To store or not to store:

Handling morphological complexity

Morphology Workshop

University of Konstanz, October 1st – 3rd 2008

Hotel VIVA, Litzelstetten

hosted by the SFB 471 "Variation and development in the lexicon" / Project D1

Wednesday, 1st October 2008

19:00	Reception

Thursday, 2nd October 2008

09:00 – 09:10   Welcome

Session 1 – Chair Carsten Eulitz

09:10 – 09:50   **Fanny Meunier**
The early morphological decomposition effect unmasked

09:50 – 10:30   **Matthew Davis**
Processing novel morphemic combinations: Evidence against a storage/decomposition dichotomy

10:30 – 11:00   Coffee break

11:00 – 11:40   **Eva Smolka**
When morphemes mean more than words

11:40 – 12:10   Comments/Discussion

12:10 – 13:30   Lunch break

Session 3 – Chair Eva Smolka

13:30 – 14:10   **Sami Boudelaa**
Semantic opacity, decompositionality and full form storage in Arabic

14:10 – 14:50   **Thomas Mayer**
Breakdown of the Broken Plural in Maltese (= Semitic, with much Italian)

14:50 – 15:20   Coffee break

15:20 – 16:00   **Frans Plank**
Directions in zero derivation

16:00 – 16:30   Comments/Discussion

16:30 – 19:00   Lake cruise

19:30   Conference dinner at the Hotel VIVA

Session 3 – Chair Aditi Lahiri

09:00 – 09:40   **Martina Penke**
Inflectional morphology in the mental lexicon

09:40 – 10:20   **Mathias Scharinger**
The surface doesn't tell it all: Representation of stem alternants

10:20 – 10:50   Coffee break

10:50 – 11:30   **Jay Rueckl**
Morphology and Visual Word Recognition: A Connectionist Perspective

11:30 – 12:00   Comments/Final discussion

12:00 – 13:30   Lunch break

Session 4 – Chair Mathias Scharinger

13:30 – 14:10   **Andrea Krott**
Are dog shoes for dogs? Children's processing and interpretation of compound words

14:10 – 14:50   **Jens Bölte**
She's a high voltage electricity grid systems supervisor: Production and representation of German compounds

14:50 – 15:20   Comments/Final discussion

15:20 – 15:50   Coffee break

16:30   City program

The early morphological decomposition effect unmasked

Fanny Meunier
Laboratoire Dynamique Du Langage (CNRS & Univ Lyon 2), Lyon, France

Recent results using the masked priming paradigm have shed light on the importance of surface morphological structure in early word processing and the morphological decomposition procedure (e.g., Rastle et al., 2000; Longtin, Segui & Hallé 2003; Rastle & Davis 2004 among other). Following these results we raised two questions: What triggered early decomposition of morphologically complex words? And how do we process pseudowords?

To answer the first question we will report two experiments that examine if only one component between the stem and the suffix can spark off the decompositional procedure rather than the surface morphological structure. In Experiments 1 and 2, prime words are either pseudo-derived words as *baguette* "breadstick" that, at a surface level, can be parsed into the stem *bague* and the suffix *-ette,* words composed of a stem plus a non suffixal ending (*brin-gue*, ''binge''), or words composed of a string of letters that do not matched with a stem and a suffix ending (*chand-ail*, ''pullover''). Prime and target words share their initial sequence of letters, and targets are simple words in Experiment 1 while consist into morphologically derived word in Experiment 2. The target recognition time analyses showed that the sole presence of a suffix ending can trigger the decomposition procedure.

To answer the second question we investigate the role of morphological structure, semantic interpretability and conceptual synonymy in the processing of pseudowords in three lexical decision experiments in French. We used the same four types of stimuli across experiments: 1- non-morphological pseudowords (an English example would be *sportume*); 2- semantically non-interpretable pseudowords (*rapidation*); 3- semantically interpretable pseudowords (*rapidify*); 4- synonym pseudowords (*gardenist*). We assessed lexical processing of these items with a conventional lexical decision task (Experiment 1) and two different variants of this task, focusing either on speed (Experiment 2) or accuracy (Experiment 3). The results of the three online experiments show significant effects of morphological structure, semantic interpretability, and conceptual synonymy on lexical decisions.

Research conducted in collaboration with Matt H. Davis and Catherine-Marie Longtin (MRC-CBU).

She's a high voltage electricity grid systems supervisor:
Production and representation of German compounds.

Jens Bölte, Heidi Gumnior & Pienie Zwitserlood
University of Münster

In many languages two or more nouns can be combined to form another noun: a compound. For lexicalised compounds the question arises how these words are stored. Two suggestions have been formulated that represent the extreme points of a continuum: The decomposition hypothesis and the full-form representation hypothesis. According to the decomposition hypothesis, compounds are stored, at least at one level of representation, decomposed into their constituent lexical morphemes. Such approach is realised in a prominent model of spoken word production (Levelt, Meyer & Roelofs, 1999). In the latter hypothesis, it is assumed that only whole-word forms are stored in the lexicon and that morphological complex words are not decomposed into their constituents (Janssen, Bi, & Caramazza, 2008).

The production of morphologically complex words has not attracted a lot of interest in contrast to the comprehension of morphologically complex words. This is in part owed to the fact that is it difficult to elicit morphologically complex responses, at least compounds or derived words. Production experiments with morphologically simple answers are in favour of the decomposition hypothesis. However, Janssen et al. (2008) report experiments supporting a full-listing approach.

We provide a short overview of results obtained so far in production research. This overview is then extended by results of three picture-word interference experiments in which participants produced German compounds. These experiments yielded data that mirror those obtained in experiments with morphologically simple answers. Thus, they are in favour of the decomposition hypothesis and undermine the full-listing hypotheses.

Processing novel morphemic combinations:

evidence against a storage/decomposition dichotomy

Matthew H. Davis
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Traditional accounts of the recognition of familiar complex words like *dancer* have suggested that these words can be processed as either whole forms or combinations of morphemic units. However, it remains unclear how this functional distinction maps onto the cognitive and neural mechanisms that underpin visual word recognition. This talk will review recent work that uses behavioural and neuroimaging methods to test 'dual-route' conceptions of morphological processing in visual word recognition. A critical test case involves the recognition of novel combinations of existing morphemes in pseudowords such as *rapidify*. These are readily interpretable although since they lack a pre-existing whole-word they necessarily require decompositional processing. fMRI responses to these items resemble those for familiar complex words, challenging the proposal that a distinct neural pathway exists for morphemic decomposition. In behavioural studies, we show that inclusion of pseudowords like *rapidify* does not hinder recognition of opaque complex words like *whisker* for which decompositional processing should be blocked (since a *whisker* is not "*someone who whisks*"). The absence of strategic 'route-emphasis' suggests that there is no competition between whole-word and morphemic processes, contra to the predictions of some dual-route models. Finally, we explore whether morphemic decomposition is confined to items that include closed-class affixes. Participants who are taught novel morpheme-like endings in combination with real stems (e.g. the ending *–nule* referring to an 'agent' in *sleepnule*, *buildnule*, etc), subsequently show form and meaning-based decomposition of novel complex items (e.g. *barnule*). These findings are interpreted in the light of accounts in which the decompositional processing of morphologically-complex words emerges from consistencies in the form and meaning of families of complex words.

Are dog shoes shoes for dogs?
Children's processing and interpretation of compound words

Andrea Krott
University of Birmingham

I will present research showing how relations between compound words in the mental lexicon play a role in children's processing and interpretation of familiar and novel compound words (e.g. *chocolate cake* or *banana shoes*). The results of the first two experiments suggest that 4-5 year-old children are more likely to segment and to recognize the morphological structure of a noun-noun compound (e.g. *chocolate cake*) when they know other compounds with the same constituents (other *chocolate* words such as *chocolate milk, chocolate bar)*. This is evidenced in children's explanations of familiar compounds in both English and French. Another experiment shows that children's knowledge of compounds with the same head (*cake*) or modifier (*chocolate*) does not only affect their understanding of familiar compounds, but also their interpretation of novel compounds. Taking all studies together, it appears that a child's understanding of a particular compound is affected by the child's knowledge of a small subset of compounds rather than by his/her knowledge of compounds in general. It therefore supports the idea of a development from a word-based analysis to a more abstract category-based analysis of morphologic structure.

When morphemes mean more than words

Eva Smolka, Matthias Gondan & Frank Rösler
University of Konstanz,
University of Regensburg,
University of Marburg

Recent models of visual word recognition (e.g., Longtin et al., 2003; Rastle et al., 2000; 2004) assume that morphological decomposition guides early word processing but vanishes as soon as morphemic constituents are processed for meaning. These assumptions are based on cross-language findings showing that semantically opaque words (whose meaning cannot be constructed from the meaning of their parts like *successor*) facilitate their bases (like *success*) under masked priming conditions, that is, when participants are unaware of the prime, but not under unmasked conditions when the word meaning is consciously integrated.

The present study used German prefixed verbs to examine whether morphological decomposition is overridden by meaning integration. German prefixed verbs are of particular interest, since their meaning can be semantically transparent or opaque with respect to their base verbs. In two visual priming experiments, verb targets (*ziehen*, 'pull') were preceded by a purely semantically related verb (*zerren*, 'drag'), by a semantically transparent derivation (*zuziehen*, 'pull together'), by a semantically opaque derivation (*erziehen*, 'educate'), by an orthographically similar verb (*zielen*, 'aim'), or by an unrelated verb (*tarnen*, 'mask'). Reaction times (RTs) and event-related potentials (ERPs) were measured under conscious priming conditions.

Both semantically transparent and opaque derivations produced robust RT facilitation as well as strong N400 modulations. These morphological effects were not influenced by semantic relatedness and were even stronger than the effects by purely semantically related verbs. Moreover, the morphological derivations induced an early left anterior negativity that indicated prefix-stripping. Orthographic similarity produced RT interference and no ERP effects, thus confirming that the morphological effects do not originate from sheer form overlap between primes and targets.

These findings show that—in German—morphological decomposition is not overridden by meaning integration. Since they differ from previous findings in other Indo-European languages, we would like to discuss possible explanations for these cross-language differences.

Morphology and Visual Word Recognition: A Connectionist Perspective

Jay Rueckl
University of Connecticut and Haskins Laboratories

From a connectionist perspective our sensitivity to morphological structure is a consequence of both the statistics of the language--the patterning of form-meaning correspondences across the words that we know--and the computational properties of the learning and activation processes that underlie language use. This view predicts that morphological effects will be graded by the formal or semantic similarity of morphologically related words. In my talk I'll review relevant experiments involving visual word recogntion as a means of bringing out the core theoretical principles embodied by the connectionist approach and, more broadly, differences at a meta-theoertical level about what counts as a good explanation.

Semantic opacity, decompositionality and full form storage in Arabic

Sami Boudelaa & William Marslen-Wilson
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A striking finding in research on Semitic languages like Arabic is that strong priming is obtained, across the board, in both overt and masked priming tasks, between words that share a root (such as {ktb}), even when the relationship between these words is judged to be synchronically semantically opaque, as in prime-target pairs like [katiibatun]/[kitaabun] squadron/book. This implies, contrary to widely accepted views for languages like English or French, that semantically opaque forms like [katiibatun] squadron, which do not share the dominant "write" meaning of the root {ktb}, are nonetheless decompositionally represented, such that the root {ktb} is extracted in order to form the basis for priming of the otherwise unrelated target word [kitaabun] book. At the same time, [katiibatun] must be represented at some level as a whole form, because its meaning cannot be captured compositionally. To explore this apparent conflict between semantic and morphological decompositionality, we looked at the underlying morphological and semantic relatedness of different types of semantically opaque forms. Words like [katiibatun] and [kitaabun] are in fact diachronically related, and are based on a shared *verbal* root, coming from the productive verbal morphology component of Semitic morphology, made up of verbs proper and deverbal nouns. The other component of the Semitic lexical system is the *primitive nouns*, which refer to basic entities such as body parts, trees, and animals, and are generally not productive. Several primitive noun roots are homophonic with verbal roots, but where there is no historical relationship, as in as pairs like [?anfun]/[?ista?nafa] nose/start again, where the root {?nf} is a primitive noun root in the prime, but a verbal root in the target. The present experiments use masked and cross-modal priming to compare priming between opaque roots belonging to verb morphology (e.g., [katiibatun]/[kataba] squadron/write), with priming between homophonic roots deriving from primitive noun morphology and verbal morphology separately. Although the two sets were matched on semantic transparency (and root productivity), only opaque roots belonging to verb morphology showed a priming effect. The absence of priming for homophonic roots suggests that there is no underlying shared root for these cases. This may reflect a possible compartmentalization of the Semitic mental lexicon, as well potential effects of the underlying relatedness of opaque roots, possibly through the presence of shared etymons (Boudelaa & Marslen-Wilson, 2001).

The surface doesn't tell it all: Representation of stem alternants

Mathias Scharinger & Frank Zimmerer
University of Konstanz
University of Frankfurt

Dual Mechanism accounts of complex word form representation and processing distinguish irregular word formation (as in English sing~sang) from regular word formation (add-added) and assume that irregulars are represented in associative memory, accessed directly and as whole forms, while regulars are represented in terms of their constituent morphemes, accessed via decomposition (cf. Pinker, 1997). However, German is not so clear-cut with respect to a dichotomous regular-irregular distinction. Both the regular 2.p. singular {-st} as well as the (masculine) plural suffix {-e} attach to the stem of regular *and* irregular stems (cf. schläf-st 'sleep, irregular'; mach-st 'make, regular'; Stöck-e 'sticks, irregular'; Stoff-e 'cloths, regular'). Are these forms handled by associative memory or by the rule-based module, or by both? In particular, how is the stem accessed in these cases?

We assume that schläfst/machst and Stöcke/Stoffe are similarly represented as stem and suffix and that the representation of the irregular stem is monomorphemic and underspecified such that it can be accessed by both the coronal and dorsal surface variants schlaf-/schläf- and Stock-/Stöck-. We provide evidence for our claims by a priming and a production study with German verb forms, and by an ERP experiment with German noun stems. The results suggest that regular and irregular verbs do not differ in terms of their present tense stem representations, and that stem access for both verbs and nouns is sensitive to featural relations between signal and lexicon. We offer an account which takes seriously phonological information in the mental lexicon, guiding speech perception as well as speech production.

Breakdown of the Broken Plural in Maltese (= Semitic, with much Italian)

Thomas Mayer, Michael Spagnol & Florian Schönhuber
University of Konstanz

Maltese shows a number of strategies to construct the plural of nouns, the most salient being sound and broken plural. Whereas sound plurals are formed by mere suffixation (*omm* 'mother' - *ommijiet* 'mothers'), broken plurals use a more intricate, non-concatenative strategy making the relationship to their corresponding singulars less transparent: *abjad* 'white' (m.sg.) - *bojod* 'white' (pl.).

So far most works on broken plurals in Maltese have concentrated on a descriptive analysis of the data by dividing the forms into different classes according to their plural CV patterns. This talk is an attempt to give a rule-based analysis which can account for the majority of these patterns. We argue that the corresponding singular and plural forms are the result of an interaction between morphology and phonology. The assumption is that neither the singular nor the plural displays all the vowels of the respective lexeme but that their surface representations are determined by phonological rules which are also at work in other morphological operations.

Inflectional morphology in the mental lexicon
Martina Penke

University of Gent

Direction in zero derivation

Frans Plank
University of Konstanz

It is commonly assumed the derivational relationships hold between WORDS. Looking at zero derivation, I'm not sure I can fully share this assumption. I would like to suggest that zero-derivational relationships hold between SENSES, of which one word may have several (=polysemy). It seems to me the strongest argument for the autonomy of senses over words that directions of derivation can be different for different senses of the same words. Such linguistic observations would seem to raise questions about the role of words in mental representations.