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# Abstracts

*Annika Wilke (Heinrich-Heine-Universität Düsseldorf)*

**Against Bracketing Erasure in English triconstituent compounds: an investigation of acoustic constituent durations**

Lexical phonology assumes that the internal morphological structure of a complex word cannot be accessed any more as soon as the word leaves the lexicon (Bracketing Erasure, cf. Kiparsky 1982: 140). This means that the articulation of the complex word, which is assumed to take place post-lexically, should be independent of its internal structure.

In contrast to this, Kunter & Plag (2016) argue that the structure of morphologically complex words affects their phonetic implementation. They propose the Embedded Reduction Hypothesis (ERH), which claims that in a complex word with more than two constituents, the embedded constituents are acoustically shorter than constituents at higher derivational levels. In support of the ERH, their analysis of English triconstituent compounds reveals a lengthening effect on the free constituent, whereas the adjacent embedded constituent is relatively short. This finding is in conflict with the assumption of Bracketing Erasure.

In this talk, I will compare the results from Kunter & Plag (2016) to the results from another analysis of 500 triconstituent compounds from a corpus of spoken English (first discussed in Kösling 2009). In both data sets, the internal structure of the compounds was found to affect the acoustic durations of the constituents, which cannot be explained by Lexical phonology. The overall durational patterns that emerge from the analysis are partially compatible with the ERH, but there are also several findings which cannot be explained by it. In addition, the constituent durations from Kunter & Plag (2016) data and Kösling (2009) show some unexpected and inexplicable differences. Apparently, the ERH is more capable of explaining constituent durations in English compounds than Lexical phonology, but it still needs more testing in future research.

*Ariel M. Cohen-Goldberg (Tufts University)*

**A theory of lexical frequency effects in morpho-phonological processing**

From a descriptive perspective, frequency is one of the most central factors that influences how words are processed. Higher frequency words tend to be produced more quickly and accurately than lower frequency words and have a better chance of remaining intact following brain damage. On the morphological side, lexical frequency facilitates the development and use of whole-word representations while on the phonological side it leads to shorter and otherwise more reduced articulations (e.g., Gahl, 2008). Given the interrelated nature of morphological and phonological processing it is not surprising that frequency also has important morpho-phonological effects, for example causing higher frequency morphologically complex words to take on the phonotactics of monomorphemic words (e.g., Dutch *aardappel* /aːrtɑpəl/ -> /aːrdɑpəl/ Booij, 1995; English *cupboard* /kʌpbɔɹd/ -> /kʌbə̆d/).

The centrality of lexical frequency requires us to develop robust theoretical accounts of how it influences the cognitive mechanisms underlying language processing. The fact that it influences both morphological and phonological processes which interact during production further requires us to develop accounts that work across these domains. Unfortunately, frequency has received very different treatments across these domains (and in some cases, no treatment at all), leaving an incomplete theoretical account of morpho-phonological processing.

In this talk I review the various positions that have been adopted in the morphological and phonological literatures. In morphology and exemplar-based approaches to phonology lexical frequency has been proposed to have a structure-building function (though the mechanism differs across these domains in important ways), has received no treatment in traditional generative phonology, and has been proposed in contemporary Optimality Theoretic approaches to influence the relative ranking of markedness and faithfulness constraints.

Using recently reported data from American English and UK English /r/-sandhi (Cohen-Goldberg, 2015) I argue that neither the structure-building account as proposed in Exemplar theory nor the relative ranking account of OT is alone sufficient to account for all of the morpho-phonological effects of frequency. I propose that lexical frequency in fact has two separate effects: creating independent representations that take priority over structure generated by language-wide rules while simultaneously lowering the faithfulness of phonological representations. I provide a sketch of how these ideas could be integrated into the Gradient Symbol Processing theory proposed by Smolensky, Goldrick, and Mathis (2014), a framework for uniting psycholinguistic and grammatical theories of lexical production.

*Arne Lohmann (Heinrich-Heine-Universität Düsseldorf)*

**The degree of homophony of English Noun/Verb homophones – a view from the corpus**

Recently a number of studies have empirically demonstrated that many alleged homophones do in fact differ in acoustic realization, defying the assumption of strict homophony. While identical on the segmental level, a number of factors have been suggested to systematically produce contrasts in the acoustic signal (e.g. Gahl 2008, Drager 2011, Podlubny et al. 2015). These findings have implications for the processing and representation of homophones. Systematic variation in phonetic detail may be used by the speaker to differentiate between homophonous words and may be part of these words' representations in the mental lexicon.

In this context, one relevant phenomenon are English noun-verb homophones, pairs of words that differ only with regard to syntactic category. For speakers of English these homophones are of particular relevance, as they make up a sizable share of the English lexicon (about 20% of all English noun/verb types). In previous research a number of acoustic differences between noun and verb homophones have been identified in child-directed speech (Conwell & Morgan 2012, Conwell 2016). Furthermore, experimental research indicates that noun and verb homophones are processed differently by both children and adults (Conwell & Morgan 2012, 2015), pointing at the possibility that these words are discriminated based on their acoustic properties.

This paper presents a detailed investigation of the acoustic differences between noun and verb homophones in adult speech and empirically explores the potential for acoustic discrimination. The study is based on an analysis of 68 N/V pairs (3,800 tokens) from the Buckeye speech corpus (Pitt et al. 2007). Based on this analysis the cue strength of different acoustic characteristics is tested. A further aim is to take a closer look at the prosodic processes that are responsible for creating acoustic differences. While it is known that nouns are pronounced with longer duration than verbs due to their occurring more frequently in constituent-final position, this paper presents a more fine-grained investigation of the interplay between syntax and prosody and how it influences the pronunciation of N/V homophones. Besides, it is also tested to what extent acoustic differences are type-specific, exploring the possibility that some N/V pairs are more homophonous than others.

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*Erin Conwell (University of North Dakota)*

**Acoustic support for resolving lexical ambiguity**

Homophony, cross-category usage and other forms of lexical ambiguity create potential points of confusion for language learning and processing. Indeed, children show significant difficulty learning homophones in experimental contexts and lexical ambiguity can produce garden path effects in adults. However, language learners do not appear to have particular difficulty with homophones in natural contexts and adult sentence processing is not disrupted by every case of ambiguity that speakers and listeners encounter. Because ambiguous words do not pose problems in natural speech contexts, these contexts likely contain disambiguating information that is not available in controlled experimental settings.
My research focuses on the acquisition of homophones and polysemes. The acquisition problems posed by homophones are distinct from those posed by polysemous words that cross lexical category boundaries. While homophones violate the one-to-one mapping principle that is integral to all theories of word learning, noun/verb polysemes have the potential to cause children to conflate lexical categories. However, accumulating evidence suggests that acoustic properties of both classes of ambiguous words may distinguish their uses. I will present evidence that child-directed speech contains these acoustic distinctions and then examine whether children can use these distinctions to facilitate learning of additional meanings for familiar words. I will also consider whether there are developmental changes in the perception of these differences and whether they are tied to specific meanings of homophones. I will describe a possible developmental trajectory of lexical ambiguity interpretation based in the acoustic properties of ambiguous words and present some testable predictions based on this trajectory.

*Fabian Tomaschek. Ben Tucker, and Harald Baayen (University of Tuebingen and University of Alberta, Edmonton)*

**Anticipatory raising during the articulation of [A] in American/Canadian English: Exploring inflectional differences, individual differences, and the consequences of the accumulation of articulatory experience.**

It is well known that acoustic durations are co-determined by lexical properties such as frequency of occurrence (Bell et al. 2003, Gahl, 2008) and neighborhood density (Gahl et al., 2012).

The acoustic characteristics of segments may also depend on their morphological function, see Plag et al. (2015) for the duration of English [s] (Plag et al. 2015) and Lee-Kim et al. (2013) for the darkness of Korean [l]. Differences in acoustic durations not only reflect articulatory differences, but may also have consequences for auditory comprehension. Kemps et al. (2004), for instance, reported that listeners are sensitive to differences in the acoustic durations of stems of Dutch plural and singular nouns.

Much less is known about the effects of lexical properties on articulatory trajectories. Tomaschek et al. (2014) used electromagnetic articulography (EMA) to study tongue movements for the German vowels [i] and [a], and observed that the frequency of use of the carrier words co-determined tongue height. The present study reports ongoing work on the articulation of the stem vowels in four English verb forms (e.g., for the verb `t*o starve*', the forms *starve, starves, starved, starving*), as realized by native American and Canadian speakers living at the time of recording in Edmonton, Canada. The goal of this study is, first, to clarify how inflectional exponents modify the articulation of the vowel, and second, to explore whether a speaker's experience with articulating specific inflected forms affects articulatory trajectories in a systematic way.

Focusing on the vowel [a] in words in which the [a] is followed by [r] (as in *starve*), and using the Generalized Additive Mixed Model (Wood, 2006) for data analysis, we observed significant differences in articulation depending on whether the stem was followed by an inflectional exponent. The tongue body sensor was higher in suffixed forms than in the bare stem. In the case of the progressive form, tongue raising is likely to be due to the substantially shorter duration of the vowel. We think that in this case, the vowel is hypo-articulated due to time pressure. This explanation is not available, however, for the second person singular and past tense forms, as for these forms, there was no significant difference in vowel duration compared to the vowel duration of the bare stem. Here, co-articulation with the upcoming inflectional exponent appears to be at issue.

Figure 1 summarizes the observed effects by means of contour plots. Deeper shades of blue indicate lower tongue positions, darker shades of yellow indicate higher tongue positions. Contour lines are 1mm apart. Top panels present tongue position for combinations of time (horizontal axis) and vocal tract height at the position of the tongue body sensor. The top panels illustrate that speakers with larger local vocal tract height (large Y-values) showed less anticipatory raising for inflected forms (panels 2-4 in the top row of Figure 1) than speakers with smaller local vocal tract height (LVTH). This can be seen by tracing the number of contour lines crossed when increasing normalized time from 0 to 1. For PAST, PRESENT 3SG, and PROGRESSIVE, fewer contour lines are crossed for high

LVTH values compared to low LVTH values. For lower values of LVTH, we find that over time, the tongue body is raised, most prominently for the PAST and PRESENT 3SG forms, but also to some extent for the PROGRESSIVE. For the bare stems (leftmost panel), we have the opposite pattern, with a steep slope for speakers with a high LVTH, and little effect for speakers with a low LVTH.

The lower panels of Figure 1 present the height of the tongue body sensor as a function of timeand articulatory experience. Articulatory experience was assessed by means of the word activations predicted from naive discriminative learning (NDL, Baayen et al., 2011). The NDL activation is a measure similar to frequency of occurrence, but fine-tuned for learnability. First note that the steepest gradient (from low to high position) is present for verbs with the lowest NDL activations. Second, tongue raising is strongest for the bare stem, and weaker for the inflected variants. Apparently, co-articulation with the post-vocalic [r] is strongest for the uninflected form, and weaker for the inflected forms. Considered jointly, we think this pattern of results indicates that with experience, speakers are better able to discriminate in their speech between uninflected and inflected verb forms by reducing the co-articulation with the [r] in the presence of a following suffix.

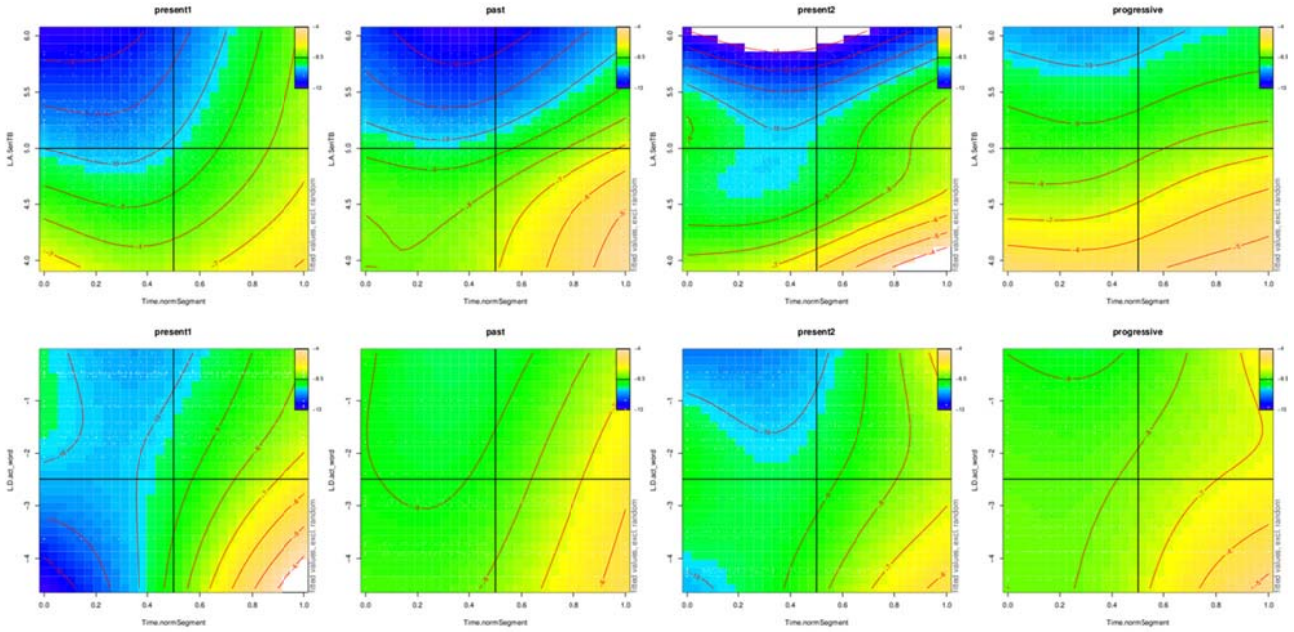


*Figure 1:* Model predictions for the height of the tongue back sensor during the articulation of the vowel [A]. Top row: Interaction of Time by Movement Area by Morphological Condition. Bottom row: Interaction of Time by Word Activation by Morphological Condition. Rugs (white dots) specify the location of the data points. Contour lines are 1 mm apart, color coding has yellow/peach for -4 as highest value, and shades off to darker hues of blue as vertical positions of the tongue back sensor are further down. Contour lines connect points with the same vertical position of the tongue body sensor.

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*Frauke Hellwig & Peter Indefrey (Heinrich-Heine-Universität Düsseldorf)*

**Homophones and their frequency effects**

Homophones are reported to show several frequency effects. In a corpus study of natural American English telephone conversations, Gahl (2008) observed for heterographic homophones a length effect, meaning that low frequent homophones were pronounced with longer duration than their high frequent counterparts. Jescheniak and Levelt (1997) and Jescheniak, Meyer, and Levelt (2003) observed a so-called frequency-inheritance effect in two translation experiments employing Dutch and German homographic homophones. The naming latencies of low frequency homophones were shorter than those of frequency-matched control words and closer to those of control words in the frequency range of the sum of the low frequent homophone and its high frequent twin.

In a sentence and word production experiment that is currently conducted, we aim to replicate both homophone frequency effects within subjects. The results will be informative as to the processing stages at which the effects arise. We will present and discuss (preliminary) results of the experiment.

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*Holger Mitterer (University of Malta)*

**Production and Perception of Maltese root consonants**

Maltese, as an originally Semitic language, uses verbs based on tri-consonantal roots. In this talk, I will focus on two challenges these provide in speech production and perception. First, the three consonants are in sequence in the present tense plural leading to articulatory difficult clusters (e.g., *k-t-b,* Engl., *to write, ji<u>ktb</u>u*, Engl., *they write*), and secondly, the middle root consonant is geminated to express a causative (e.g., *w-q-f,* Engl., *to stop*, *waqaf quddiem il-hanut,* Engl., *he stopped in front of the store*, *waqqaf il-karrozza*, *he stopped the car*). Such forms were elicited in a sentence-guessing task with a picture prime (to avoid reading in a production task) and analysed using forced alignment. The results showed that root consonants are quite resilient against reduction/deletion, and even leading to vowel transpositions, putatively to prevent reduction (*se jibdlu → sejbidlu*, Engl., *they will change*). For the singleton-geminate distinction, the results show that, next to duration, especially laryngeals geminates have additional cues that cannot be easily explained as a consequence of the increased prosodic weight of geminates. Perception experiments show that listeners strongly rely on these cues. This provides additional evidence that phonological features are unlikely to be involved in prelexical speech processing (cf. Mitterer, Kim, Cho, 2016; Reinisch & Mitterer, 2016), because the realization of [+LONG] depends on place of articulation. Finally, I will present data that the singleton-geminate distinction is rate-dependent in both perception and production, contrasting with recent views that rate-dependencies may not be pervasive in speech processing.

*Javier Sanz & Sabine Arndt-Lappe (Universität Trier)*

**Stress Variation in English *-ory* Derivatives**

The adjectival suffix *-ory* is traditionally considered to be a stress-shifting suffix (cf. e.g. Liberman & Prince 1977; Zamma 2012 and references therein). However, the literature also reports on anecdotal evidence of stress variation and stress preservation effects in *-ory* derivatives (cf. Bauer et al. 2013: 301). The paper presents the results of a comprehensive production study investigating British English speakers' stress patterns in long *-ory* derivatives. We find that not only is there more variation than is traditionally assumed; the

variation is also systematic and cannot be accounted for in terms of traditional frameworks relying on a categorical distinction between stress-shifting or stress-preserving suffixes.

Instead, we will argue that the variation is related to both the stress pattern of the possible verbal and nominal bases and the prosodic markedness of the derivative. For instance, the form *celebratory* has two possible bases: the verb *célebrate* and the noun *celebrátion*. The three most common pronunciations in our data are *célebr*[ə]*tory* and *célebr*[eɪ]*tory* (which preserve the stress pattern of the verb) and *celebr*[éɪ]*tory* (which preserves the stress pattern of the noun). At the same time, we see a clear influence of markedness in that stem-final heavy syllables strongly attract stress: *celebr*[éɪ]*tory* is much more common than *célebr*[eɪ]*tory*, and closed stem-final syllables are always stressed, as in *contradíctory* and *satisfáctory*. These factors can be modelled by using faithfulness and markedness constraints within an optimality-theoretic framework (cf. Stanton & Steriade 2014 for a similar proposal).

*Jessica Nieder* & *Ruben van de Vijver* (Heinrich-Heine-Universität Düsseldorf)

**Maltese plurals: A production experiment**

The complexity of the plural formation in Maltese, a semitic language spoken in Malta, has baffled many linguists (Cardona 1996, Mayer, Spagnol & Schönhuber 2013, Mifsud 1994, Schembri 2012). In Maltese there are two ways to build the plural of a noun: *Sound* plurals are formed concatenatively by adding one of a number of sound plural suffixes to the singular form. For example the plural of the singular *kappella* is formed by adding the suffix –i: *kappelli* ‚chapel(s)'. *Broken* plurals are formed non-concatenatively by internal restructuring of the singular stem (Borg & Azzopardi-Alexander 1997). For example the plural of the singular *kelb* is formed by changing the internal prosodic structure: *klieb* ‚dog(s)'. Within the broken plural we find numerous patterns (between 4 (Mayer, Spagnol & Schönhuber 2013) and 39 (Borg & Azzopardi-Alexander 1997)) depending on different classification strategies of earlier works. In addition, some words take both, a sound and a broken plural, without a change in meaning (Borg & Azzopardi-Alexander, 1997): *tapit* – (pl.) *tapiti* – (pl.) *twapet* ‚carpet(s)'.

There is consensus in the literature that inflection is sometimes created by rule and sometimes by analogy; an idea that is synthesized in Albright & Hayes's (2003) Minimal Generalization theory (see also Dawdy-Hesterberg & Pierrehumbert 2014). This theory has been tested extensively for concatenative languages, but to a lesser extent for non-concatenative languages. We set out to test this theory for Maltese, a non-concatenative language.

In order to investigate the Minimal Generalization theory we conducted a production experiment in which Maltese native speakers were asked to produce plural forms for existing Maltese singulars and phonotactically legal nonce singulars (see also Berko- Gleason 1958). The words were taken from a corpus study (MLRS Corpus Malti v.2.0 available at CQPweb, Ġabra: an open lexicon for Maltese created by Camilleri 2013). We extracted 110 words and divided them up in four groups: frequent sound, infrequent sound, frequent broken and infrequent broken. The nonce forms were constructed from existing words by

changing either the consonants or the vowels or both systematically. 38 adult native speakers of Maltese participated. Their productions are currently being transcribed and prepared for statistical analysis and modelling (logistic regression, AML, TiMBL, NDL). The results of the analysis and modelling will be presented at the conference.

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*Joana Cholin (Ruhr-Universität Bochum)*

**Neuropsychological evidence for the interplay of morphology and phonology in spoken language production**

Theories on spoken language production (e.g., Caramazza, 1997; Dell, 1986; Levelt et al., 1999) differ with regard to the question of where/when morphology and phonology interact during speech planning. Potential levels for an involvement of phonology in morphological processing are 1) the retrieval of stored morphemic entities from memory and 2) during the combinatorial processes when joining morphemes into multi-morphemic utterances. In my talk, I will present data from two single-case studies that suggest an interplay of phonology and morphology during the second but not during the first stage of morphological processing.

In the first study, we examined a bilingual German-English speaker (WRG) with aphasia who showed an impairment at the interface between morphology and phonology

(Cohen-Goldberg et al., 2013). In order to examine WRG's deficit, we tested his abilities to produce phonologically complex sequences (coda clusters of varying sonority) in mono- and multimorphemic environments in elicitation, reading and repetition tasks. WRG exhibited phonological errors that reduced coda sonority complexity by inserting material in multimorphemic utterances (e.g., passed → [pæstɪd], gesagt → [gəza:gət]) but not in monomorphemic utterances (e.g., past, Jagd). He also inserted additional material to avoid stress clash (briskness → [brɪs.kɪd.nɛs]). As WRG's post-lexical abilities were mostly intact and a morphological locus for his repairs could be excluded, we concluded that the fact that his phonological errors center on morpheme boundaries provide evidence for a separate morpho-phonological encoding level during language planning.

In the second study, we re-analyzed data stemming from another single case study in which a female speaker with aphasia (FME) was tested on picture naming of homophonous words and phonologically related control words (Biedermann & Nickels, 2008a, b). Homophones (e.g., 'bank' vs. 'bank' or 'flower' vs. 'flour') may either share a morpho-phonological form or are represented by separate entities (e.g., Dell, 1990; Jescheniak & Levelt, 1994; Caramazza, 1997). The results from FME supported the shared account, showing a homophone advantage in picture naming treatment: With treatment of only one homophone partner, the treated as well as the untreated homophones improved naming performance, whereas phonologically related controls did not.

In a re-analysis of these data, we examined whether this advantage could be attributed to activation feedback from phonology. Since their phonemes are shared, homophones would receive greater feedback and would thus be more likely to benefit from treatment than phonologically related controls. However, when we analyzed a number of phonological variables, the results did not reveal an influence of any of these factors. We therefore conclude that these data do not support the involvement of phonology at this early stage of morphological retrieval.

Taken together, these two studies provide evidence for an involvement of phonology in morphological processing at a later, morpheme assembly stage, possibly constituting a separate morpho-phonological level but not during pre-combinatorial morphological retrieval processes.

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*Julia Zimmermann (Heinrich-Heine-Universität Düsseldorf)*

**Morphological status and acoustic realization: Findings from NZ**

Recent research on lexeme homophony has shown that seemingly homophonous lexemes actually differ in phonetic details such as duration and vowel quality (e.g. [1], [2]). This poses a challenge to traditional models of speech production which locate frequency information at the level of the phonological form, and which postulate that phonetic processing and the module called 'articulator' do not have access to any information regarding the lexical origin of a sound (e.g. [3], [4]).

The findings on lexemes prompt the question of whether similar differences also hold for allegedly homophonous affixes (instead of free lexemes). Plag, Homann & Kunter [5] conducted a corpus study to investigate the duration of S (that is [s] or [z]) as non-morphemic instances and as markers of plural, genitive, genitive plural, 3rd person singular and the cliticized forms of *has* and *is* in General American English. They found systematic differences in duration between the different kinds of S, with non-morphemic S being longer than the morphemic S. Furthermore, within the group of morphemic S, the affixes were found to be systematically longer than the clitics.

*Seyfarth et al. [6], however, find morphemic S to be longer than non-morphemic S when considering homophonous word pairs such as lacks and lax. They used an experimental setup in which pairs of participants read out naturalistic dialogues that served as carriers for the words under investigation. These divergent findings call for further evidence about the nature of durational differences between morphemic and non-morphemic S in English.*

The present study extends the research on the acoustic properties of affixes by looking at the behavior of S in a different variety of English, namely (Pākehā) New Zealand English. Using over 6,900 items from the Quakebox corpus [7], the duration of morphemic and non-morphemic S is investigated in order to test whether New Zealand English shows the same systematic durational differences as found for General American English by [5] or those found by [6].

Linear mixed effects regression with a number of pertinent covariates (such as frequency, speaking rate, phonetic environment, etc.) is used to predict the duration of the S. Voiceless and partially voiced non-morphemic S are found to be longer than most other types of S, while suffix S are longer than clitic S. This is the same pattern that was found by Plag, Homann & Kunter [5] and thus provides further support for the idea that there is morphological information in the phonetic signal, i.e. in postlexical stages of speech production. This is unpredicted by current linguistic and psycholinguistic theories of lexicon and grammar.

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**Comprehension of German homophonous nouns**

Previous research has shown that homophonous words may differ in word length. Low frequency readings of homophones are articulated with longer duration than their high frequency twins (see Gahl 2008). Based on these findings on the production of homophones it is possible that homophones do not share a lexical entry in the human brain.

We aim to find out how monolingual homophones are processed in comprehension and whether underlying neural processes provide evidence for either shared or separate lexical entries. Participants will be tested using EEG to gain ERPs during listening to sentences containing homophonous nouns. By using a N400 paradigm we will get insights in the neural processing of these words and hopefully be able to shed light on the lexical storage of monolingual homophones.

In this talk I will present the ERP study, which is currently in preparation and have a special focus on the experimental conditions and the stimuli we are using.

*Sonia Ben Hedia (Heinrich-Heine-Universität Düsseldorf)*

**Prefixal Gemination in English*:* An experimental study on *un-* and *in-***

In English, affixation may lead to the adjacency of two identical consonants across a morpheme boundary (e.g. *un#necessary*). The standard view of what happens in those cases is that with certain affixes the sequence of two identical consonants leads to a longer duration of the segment in question (gemination), while with other affixes the double consonant is of the same duration as a single consonant (degemination). A standard view in the literature is, for example, that the prefix *un-* geminates, whereas the prefix *in-* does not. Hence, the nasal in *unnatural* is predicted to be longer than the one in *uneven*, while the duration of the nasal is the same in *innumerous* and *inevitable* (cf. Cruttenden & Gimson 2014).

The idea of *in-* and *un-* displaying different behavior is in line with the theory of Lexical Phonology which assumes two lexical strata with two different phonological processes happening at each of these levels. While Level 1 affixes like *in-* integrate phonologically with their base and feature a weak morpheme boundary, Level 2 affixes like *un-* display less integration and a strong boundary (cf. Kiparsky 1982). Thus, *in-* is predicted to display degemination while *un-* is expected to geminate.

Only a few studies have empirically investigated the gemination of *un-* and *in-* (Kaye 2005, Oh and Redford 2014, Ben Hedia and Plag 2016). While for the prefix *un-*, all studies found gemination, the gemination behavior of *in-*prefixed words is less straightforward. While in their corpus study Ben Hedia and Plag (2016) found gemination for all *in-*prefixed words, the two experimental studies on the gemination on *in-* found variation (cf. Kaye 2005, Oh and Redford 2012). In Kaye's study the gemination of *in-* was speaker dependent and Oh and Redford found item-dependent variation, i.e. some *in-*prefixed words showed gemination and some showed degemination. Even though the gemination pattern of *in-* is yet unclear, the results of all previous studies indicate that the prefix *in-* does not show general degemination, i.e. degemination in all cases. In all studies, at least some *in-*prefixed words showed gemination. This clearly speaks against the standard view in the literature, as well as against the predictions made by stratal theories like Lexical Phonology.

One major drawback of previous studies is however the number of investigated types and tokens. The number of *in-*prefixed types with a double consonant in the studies ranges between 1 and 16, the number of *un-*prefixed types with a double consonant between 2 and 6. A large-scale empirical study which investigates a great number of *un-* and *in-*prefixed types is needed to clarify the gemination behavior of the two prefixes. The present paper presents such a study.

In a reading experiment, 29 speakers of British English produced around 3500 *in-* and *un-* prefixed tokens with a double (*unnatural*) or a single consonant at the morphological boundary (*uneven*), as well as pertinent bases (*natural*). The study includes 183 different types. Linear mixed regression models were used to compare the duration of two identical cross-boundary consonants (e.g. *n#n* in *unnatural*) with the duration of a corresponding single consonant in prefixed (e.g. *n#V* in *uneven*) and in base words (e.g. *n* in *natural*). In the models, I controlled for the influence of pertinent phonetic and phonological aspects, such as word duration, number of segments in the word, and stress pattern by including them as covariates.

Preliminary results reveal that while *un-*prefixed words, as in previous studies, show clear gemination, *in-*prefixed words display more complex patterns that are only partially in line with earlier findings. In my talk, I will present the results for both prefixes, and I will discuss the implications for the above-mentioned assumptions on gemination in English.

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**Spelled morphology**

What is the relationship of a word like *parsable* (or *parsible*) to its morphological constituents *parse* and *able/ible*? The premise of the Spoken Morphology project is that pronunciation variation can offer information on morphological processes preceding speech production. An encouraging amount of evidence consistent with that premise already exists, and there is every reason to think that the interpretation of phonetic detail will continue to be a fruitful area of psycholinguistic research. Part of my talk is a very condensed overview of my own recent efforts in this area, which have focused on changes in individual's pronunciation over time (Gahl et al., 2014, Gahl & Baayen, in prep.), phonetic vs. lexical factors in pronunciation variation (Gahl, 2015), and the implications of phonological neighborhood density effects on the pronunciation and recognition of words and sentences (Gahl & Strand, 2016).

In the remainder of my talk, I wish to draw attention to the mutual relevance of spelling variation and pronunciation variation. English contains pairs of very similar suffixes such as *–able/-ible, -ative/-itive, -ence/-ance*, and *-er/-or*. Here, I focus on the pair *able/ible*. Morphological analyses tend to treat such pairs either as "spelling variants" of single suffixes, or as separate suffixes with identical meaning, similar to pairs like *–ity / -ness*. Discussions of the choice of *ible* vs. *able* usually focus on the history of the words containing them and on the free vs. bound nature of their roots: Historically, words ending in *–ible* tend to have entered English usage as whole-word loans; consequently, many *–ible* words contain bound bases (e.g. *permiss-*, *aud-*). By contrast, many words ending in *–able* represent English coinages and consequently have free bases (*doable*, *readable*). New *-able* coinages are far more common than new *–ible* coinages, which are sometimes claimed not to exist at all.

These generalizations have a number of empirical shortcomings even when one only considers standard orthography, but fall short even more when one considers how people actually spell: New coinages with *–ible* do exist, and *–able* does occur in new coinages (or nonstandard spellings) involving bound roots, as in the following examples: "Hello - is siri audable on the Apple watch ?" (online Discussion board); "the anticipation of the acoustic consequences of admissable articulatory shortcuts would not have this disadvantage" (Baayen, 2014).

Based on previous research on morphological productivity and boundary strength (Hay, 2001, 2003; Hay & Baayen 2002, 2005), I hypothesized that semantic transparency of

base and suffix and relative frequency of base vs. derived frequency should both affect the choice between–*able* vs. –*ible*. A preliminary analysis of several databases of misspellings bears this out.

One implication of this result is that spelling variation may offer information about morphological processing. I conclude by discussing some of the methodological advantages and drawbacks of spelled and spoken morphology.