account of autism (Happé & Frith 2006, Frith & Happé, 1994). From this account, the presence of a local processing bias is evident in the ways in which autistic individuals solve common problems, such as e.g. assessing similarities between objects, finding common patterns, and may present an advantage in some cognitive tasks compared to typical individuals. We extend the WCC account to language, and provide evidence for a connection between the local processing bias and the acquisition of morphology and grammar, also coherent with Newport's less is more hypothesis of language acquisition (Newport 1988, 1990). We argue that this account can explain the pattern of strengths and weaknesses within language skills in Asperger syndrome (Vulchanova, Talcott, Vulchanov & Stankova, under revision). We provide evidence from eye-tracking studies that demonstrate the limitations of this advantage whereby a distinction in grammatical function appears to mark the border between word level morphology (inflectional, derivational) and clause level morphology, such as e.g., clausal clitics.

Grammatical gender assignment in Spanish: All the nouns are not the same

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Grammatical gender is a phenomenon present in many of the world's languages. Because grammatical gender is typically non conceptual in nature, and cannot be derived from the meaning of the word, it is unclear how this is assigned during the comprehension and the production process. We address this issue by conducting two experiments in which participants had to perform a gender decision task over Spanish nouns. In Experiment 1, we manipulated the regularity of the endings of nouns ended in -o/-a (caso and mano are regular and irregular nouns respectively) and nouns with other endings, which are also biased to a particular gender (ciudad versus abad). The results showed that regularity affected reaction times and error rates only in the case of the nouns ending in -o/-a, suggesting that these endings were used as a cue to decide the noun's gender. In Experiment 2, nouns ending in -o/-a and nouns with other endings were preceded by two different masked primes: a definite article (el, la), which provides information about the gender of the noun, or a possessive pronoun (mi, tu), which does not contain gender information. The presentation of the article produced shorter times compared with the possessive pronoun only in the case of phonologically opaque nouns. Taking together, these results indicate that gender of nouns ended in -o/-a is assigned through a process different from the rest of nouns. It seems that gender decisions for nouns ended in -o or -a rely on this sublexical information (the ending -o is attributed to the masculine gender and -a to the feminine gender), whereas the rest of nouns may require the retrieval of the article. Previous literature and theoretical models are discussed at the light of this new evidence.

Morphological decomposition and second language proficiency

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The processing of inflectional morphology reveals important differences between L2 learners and native speakers (NSs), as well as differences between L2 learners at different stages of proficiency/development. We report morphological priming effects in an auditory lexical decision experiment, with data from three groups of L2 learners of Russian (advanced, advanced high, and superior proficiency; N=57) and a group of Russian NSs (N=11). In matched-prime conditions, the primes were verbs in the 1st person singular nonpast tense, and the targets were infinitives of the same verbs. Russian regular, irregular, and semi-regular verbs were balanced across two frequency ranges, high and low (20 items per condition). Reaction time (RT) data were analyzed using linear mixed-models, and revealed a striking asymmetry in the role of priming with irregular verbs. For NSs, priming was observed for all verb types, and was significantly larger ($p < 0.001$) for irregular verbs. In contrast, for the advanced and advanced high L2 learners, priming was observed in every condition except for low-frequency irregular verbs. Only at the superior level of proficiency did significant priming emerge for low-frequency irregular verbs in L2 learners. The results do not support a categorical difference in the processing of regular and irregular verbal morphology by NSs (cf. Orsolini & Marslen-Wilson, 1999, for Italian verbs). Conversely, less proficient L2 learners did not take advantage of the mapping of irregular primes and targets, which indicates that they had problems with decomposition of irregular inflected verbs involving complex allomorphy. These results support general claims that L2 learners should have reduced or delayed access to morphological decomposition (e.g., Ullman 2005, Clahsen et al. 2010), but they provide a richer picture of the development of morphological processing, even to the point of demonstrating fairly deep processing of less transparent irregular forms at higher levels of L2 proficiency.

Morphology and grammatical class: Noun and verb stems in Italian complex words

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An issue that has gone largely unnoticed in the research on complex word reading is how grammatical class is processed within the word identification system. It is not clear from previous research, for example, whether morphological stems that sub-serve the formation of both nouns and verbs (e.g., deal-) have a unique, grammatical class-independent representation, or rather feature two separate, grammatical-class specific representations [1]. This issue was addressed in the present study through two priming experiments carried out in Italian. In Experiment 1, participants were asked to read aloud nouns and verbs that were anticipated by morphologically-related primes belonging to the opposite grammatical class (e.g., partenza-PARTIRE, departure-TO LEAVE). In order to disambiguate genuine morphological priming from semantic facilitation, the same target words were also paired in a second condition with semantically related, but morphologically unrelated primes (e.g., viaggio-PARTIRE, trip-TO LEAVE). Morphological and semantic primes were contrasted with separate sets of control primes, so that matching was guaranteed between related and control primes for written and spoken frequency, length in letters and number of syllables. The results showed reliable cross-class morphological priming; this effect was also shown to be independent from whether nouns primed verbs or vice versa, and from SOA (100 ms vs. 300 ms). In Experiment 2, cross-class morphological priming was shown to emerge even when the related primes were compared with control words that shared their orthographic and phonological onset (e.g., abbraccio-ABBRACCIARE, (the) hug-to hug vs. abbazia-ABBRACCIARE, abbey-to hug). This is taken to confirm that the effect is truly morphological in nature, and depends on the fact that morphologically related nouns and verbs contact the same, grammatical class-independent stem representation during reading. References [1] Caramazza, A., Laudanna, A., & Romani, C. (1988). Lexical access and inflectional morphology. *Cognition*, 28, 297-332.

ERP-evidence from strong adjectival inflection in German supports morphological underspecification

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In our study we investigated the relevance of the concept of underspecified inflectional markers for the processing of language in the human brain. This concept is used in a wide range of frameworks in order to account for syncretism (Bierwisch (1968), Halle & Marantz (1993), Stump (2001)) although relatively little is known about its cognitive status (Clahsen (2006)). In underspecification-based theories a morphological marker can be incorrect for a given context for two reasons: i) its feature set either contains conflicting features, or ii) it is not specific enough (i.e., there is a more specific marker). Our hypothesis was that, if ungrammatical phrases are parsed that contain one of these different types of violations, this difference should be mirrored in divergent brain responses. We used the ERP violation paradigm to approach this hypothesis in the domain of German adjectival declension. For each correct phrase we provided two incorrect versions by manipulating agreement markers on adjectives preceding a noun. According to our hypothesis, both incorrect versions represent different kinds of violations and should therefore influence ERP-components relevant for morpho-syntactic integration differently (i.e., LAN and P600, see Friederici (2003)). Our results strongly support the underspecification-hypothesis. Although alternative explanations for single effects are available (e.g. surface-near phonological repair), they can be ruled out by the overall pattern and a second observation: LAN was strongest for more specific markers even in correct contexts. This is remarkable as it indicates increased processing demands for highly specific markers. LAN-effects may thus be sensitive not only to morpho-syntactic errors but to the degree of processing-effort as well. Our study suggests that underspecification is real, and that it even may qualify as optimal from an optimal design perspective on language (Chomsky (2005)) as it reduces complexity for both: i) the lexicon, and ii) the procedural part.

Morphological decomposition in recognition of Korean affixed words

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As an alphabetic syllabary, the syllable unit in Korean Hangeul orthography is visually salient. In many cases, the syllable also corresponds to a morphemic unit in derived words. The present study addressed the question whether the distinct syllable boundary in Korean plays a role in morphological decomposition dependent upon the different types of affixed words (i.e., prefixed words vs. suffixed words). Native Korean adults participated in one of two experiments using a masked priming lexical decision task with a short prime duration (47ms). In Experiment 1, participants were given prefixed words (e.g., 비현실, "unreal" in English), non-morphological pseudowords (e.g., 서현실 "tanreal" in English), and unrelated words (e.g., 물이해 "misunderstand" in English) as the primes and the corresponding stem as the target (e.g., 현실 "real" in English). In Experiment 2, the primes were suffixed words (e.g., 현실감 "reality" in English) and non-morphological pseudowords (e.g., 현실먹 "realdal" in English) and the target was their corresponding stem (i.e., 현실). The stems of the critical items were same in both experiments. Reaction times for the targets were significantly faster when it was preceded by either prefixed words or suffixed words in comparison to the corresponding non-morphological pseudowords. In both experiments, there was no significant difference in priming effects of the non-morphological pseudowords on the targets as compared to the unrelated primes. There was also no significant difference in the priming effects when comparing the prefixed and suffixed words. These results suggest that it is the morphological structure, but not the syllable boundary that determines morphological decomposition in Korean. Furthermore, different types of affixed words are processed in a similar fashion. On-going three more experiments further examine the effects of lexicality and interpretability of the complex words using derived pseudowords as the primes (e.g., 반현실 and 현실계, for interpretable; 최현실 and 현실채 for non-interpretable cases).

Lexical factors influencing processing of English inflectional morphology – Evidence from adult naming times and a connectionist model

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Theories of inflectional morphology differ with respect to how they predict lexical variables will influence processing of regular and irregular forms. In this study we revisit the well-known case of past tense verbs in English with an eye to better understanding the relative contributions of frequency, regularity, and consistency (i.e., similarity of transformation among inflected forms). In Experiment 1, adult English speakers (N=54) viewed a present tense verb on-screen and named its past tense as quickly as possible. We obtained data for both regular and irregular verbs, across a range of frequencies and consistencies. The results yielded several interesting patterns. Both regular and irregular verbs showed frequency effects marked by slower generation of lower frequency items. Additionally, we observed slower RTs for inconsistent regulars than consistent regulars, although irregulars showed no apparent consistency effect. The overall findings contradict the view that regular inflections are produced by a rule mechanism that is insensitive to lexical variables. However the lack of a consistency effect in irregulars might also be problematic for a single-mechanism theory in which all past tenses are processed within a single system able to code phonological similarity among forms. In Experiment 2 we examined this more closely by presenting the same items to a connectionist model of past tense (Joanisse & Seidenberg, 1999; Woollams, Joanisse & Patterson, 2009). Model responses showed a striking similarity to human RTs, both with respect to the effects of frequency and consistency. We suggest that a single mechanism encodes both regular and irregular patterns, but in a way that optimizes the types of statistical regularities that are useful for subsequently accessing and generalizing the inflectional pattern of a given form.

Is word processing sensitive to morphological cycles?

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In Portuguese, complex words may be built upon roots, themes or words. This latter option is chosen, for instance, by z-evaluative suffixes (eg. *anel*zinho ‘small ring’). From a morphological point of view it is self-evident that these words comprise two full cycles: the formation of (i) the base word and (ii) the complex word. Evidence comes from the fact that they present two stressed syllables (eg. a[nel][zi]nho) and that they exhibit the same inflectional allomorphs of the base in word final position (eg. *anel*zinho / *ane*izinhos]). Diminutives, though, may also be formed by simple evaluative suffixes, such as *-inho*, which are adjoined to roots. In this case, the morphological process is less complex, since only one cycle is needed to complete the diminutive formation. Nevertheless, Portuguese native speakers prefer z-evaluative suffixation to its simpler counterpart. The hypothesis we want to put forth is that words formed upon words, although structurally heavier, offer better recoverability cues and that this is why native speakers like it better. In order to support this hypothesis, we developed a lexical decision task experiment where the base word (eg. *gaveta* ‘drawer’) is presented followed by either a diminutive form built upon the base root (eg. *gavetinha* ‘little drawer’) or by a z-diminutive form built upon the base word (eg. *gavetazinha* ‘little drawer’). Since word length seems to play an important role on the choice of the suffix, words with different number of syllables are tested. The results will allow us to verify if structural morphological differences have different cognitive costs and, more precisely, if words that comprise different morphological cycles have different processing costs.

**The processing of morphologically complex words in German:
A simple combination**

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There is growing evidence that morphologically complex words are split into their constituents as they are processed. The question, whether this decomposition facilitates or hinders visual word recognition, remains yet to be solved. Since the constituent frequency tends to be higher than the compound frequency, one might expect facilitation. On the other hand, integrating constituents into a compound might result in additional time costs compared to the processing of a monomorphemic word of comparable lexical properties. We present data from two reaction-time studies which explored the influence of the constituents' word frequency on the recognition of compounds in comparison to the recognition of morphologically simple words. Using a visual lexicon decision task, we chose pairs of German compounds that shared either their first (Postbote, Postfach; mailman, post-office box), or their second constituent (Terminplan, Stadtplan; time schedule, city map), and matched them with morphologically simple words in length and frequency. Compounds whose non-shared constituent had a high word frequency were recognized significantly faster than compounds whose non-shared constituent had a low word frequency. The comparison of these reaction times to those of the matched morphologically simple words supports the assumption that integrating the constituents into a compound comes along with time costs that consume the compounds' head start due to higher word frequencies of their constituents.

In case of CHAOS, can family help you out? - Morphological family size effects in bilingual word processing

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Monolingual studies have shown that response latencies in visual word recognition tasks are affected by the number of morphological family members a target has, i.e. its morphological family size (MFS). For example, WORK ROOM and HOMEWORK are members of the morphological family of the word WORK. It has been found that words with larger morphological families are processed faster and than words with smaller morphological families. Since it is likely that bilinguals acquiring a second language (L2) develop morphological and semantic relationships between words from their L2, the MFS of L2 words is expected to play a role in L2 word processing. In addition, given the evidence in favor of language non-selective access, even the MFS of their first language (L1) should affect L2 word processing. The present study explores this bilingual terra incognita by using cognates. Cognates are interesting because their form and meaning overlap might strengthen MFS effects or, in contrast, cancel them in particular experimental conditions. Observing activation effects of the morphological family members of cognates in both languages would provide evidence for an integrated lexicon because cross-linguistic effects would only be observed when morphological family members of both languages interact. MFS effects in cognates were examined by testing Dutch(L1)-English(L2) bilinguals in English lexical decision and English-Dutch language decision. The results suggest that cross-linguistic MFS effects in cognates are dependent on both task requirements and the degree of form overlap in cognates (identical vs. non-identical).

German ver-prefixed verbs: Holistic representations but decomposed processing

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Prefixed verbs in German fall into two classes: either the prefix is separable from the stem or not. Verbs that carry the prefix *ver-* (e.g. *vertrauen* – to trust) represent the biggest group (n=692) of German verbs where the prefix is inseparable from the stem. Therefore, it is of interest to ask whether these verbs undergo morphological decomposition during word processing or whether they are represented and processed holistically. Ver-prefixed verbs are particularly revealing because they can be divided into different subgroups with respect to a) the verb's internal morphological structure (right-branching or flat), b) the frequency of the i) full form and ii) the root (high or low), and c) the verb's semantic transparency (transparent, semi transparent or opaque). In a series of three experiments employing visual lexical decision (VLD) and masked morphological priming, we investigated if these factors influence the processing of ver-prefixed verbs in native speakers of German. Experiment 1 showed that RTs in simple VLD are modulated by the verb's morphological structure (RT flat > RT right-branching), full form frequency (low > high) and semantic transparency (opaque > transparent). Experiment 2 showed a non-significant trend that verbs with a flat structure [*ver+root+en*] show a greater effect for root than for *root+en* primes, while verbs with a right branching structure [*ver+[root+en]*] display the opposite pattern. In Experiment 3, root priming led to bigger priming effects for low frequent than for high frequent full forms. Our findings show that opaque and low-frequent ver-prefixed verbs are represented holistically in the mental lexicon. At the same time, in all verbs, the prefix *ver-* is mandatorily stripped from the stem in visual word recognition. We thus conclude that certain ver-prefixed verbs have a holistic representation in the mental lexicon but are processed in a morphologically decomposed manner.

Producing hogwash using a dunky - Semantic priming effects in the production of transparent and opaque compounds

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In a series of experiments we kept working on the question whether constituents' lemmas are activated in compound production. Using an adapted version of the position-response association task, our participants can produce the desired compounds with no need for pictures (difficult for opaque compounds) or spelled-out target words. In alternating learn- and test-phases, participants proceed through the experiment. In a learning phase, 4 screen positions are associated with 4 compounds such that the positions can be used as triggers in the immediately following test phase. 150 ms before the trigger appears, a written distracter is presented in the centre of the screen. Distracters are semantically unrelated or semantically related to the compound (semC) / to the initial constituent (sem1). The results of our first experiments were both promising and demanding follow-up studies. The task adaptation was successful, semantic priming worked, but most likely in multiple ways: Compound production started about 40 ms later when the distracter was semantically related to the compound (semC) than when it was related to its initial constituent (sem1), suggesting less or no inhibition by constituents at the lemma level. Compared to unrelated primes, however, the net effect of semC primes was about zero, while sem1 primes reduced the production latencies by up to 50 ms (stronger for transparent than opaque compounds), suggesting an indicative function of semantically related primes in the position-response association task. In a follow-up experiment, we reduced the indicative potential of related primes to disentangle and estimate the size of the effects.

The influence of the noun suffix in processing grammatical gender in Italian

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The aim of the current study is to further investigate the role of the noun's suffix in processing grammatical gender. We used nouns in which the final vowel is consistent with the typical gender-to-ending distribution in Italian (transparent nouns ending in -aFEM and in -oMASC); nouns in which the final vowel is not informative on the gender (opaque nouns, ending in -e); and nouns whose grammatical gender does not conform to the gender that would be expected from the suffix (irregular nouns). Previous research suggests that when the orthographical-phonological information conveyed by the noun suffix is inconsistent with gender, lexical processing is slower and less accurate. However, the morphological status of the noun suffix and the time course with which the suffix is used in processing semantic gender and arbitrary grammatical gender are still unclear. To test the influence of the noun suffix in processing gender, we used a paradigm highly similar to that employed by Dell'Acqua et al. (2007). In our study we contrasted the role of the noun suffix in Italian nouns characterized either by a semantic gender (e.g., *mamma*, mother) or by an arbitrary gender (e.g., *lampada*, lamp), with transparent, opaque or irregular endings. The noun was followed by two lateralized stimuli (an adjective and a distractor) presented one to the left and one to the right of a central fixation cross. Each noun was paired with a gender agreeing or disagreeing adjective and participants were asked to judge whether they agree or not. Our results showed that: 1. the gender-to-ending consistency of the suffix affected the computation of grammatical agreement early on; 2. the effect was stronger for biological than for arbitrary gender nouns. The results are discussed with respect to the morphological status of the noun suffix.

Production of nominal and verbal compounds in Chinese fluent and non-fluent aphasic speakers

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Nouns and verbs are basic word classes that exist in perhaps all languages. Neuropsychological evidence showing double dissociation between noun and verb processing is consistent with such a distinction. Early reports of individuals with aphasia described verb deficits relative to noun in non-fluent aphasic speakers with left frontal lesions. However, recent extensive reviews of imaging studies conclude that neural representations of nouns and verbs are not spatially separated (Crepaldi et al., 2010; Vigliocco, et al., 2010). This suggests that neither aphasia types nor lesion sites necessarily predict impairment to a specific word class. This paper presents preliminary data of noun and verb production in speech samples from two Cantonese fluent aphasic speakers (FA) and two non-fluent aphasic individuals (NFA), and their controls (CON). The results show that (i) Both aphasic speakers and controls produced more different verbs than nouns – CON: 17-36 different nouns vs. 29-46 different verbs; FA: 11-25 vs. 25-45; NFA: 7-10 vs. 14-17. (ii) At least half of the different nouns contain two or more morphemes. The opposite was observed for verbs. (iii) All speaker groups produced more different compound types for nouns than verbs (Nouns – CON (9) vs. FA (6) vs. NFA (5); Verbs – CON (6) vs. FA (3) vs. NFA (2)). And (iv) nominal compounds of the same internal structures, AN and NN, and nominal and verbal compounds of the same structural types, VN and VV, were produced by all speakers. These observations indicate that differences in noun and verb production between normal and aphasic individuals and between fluent and non-fluent aphasic speakers are quantitative, not qualitative, similar to function word production between fluent and non-fluent speakers (Law & Cheng, 2002), and that such differences cannot easily be attributed to word length or compound type.

Processing finite and non-finite inflected verbal forms of Italian

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Italian verbal forms result from the combination of a root with one or more suffixes which encode a number of morpho-syntactic properties (Finiteness, Tense, Person, Number). Each verb belongs to an Inflectional Class (IC), and its forms are generated according to a specific paradigm. Previous research revealed that lexical access is sensitive both to the different degree of regularity and productivity of the ICs and to lexical-grammatical information about finiteness. The present study investigates the role of finiteness during lexical access and whether and how it interacts with the IC information. Four lexical decision experiments based on the priming paradigm with four different SOAs were carried out. Twenty-four inflected verbs from the three Italian ICs were selected as target stimuli: 12 finite (e.g., indicative forms) and 12 non finite (e.g., infinitive forms). Prime-target pairs composed by two Finite (F) and Non Finite (NF) forms from the three IC were compared with pairs composed by F-NF and NF-F pairs. A number of control conditions were included. F and NF stimuli were matched for the main lexical variables as well as stimuli from the different ICs. Results showed: 1. a priming effect between morphologically related forms; 2. significant differences between F and NF forms: regardless of the experimental condition, F forms were subject to stronger priming effects; 3. a priming effect of Finiteness, which was restricted to a temporal window of a few hundred milliseconds; 4. a significant interaction between Finiteness and IC. The results are compatible with the hypothesis that the many forms of a verb paradigm are organized into different sub-classes on the basis of the Finite/Non-Finite distinction. Furthermore, the regularity and productivity of ICs modulate the finiteness effect and give rise to different representations: decomposed representations for regular and productive paradigms and whole-form representations for irregular and unproductive paradigms.

The effect of Base Frequency and affix productivity in Spanish

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The effect of Base Frequency (BF) is very important to morphological processing because it suggests that morphologically related words share morphemic representations. This (facilitatory) effect has been observed in the case of inflectional and derivational morphology. However, concerning derivational morphology, some authors propose that the effect of BF only appears when productive affixes are concatenated to stems, so the effect of BF would depend on the productivity of affixes. This would mean that only productive affixes are represented in the lexicon. There is evidence consistent with this claim in Dutch and English, but not in Spanish for instance. There are reasons to suggest that differences between languages play an important role on this issue. It is well known that Spanish or Italian languages are phonetically transparent, but Dutch and English are opaque in this sense. Does this difference play any role in the study of BF and affix productivity? The answer could be “yes” if we consider that readers of shallow orthographies rely more on sublexical cues than readers of deep orthographies, and there is some evidence showing it. All in all, it seems to be the case that only productive affixes are stored independently of whole words in languages like Dutch or English, but phonetic differences between these languages and Spanish lead us to hypothesise that the BF effect in Spanish is independent of affix productivity. Our prediction is that affixes in Spanish are represented in the lexicon no matter whether they are low or high productive ones. In order to study this hypothesis we carry out an experiment in which participants are presented to high and low BF words and high and low productive affixes while key variables like family size are controlled.

The effects of language experience and working memory on processing redundant morphological and lexical cues

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Much research has been conducted to explain the obstacles associated with adult second language acquisition (SLA). The Associative-Cognitive theory (Ellis, 2007) suggests that early learned cues from the L1 affect the learning of later learned cues in the L1 and L2. Immersion has been posited to help, but research has not shown it to have positive effects on grammar development (Lafford, 2006), whereas working memory does positively affect SLA (Harrington & Sawyer, 1992; Sagarra, 2007). This research examines the effects of the previous L2 learning experience and working memory on learning new L2 morphological cues by comparing classroom learners with and without an immersion experience. The 96 participants completed an eye-movement test and a working memory test. The participants read sentences in Spanish at their own pace and answered a comprehension question after each sentence. All experimental sentences contained past tense adverbs but the verbal morphology varied between present and past tense, with the location of the adverb or verb also varying. Results for total reading time (RT) at the adverb revealed that learners without immersion relied more on the adverb than the other groups. Contrariwise, total RT at the verb indicated that Spanish monolinguals and learners with immersion relied more on the verb morphology. Thus, an immersion experience can help English-Spanish learners of otherwise equal proficiency to alter their L2 cue preferences and to process the morphological cue, just as monolingual Spanish speakers do. Results from the working memory data suggest that working memory capacity affects L2 temporal processing, and that the study abroad learners are better at noticing the incongruent tense condition, and may also benefit more from the study abroad experience. These findings suggest that the more important factors for altering L2 cue preferences appear to be the L2 learning context and working memory capacity.

Separate activation of form and meaning properties of morphemes during morphological decomposition: Evidence from French developmental dyslexia

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In the current adult literature of morphological processing, the hypothesis of a separate contribution of form and meaning properties of morphemes in the process of morphological decomposition is being put forward. One way to illustrate this dissociation is to examine morphological priming in dyslexics, who are proficient in semantic processing but have difficulties to manipulate phonology and orthography. In this respect, we conducted two morphological priming experiments (prime duration = 60ms) among 12-year-old developmental dyslexics, as long as reading-age and chronological-age matched children. In the first experiment, we dissociated form and meaning through prime-target pairs that shared four relationships: morphological (singer – SING), pseudoderivation (corner – CORN), orthographic control (turnip – TURN), semantic control (banana – MONKEY). While reading-age and chronological-age matched children benefited both from morphological and pseudoderivation priming, dyslexics benefited only from morphological priming, suggesting that they are only sensitive to the semantic properties of morphemes. To confirm this result, we conducted a second experiment in which we manipulated the phonological and orthographic overlap between morphologically related words, while keeping the semantic overlap constant (except in the orthographic control condition). Prime-target pairs shared four relationships: morphological without modification (singer – SING), morphological with a phonological modification (electrician – ELECTRIC), morphological with a phonological and orthographic modification (curiosity – CURIOUS), non-morphological orthographic control (turnip – TURN). In dyslexics, priming effects were significant in the three morphological conditions, whereas reading-age and chronological-age matched participants benefited from the prime only in the morphological condition without modification. Again, dyslexics' reliance on morphology appears to be sensitive to the semantic rather than the orthographic properties of morphemes. Taken together, these results indicate that developmental dyslexics are able to rely on morphemes (via their semantic properties) during word recognition and confirm that the form and meaning properties make a separate contribution to morphological decomposition.

Individual strategies of morphological processing

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Most recent computational models postulate multiple parallel routes of morphological processing. Lexical properties that affect the balance between these routes are well studied. Yet word recognition is codetermined by linguistic characteristics of words as learned by particular individuals. We explore how verbal skills shift the balance between processing routes, as diagnosed by interactions of scores in skill tests and distributional properties of suffixed words (trucker) and their bases (truck). Seventy-one non-college-bound adolescent speakers of US English took 17 skill tests gauging major components of reading ability. They read 240 sentences silently for comprehension, while their eye-movements were recorded. We fitted linear mixed-models to eye-movement measures registered for 69 transparent derived words in those sentences: critical predictors were the test scores and frequencies of derived words and morphemes. Scores in segmentation tests (measuring the skill of segmenting words and nonwords into phonemes) interacted with whole-word frequency such that the frequency effect was stronger for poor scorers than better ones. Crucially, the interaction of skill by base word frequency was such that a higher-frequency base came with shorter reading times for poor scorers, a weak negative correlation for mid-range scorers, and a noticeable inflation of reading times for high-scorers. Thus, good readers suffered from lexical competition from morphologically related words, while poor readers received a recognition boost from base words. The additive processing advantage from higher-frequency derived and base words in poor readers cannot be accommodated by current computational models of morphological processing. Evidence supports both morphemic and whole-word routes, yet their engagement varies qualitatively as a function of individual verbal skill. Readers strategically adjust weights of different sources of morphological information, depending on the quality of lexical representation of both derived words and morphemes (measured here via lexical frequency), and the ability of individuals to segment morphemes out of complex words.

Is morpho-orthographic decomposition an all-or-none process?

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Morphemes are units of meaning and units of form yet in recent years it has been suggested that, at an early stage of processing, words composed of multiple morphemes are recognized in terms of constituent morphemes that are unspecified with respect to semantic properties. The argument for semantically blind morpheme-based decomposition rests on two claims (Davis & Rastle, 2010). First is the failure to detect effects of semantic transparency on morphological facilitation in many forward masked priming studies so that semantically transparent pairs like HUNTER-HUNT and semantically opaque or pseudo-derived pairs like CORNER-CORN show equal magnitudes of facilitation. Second is the failure to observe effects of primes whose morphological structure is partially decomposable (stem + illegal affix) under conditions where fully decomposable (stem + legal affix) primes typically facilitate. For example, pairs with partially decomposable primes like BROTHEL-BROTH fail to differ from unrelated controls whereas those with exhaustively decomposable primes like CORNER-CORN tend to facilitate. In the present study we focus on the decomposability claim. We pair the same targets with exhaustively decomposable (BROTHER-BROTH) and partially decomposable morphological structured primes (BROTHEL-BROTH) where neither prime-target type is composed of semantically similar words. Then we compare target decision latencies (accuracy) in the forward masked priming paradigm. Results fail to corroborate reliable facilitation based on decomposition and reveal, instead, inhibition that is stronger for partially than exhaustively decomposable primes. Evidently effects of decomposability can be graded and can lead to inhibition. Similarities and differences between semantically unrelated words that appear to share stems (e.g., BROTH) but to differ with respect to the potential for exhaustive decomposition (e.g., BROTHER, BROTHEL) will be discussed in terms of the purportedly all-or-none process of parallel morpho-orthographic segmentation of stem from affix.

Working memory effects on processing L2 word order

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Studies with native speakers of a fixed word order L1 (English) learning a flexible word order L2 (Italian, Spanish) show that the learners process the first noun/pronoun they encounter as the subject (VanPatten, 2004). Recent research comparing learners that have an L1 with flexible word order to those that have an L1 with rigid word order acquiring an L2 with flexible word order lack offline data (Isabelli, 2008) or cannot draw conclusions regarding the reanalysis of OS sentences because the technique (self-paced paradigm) does not allow regressions (Hopp, 2006; Havik et al., 2009). Our study takes one step forward by examining how native speakers of a rigid (English) and a flexible (Romanian) word order language process SVO and OVS sentences in Spanish at different L2 proficiency levels, using processing capacity measures, an online task that allows for reanalysis (eyetracking), and an offline task (grammaticality judgments). For the eyetracking task, 96 learners of Spanish (half L1 English, half L1 Romanian) and 72 monolingual controls read SVO and OVS sentences in Spanish (or their L1 for control groups) and chose one of four pictures: [+/-grammatically congruent, +/-semantically congruent]. For the grammaticality judgment task, they read similar sentences and identified whether they were correct or not, and if not, they corrected the sentences. The results from both tasks indicated a preference for SVO interpretation, and working memory data confirmed that such preference was due to cognitive demands. These findings are in line with Havik et al.'s (2009) results that high, but not low, working memory span learners processed long object relative clauses like native speakers. Our data suggest that it is working memory, rather than universal processing strategies, that determines the preference for an SVO interpretation at early stages of acquisition, and that language experience influences when L1 transfer takes place.

Divergence of negation morphology in Western Japanese dialects

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We argue that the sub-regional variations of negation morphology in the Western Japanese dialect are a result of an interaction of two mutually independent forces, one phonological and the other semantic, avoidance of ambiguity in particular. We focus on two forms of negation observed in this dialect, /n/ and /hen/, and show two examples the different distributions of which can be explained by such a mechanism. One example is the preference in the Shiga region for the /n/ form despite the shift to the /hen/ form in other regions. We relate this phenomenon to an assimilatory phonological process that alters /r/ preceding /n/ into the latter sound (e.g. /nage-ru/+/no/ -> /nage-n-no/ 'throw'+Question), observed widely in Japanese but *not* in Shiga. If this process was allowed, a serious ambiguity would ensue for the /n/ form for many verbs: /nage-n-no/ could then be either affirmative or negative. As predicted by our hypothesis, this assimilation is indeed suppressed in Shiga, while the preference for the /hen/ form can be interpreted to have arisen to avoid this ambiguity. The other example is a phenomenon observed in Osaka, where a relatively new but increasingly dominant 'potential' ('can') morphology, formed by adding the vowel /e/ to the stem, does *not* gain popularity in its negative form. This can be related to the separate phonological process unique to Osaka that the negative /hen/ suffix causes a vowel harmony in the stem, e.g. /ina-hen/ ('not leave') -> /ine-hen/ ('not/cannot leave'), causing ambiguity between the plain and potential readings. The dispreference can again be accounted for by the interaction between the disambiguatory pressure and a phonological process. More generally, we advocate a dialectal comparative approach to investigate morpho-phonological processes, since sub-regional morphological differences can be seen as a transitional stage where universal principles of morphological change are observable.

Agent-initial processing preference in Basque: a visual-world eye-movement experiment

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Morphological case marking information has been proved to be very useful for the form-to-meaning mapping process, especially in verb final structures. However, arguments are not always unambiguously case-marked. In a visual-world eye-movement experiment we studied the processing preferences shown by speakers for ambiguously case-marked arguments in Basque. We monitored the eye movements of forty native speakers of Basque to objects in visual scenes during auditory sentence comprehension. Experimental spoken sentences contained an initial animate NP argument which was morphologically ambiguous between ergative case (a singular agentive subject) and absolutive case (plural object/intransitive subject). Target referential NPs were depicted both by single-entity objects as well as by several-entity objects. Argument disambiguation occurred at the verb, at sentence final position. Results revealed that at the ambiguously case-marked NP participants tended to fixate on the object depicting more than one entity more often than to the single entity, probably due to the visual salience of the plural object. Eye-tracking at the disambiguating verb window showed refixations to the objects referencing the initial NP, but interestingly, the proportion of these refixations was higher when the verb disambiguated the local ambiguity towards the plural object/intransitive subject (absolutive case) than when disambiguating towards a singular agentive subject (ergative case). Since refixations are usually associated with linguistic reanalysis processes, these results indicate that Basque speakers preferably interpret the ambiguously case-marked NP as singular agentive subject (ergative). Overall, the findings suggest that, in ergative languages like Basque, speakers interpret an initial ambiguous animate NP as the higher ranking argument of the event, and therefore, that there is an agent-initial processing preference.

Oscillatory neuronal dynamics of morphological processing: a MEG/EEG study

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The role of gamma-band oscillations (30-80 Hz) in cognitive processing is a matter of intense debate but there is growing evidence from MEG/EEG that synchronisation in oscillatory dynamics reflects the transient coupling and uncoupling of functional networks related to different aspects of language comprehension (Hagoort et al. 2004). Within the neural language system, linguistic complexity engages primarily left lateralised processes, whereas general processing complexity - as indexed by lexical competition - engages a more bilateral network (Bozic et al. 2010). To track the functional role of oscillatory synchrony in these systems we combined magneto-encephalography (MEG) and event-related brain potentials (ERPs) in an auditory study. Participants listened to lists of words that varied on these two core processing dimensions and occasionally performed a 1-back memory task. Linguistic processing complexity was manipulated by the presence or absence of a potential inflectional morpheme (played, trade). General processing complexity was engaged by the presence of onset-embedded lexical competitors (claim, hump). Source estimates were computed with MNE (L2, minimum norm estimates; Hämäläinen et al. 1993) and phase-locking values (PLV; Lachaux et al. 1999) were analysed to determine trial-by-trial covariance between the left posterior superior temporal gyrus (LpSTG) and temporal and frontal regions. Results time locked to the onset of an inflectional morpheme revealed that phase synchrony increased in the gamma-band between LpSTG and left pars opercularis (B44). In contrast, processing an onset-embedded competitor induced synchrony in a network linking the LpSTG and left anterior inferior temporal gyrus. These findings suggest that enhanced cross-cortical interactions between left temporo-frontal cortical areas are necessary for morpho-syntactic functions while connectivity within temporal brain regions may be sufficient to support aspects of general processing complexity.

Acquisition of perfect and passive in German as a foreign language: A corpus study

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German perfect and passive exhibit structural analogies which together with their usual acquisition sequence (perfect proceeds passive) prepare challenging grounds for investigating their acquisition. Both analytical forms consist of an auxiliary and a past participle. The participle typically contains the prefix *ge-* and, depending on whether the verb is regular or irregular, a suffix *-t* (*gespielt*-played) or *-en* (*gesungen*-sung). The position of the prefix *ge-* depends on the presence of other prefixes and their status (separable/unseparable). The auxiliary of the perfect tense is either *haben* or *sein*, depending on the syntactic-semantic properties of the verb. The auxiliaries of passive are *werden*/*sein*. Their choice is determined both by the meaning the speaker wishes to express (process vs. state) and by the verb properties (not all verbs can build both types of passive). In German clauses, the word order of analytic verb forms is inverted and the finite form of the auxiliary follows the participle. Contrary to previous studies on related topics, (e.g. Blackshire-Belay, Clahsen Attaviryanupap), we explored the two structures in their morphosyntactic complexity rather than focusing only on one aspect of their acquisition. The basis of our research was the FALKO corpus of L2German. A thorough quantitative and qualitative analysis of all target structures resulted in number of novel insights concerning e.g. (1) the interaction of the involved morphosyntactic features during the acquisition process, (2) the role of type and token frequency especially in the acquisition of regular and irregular verbs, (3) the factors affecting the determination of default forms, (4) the influence of earlier acquired structures on later acquired related structure, (5) discrepancies between mental and linguistic grammars especially with respect to defining borders between “different” linguistic phenomena, and (6) the modelling of lexical representations and processing of the investigated structures, especially reflecting the dynamic character of the interlanguage.

Spatiotemporal dynamics of the processing of spoken derived and inflected words

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The present study examined the time-course and the neural sources of recognition of spoken morphologically complex words. Ten participants listened to derived, inflected, and monomorphemic Finnish words and judged their acceptability while their electroencephalography (EEG) and magnetoencephalography (MEG) responses were simultaneously recorded. We also aimed to relate latencies to the point in time when the sensory information crucial to morphological processing or word recognition is available and to separate the base morpheme and suffix-related processes. To this end, the EEG and MEG responses were time-locked to the onset of the critical information (suffix onset for the complex words and uniqueness point for the monomorphemic words). The event-related potential (ERP) results showed that inflected words elicited a larger left-lateralized negativity than derived and monomorphemic words approximately 200 ms after the critical point, but no differences were observed between derived and monomorphemic words. Equivalent current dipole (ECD) modeling of the MEG responses showed that this negativity was explained by two bilateral sources in the temporal cortex, with inflected words showing larger source amplitudes than derived words. There were also significant differences in the dipole locations between inflected and derived words. Moreover, source modeling showed one bilateral source in the superior temporal area ~100 ms after the critical point, with derived words eliciting stronger source amplitudes than inflected and monomorphemic words in the right hemisphere. The current results provide electrophysiological evidence for distinct cortical processing of spoken inflected and derived words. In general, the results support models of morphological processing that state that during the recognition of inflected words, the constituent morphemes are accessed separately. The left-lateralization of the ERP responses suggests that the stem and suffix combination undergoes (morpho)syntactic licensing. With regard to derived words, stem and suffix morphemes might be at least initially activated along with the whole word representation.

Influence of syllabic composition and lexical stress on decoding test: a comparison between dyslexic children and fluent readers

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Italian words can be stressed on penultimate syllables (last but one, es.: volare) or on the antepenultimate (last but two, es: tenero). In both cases, stress assignment is not predictable by rules, but needs lexical look-up. Italian words with stress on the penultimate syllable are defined regular because the proportion of this words is much larger than words with stress on the antepenultimate syllable, defined irregular. In this study, over the stress regularity, words syllabic composition is of particular importance (assume particolare importanza). We set to investigate the influence (in terms of correct stress positioning) of different syllabic and stress structures during decoding of developmental dyslexics and good readers. The participants were 48 children (24 males and 24 females) attending third grade junior school (average was 8,1 years). They were selected from a sample of 200 pupils on the basis of their cognitive level and reading abilities. In particular, according to the decoding difficulties level, the subjects were distributed into two groups: 24 with dyslexia and 24 without reading decoding difficulties. The subjects decode target words, selected on the basis of frequency (high and low frequency) and different syllabic and stress structures: irregular stress (on the third last syllable) and structure of second-last syllable open (ending with vowel); regular stress (on the second-last syllable) and structure of second-last syllable open; regular stress and structure of second-last syllable close (ending with consonant). Both groups performance was worse in case of open second-last syllable regardless of regularity. Instead, close second-last syllable made it unlikely accentuation mistake. In particular, dyslexic children are influenced by stress and syllabic structure also in case of high frequency use lists of words, contrariwise fluent readers that always worse performance in case of low frequency words.

Grammatical class of base word and use of morpho-lexical representations in reading aloud derived nouns: a comparison between children with dyslexia and young skilled readers

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Several data from both skilled readers and children with dyslexia revealed that the pronunciation of a derived low-frequency word can be improved by the recognition of its high-frequency base, thus indicating the use of morpho-lexical information in reading aloud. This study aims at investigating whether the grammatical class of base words contributes to the morpho-lexical effect on reading derived nouns. Many studies found that nouns and verbs are differently processed, thus the reading performance with derived nouns could be more affected by the activation of same-class bases (noun) than by the activation of verb bases. This difference may emerge in children with dyslexia due to their difficulty in processing verbal forms with respect to nominal forms: a difference that does not occur in young skilled readers (Egan and Pring, 2004). Method. Twenty 4th and 5th grade children with dyslexia and 40 skilled readers, matched by age, gender and cognitive development, participated in the study. Fifty nouns derived from noun bases (e.g. artista, artist) and 50 nouns derived from verb bases (e.g. punizione, punishment) were employed as experimental stimuli. They were presented randomly in a reading aloud task, along with 100 simple words ending with suffix-like orthographic sequence (e.g. intervista, interview; soluzione, solution) matched to the derived words for their psycholinguistic properties. Results. Generalized linear mixed models carried out on RT showed for skilled readers significant facilitatory first-level effects of whole-word and base frequency, irrespective of the grammatical class of the base word. As for children with dyslexia, the base frequency had a facilitatory effect only in case of noun bases, while the effect is null for verb bases. Conclusions. Data confirmed the use of morpho-lexical representations in reading aloud, but also the difficulty of children with dyslexia in the recognition of verb bases in written stimuli.

Irrespective of meaning: the acquisition of morphological structure in German 11-12 year olds

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Studies on morphological effects in Indo-European languages like English assume that lexical representations are determined by meaning compositionality. Morphologically complex words that are semantically transparent (e.g. disobey) are represented via their base {obey}, whereas words that are semantically opaque (e.g. release) must be represented as whole words {release}. In contrast, previous findings in German have shown that morphologically related verbs activate their base, even if they are not semantically related with it (e.g., VERSTEHEN-stehen, 'UNDERSTAND-stand'), indicating that morphologically complex verbs in German are represented via their base regardless of meaning compositionality. The aim of this study was to examine how such lexical representations develop. Two overt visual priming experiments (500 ms SOA) examined the acquisition of lexical representations of complex verbs in German by testing ninety 11-12 year-old children and sixty adults. Relative to matched unrelated conditions, the priming of prefixed verbs to base verbs was compared between (a) purely semantically related verbs (VORANGEHEN-führen, 'ANTECEDE-guide'), (b) morphologically and semantically related verbs (ANFÜHREN-führen, 'HEAD-guide'), (c) purely morphologically related verbs (VERFÜHREN-führen, 'SEDUCE-guide'), and (d) form-related verbs (BEFÜHLEN-führen, 'PALPATE-guide'). Similar to adults, children showed neither semantic nor form effects, but strong morphological effects: Morphological relatedness facilitated responses even without meaning relatedness. However, unlike with adults, this morphological facilitation was smaller than that by shared morphological and meaning relatedness. While the former finding indicates that complex verbs in German are lexically represented via their base {führ} regardless of meaning compositionality, the latter finding indicates that the children's system requires further exposure to morphological regularities so as to generalize morphological structure above and beyond meaning compositionality, as is the case in the adult system. These data provide evidence that morphological regularities are acquired in morphologically rich systems like German.

Spatiotemporal dynamics of morphological processing as revealed by linear regression analysis

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Extensive behavioural evidence points to a process of automatic segmentation for any visual form that is potentially morphologically complex (Rastle, Davis & New, 2004; Longtin & Meunier, 2005). It is argued that the presence of morphological structure drives this process since both a stem and an affix are necessary to trigger segmentation, regardless of word meaning. Our goal was to delineate the role of morphological structure in modulating the processing of morphologically simple and complex words in English using magnetoencephalography (MEG). Test words contrasted the presence of a potential stem and affix and the semantic relationship between the embedded stem and whole form (farm-er, corn-er, scan-dal). A single-trial approach using multiple linear regression analysis was employed (Hauk et al., 2006), which can take advantage of spatiotemporal information from individual words. Six orthogonal variables associated with morphological processing and visual word recognition were submitted to linear regression analysis at each sensor at every millisecond: word length/N size, bigram/trigram frequency, word frequency, stem frequency, affix frequency and semantic relatedness. A hierarchical processing stream emerged moving from bilateral occipitotemporal cortex to left anterior temporal cortex: early sensitivity to length/N size and orthographic structure at 100 ms was followed by effects of stem and affix frequency between 220 and 300 ms, with word frequency and semantic transparency effects appearing after 400 ms. The results support claims for early morphological processing based on the presence of orthographic cues to morphological structure, and suggest that the application of multiple linear regression to MEG along with standard factorial analyses can aid in further elucidating the linguistic variables that modulate neural activity across space and time.

The nature of early morphological segmentation: Which (sub)lexical properties predict the magnitude of masked morphological priming?

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Whether words are stored as morphological constituents or as holistic whole-word representations has important implications for models of language processing. Under masked conditions with very short prime durations, both transparent and morphologically opaque primes facilitate the processing of monomorphemic targets (Rastle, et al. 2000). These results suggest the underlying decompositional mechanism operates on a purely formal basis (Rastle & Davis, 2008). In many reports, however, transparent primes produce greater facilitation than opaque primes, a difference that can be enhanced under certain experimental conditions (Feldman, et al. 2009). In the current experiment, we tested 33 native speakers of English in a masked-priming, lexical decision task. Included were prime-target pairs that were transparent (acidic-ACID), morphologically opaque (beaker-BEAK) or contained only orthographic overlap (spinach-SPIN). Our materials had broad statistical distributions for several lexical parameters (e.g., Baayen et al., 2007) allowing for a correlational analysis of the reaction time data against these lexical statistics. First, as predicted, transparent and opaque primes significantly facilitated the processing of the target word (transparent: +27 ms; opaque: +12 ms), while there was no difference between the orthographic pairs and controls (-6 ms). Second, for the transparent condition, we found a significant negative correlation between prime stem frequency and magnitude of priming, and in the opaque condition, a positive correlation between the prime orthographic neighborhood size and magnitude of priming. When collapsing across conditions, we found a reliable correlation between magnitude of priming and the prime log lemma frequency, as well as a correlation between priming and semantic relatedness of prime and target. Unexpectedly, we did not obtain reliable correlations between the root-suffix transitional probability and the size of the priming effect. These results are discussed within the context of current models of lexical access.

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