Book of Abstracts
Poster Presentations

Abstract Concepts:
Structure, Processing and Modeling

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Time domain matrix modeling
in cognitive linguistic research

I. Bondarenko
Vasyl Karazin Kharkiv National University, Ukraine

The abstract nature of time serves the point of departure for natural scientists expressing doubts about the very possibility of its existence apart from space (Hawking 2005). As a result, cognitive linguistics rests on the statement that time is the product of convention (Evans 2004) as well as directly embodied human experience (Lakoff & Johnson 1999). Both aspects find implementation in our time perception and therefore, its measuring, registering and verbalizing.

This is also manifest in terms of the difference between the scientific (philosophical and natural) and non-scientific (mythological and/or poetic) ways of construing the world (Taylor 1995). As the tool to verify the differences in time perception, the domain matrix (Langacker 1987; Clausner & Croft 1999) of the time concept is featured. The offered matrix is comprised of the domains, which characterize time ontologically, i.e. by its origin, beginning and end, elements (units), antithesis, objects and results of influence, qualities, locality, varieties, measuring instruments and metaphoric correlates (Bondarenko 2014).

Using the corpora of scientific and poetic texts of corresponding periods in the English language history (7-21 cc.), the domain matrices are reconstructed and compared for every period. The tendencies, constants and variables in the time perception including metaphoric transformations are singled out.
Lexical semantic competence and visual imagery

F. Calzavarini, F. Garbarini, M. Diano & D. Marconi

University of Turin, Italy

Lexical competence, i.e. the ability to use words, includes both the ability to relate words to the external world as accessed through perception (referential tasks) and the ability to relate words to other words in inferential tasks of several kinds (e.g., word-word matching, naming to definition) (Marconi, 1997). There is evidence from both traditional neuropsychology and more recent neuroimaging research that the two aspects of lexical competence may be implemented by partly different brain regions. However, some very recent experiments appear to show that typically visual areas are also engaged by purely inferential tasks, not involving visual perception of objects or pictures (Marconi et al., 2013). Such activation might reflect visual imagery/simulation processes triggered by the concrete and high imageable sentences and words used in that study.

In the present fMRI study, we have investigated the role of visual imagery in lexical inferential competence by using a “Naming by definition” task. A sentence was pronounced and the subjects were instructed to listen to the stimulus and to overtly name, as accurately and as fast as possible, the target word corresponding to the definition. The factorial design of the study included two within-subjects factors, in which the visual imageability (and concreteness) of both “Target” and “Definition” was manipulated. We found a significant effect of “definition” in the left fusiform gyrus and temporo-occipital junction suggesting a greater recruitment of this area when subjects were recovering a word from a high imageable, concrete definition (vs low imageable, abstract definitions). Furthermore, a significant correlation between the subjects’ behavioral performance (inverse efficiency, IE) and the activity of both the fusiform gyrus and the temporo-occipital junction was found. This suggests that the greater is the activity of these brain areas the more efficient is the subjects’ performance (i.e., the lower are the IE values).

Brain areas involved in visual processing showed to have an important role in lexical inferential tasks. The fusiform gyrus is an important area for visual information processing and is often associated with face and body recognition. In this study, we demonstrated that a specific brain area, typically linked to visual imagery and visual processing, is recruited in inferential tasks with high imageable linguistic stimuli.
In this fMRI study we evaluated whether the auditory processing of action-related verbs, presented in the imperative mood, differently modulates the activation of the Broca’s area and the fronto-parietal mirror circuit when linguistic stimuli are pronounced by a human or a robotic voice. The study produced three results. First, the activation pattern found during listening to action verbs was very similar in both the robot and human conditions. Second, the processing of action-related verbs compared to abstract verbs determined the activation of the premotor cortex and the parietal-premotor circuit, classically involved during the comprehension of action semantics. Third, and most importantly, listening to action verbs, regardless of the condition (human vs. robot), activated the supramarginal gyrus. This area has been considered to underpin hand-tool/object interaction, as studies on affordances have widely shown. However, differently from previous studies showing the activation of this network during the processing of visual tools/objects or tools/objects’s names, our study is the first showing the activation of the supramarginal gyrus in spite of the absence of visual tools/objects tools/objects’s names in our stimuli. These results extend our knowledge about the context and task dependency of the activation of motor simulation, show its predictive function and suggest the possibility that implicit meaning can modulate the activation of the mechanism of simulation.
Love vs. Logic: fMRI dissociations between emotional and non-emotional abstract nouns in left motor areas during passive reading

F. R. Dreyer & F. Pulvermüller

Freie Universität Berlin, Germany

Previous research showed that modality-preferential sensorimotor areas are relevant for processing or words referring to concrete objects or actions. However, whether modality-preferential areas also play a role for abstract words is still under debate. Whereas recent fMRI studies suggest an involvement of motor cortex in processing the meaning of abstract emotion words as, for example, “love”, other non-emotional abstract words, in particular ‘mental words’ such as “logic”, are believed to exclusively engage ‘amodal’ semantic systems.

To test this, we conducted a passive reading, event related fMRI paradigm on 28 native speakers, using nouns from different semantic categories, confirmed via extensive semantic ratings and matched for a range of lexical and sub-lexical psycholinguistic variables. In addition, participants performed a motor localizer task to identify foci of hand and face motor processing.

Results indicate a specific involvement of face- over hand motor areas in the processing of mental nouns, whereas abstract emotion words did not show such a dissociation. This result was confirmed when subject-specific face and hand motor regions were used in analysis.

We conclude that a role of motor systems in semantic processing is not restricted to concrete words but extends at least to some abstract ‘mental’ symbols previously thought to be ‘disembodied’. Furthermore, the observed dissociations between different types of abstract nouns within the motor system highlight the importance to consider fine grained semantic subclasses when testing for a role of modality specific brain areas in the processing of abstract words.
Different degrees of abstraction from visual cues in processing concrete nouns

F. Franzon, S. Benavides-Varela, R. Lorusso, & C. Zanini
University of Padova, Italy

In our experience of the world, concrete entities, objects and substances, are visually perceived as having boundaries. Literature has highlighted the crucial role of boundaries in conceiving an entity and accordingly name it (Prasada et al., 2002; Chesney & Gelman, 2015). However, boundaries are not pertinent when denoting substances, thus mass references (much butter) are more abstract than count references (a ring).

The capability to recognize entities independently from their incidental shape is linked to non-linguistic logical operations such as abstraction, deduction, conservation (Vianello & Marin, 1997). Such abilities are not mature until the age of eight, whereas the acquisition of language is completed at five (Tomasello, 2003).

This study aims at understanding in what sense the non-linguistic abilities of abstraction and conservation affect the possibly different degrees of abstractness of linguistic reference to entities. The performance of 58 Italian five-to-six-year-old children on a test assessing the logical operations, the LOC (Vianello & Marin, 1997), was compared with a judgement task concerning the acceptability of nouns in mass or count morpho-syntactic contexts. In line with previous literature (Barner & Snedeker, 2005; Gathercole, 1985), children overextended the count interpretation in the linguistic task. Crucially, their performance with mass (r = .27; p< .05) -but not count (r = .12; p = .36)- contexts positively correlated with their performance in the LOC test.

We argue that even referring to concrete entities can require some extra-linguistic operations of abstraction to suppress the perceived boundaries when these are not pertinent for the linguistic reference (mass interpretation). When abstraction abilities are not fully mastered, the count interpretation is preferred.
Spatial meaning shifts in German particle verbs with “auf” and “an”

D. Frassinelli, A. Abrosimova, S. Springorum, E. Kiangia & S. Schulte im Walde
University of Stuttgart, Germany

German particle verbs (PVs; e.g., anschieben 'push something forward') are highly productive and ambiguous complex structures that combine a particle such as an with a base verb (BV; schieben 'push something'). They often trigger (regular) meaning shifts of the BVs (Lechler & Roßdeutscher, 2009; Springorum et al., 2013). For example, while anschieben emphasizes the horizontal direction of the pushing event schieben, the PV aufschieben ('postpone') expresses a metaphorical meaning. Similarly to embodied models of cognition (Gärdenfors, 2004; Lakoff, 1987), we understand the basic meanings of prepositional particles as spatially grounded mental structures. In the vein of perceptual frameworks of motion cognition (Bergen et al., 2007; Kaschak et al., 2005), our work investigates the directional concepts of the particles auf and an. We hypothesize that auf is primarily associated with a vertical directionality, and an is primarily associated with a horizontal directionality. Thus, an combining with BVs incorporating a horizontal direction (such as schieben) results in a literal PV reading, while auf combining with horizontal BVs results in a meaning-shifted PV reading. Vice versa for the remaining conditions. In a priming experiment, we study the effect of combining these two particles (as primes) with BVs intrinsically describing a horizontal vs. vertical movement (as targets). Preliminary results show a processing facilitation (in terms of shorter reaction times in a lexical decision task) when the direction of the particle and the BV match (e.g., anschieben). On the other hand, a mismatch in directionality causes processing interference as reflected in longer reaction times (e.g., aufschieben).
Inference to the concrete:  
Force-inferences in the verb-adverb domain

A. Goldschmidt  
Utrecht University, The Netherlands

Many abstract concepts are represented as concrete via mechanisms such as metaphor, e.g. My lawyer is a shark, where certain concrete properties of a shark, such as VICIOUS, are attributed in an abstract way of the lawyer (cf. Glucksberg, 1998).

But this relationship also holds vice versa, in that abstract concepts can influence the representation of concrete concepts. Consider the examples in (1-3):

(1) Nancy hit Oliver playfully/angrily on the arm.

(2) Nancy hit Oliver playfully, but still rather ?lightly/?hard, on the arm.

(3) Nancy hit Oliver angrily, but still rather ?lightly/?hard, on the arm.

When someone utters (1), the representation of the concrete hit is one of less force compared to the typical hit in the case of playfully, and one of more force in the case of angrily. This is shown by the acceptability of hard in (2). The “low force reading” of playfully can be cancelled through the use of but hard. And similarly for angrily and but lightly in (3).

We tested these “force inferences” in a self-paced reading experiment; the results show a significant reading time delay (p < .05) on the adverb that cancels the inference and the spillover area.

These “inferences to the concrete” can best be modelled within Frame Semantics, i.e. recursive attribute-value structures (Petersen, 2015). If playfully is applied to the frame for hit, it negates the value ‘with high force’ of the attribute INTENTION of the agent, creating the default of low force. The acceptability of hard in (2) is due to the fact that the hit can accidentally be hard.
Detecting implicit stereotype bias in natural language

M. Homan & P. Sommerauer
Vrije Universiteit Amsterdam, The Netherlands

Research in social psychology and communication science shows that stereotypic believes are not just communicated on the level of content, but also by means of employing specific linguistic strategies unconsciously. For instance, there are consistent patterns people use when naming social categories or ascribing behavior to a social category. In general, speakers tend to use a high level of abstraction when talking about observations that are consistent with their own stereotypic beliefs. In contrast, when describing experiences that are inconsistent with their expectations, they tend to use concrete language (Beukeboom 2014).

Whereas individual linguistic aspects of these tendencies have been observed in experiments, so far, there has been no consistent investigation of natural language use. In the course of our project, we aim at an annotation framework for stereotypic bias in natural language. In order to develop this, we conducted an online experiment consisting of two writing tasks, asking participants to write about men and women working in three different professional fields, in combination with questions testing for gender bias and controlling for demographics and contextual factors. On the basis of a selection of the collected texts, we designed a preliminary annotation framework analyzing social category labels, behavior descriptions and other relevant factors according to their degree of abstraction. In addition, our interdisciplinary data sessions yielded a number of insights about implicit assumptions made in the different fields. In further research, we aim at implementing an automatic system able to perform annotations on wide ranges of texts.
How to determine the determinants of abstractness and concreteness?

L. Hustinx & W. Spooren
Radboud University Nijmegen, The Netherlands

Although much research assumes that concreteness, as opposed to abstract language, is related to comprehension and interestingness of texts, the notion of what constitutes the concepts of abstractness and concreteness up to now remains unclear. Our research directly refers to the first question of the symposium: on which dimensions of meaning do abstract and concrete concepts differ?

In a large survey study we tried to assess which concepts contribute to the notions of concreteness and abstractness. Native speakers judged 2011 Dutch words (nouns, adjectives and verbs) on five possible determinants of concreteness / abstractness. The determinants were selected on the basis of the literature and two pilot studies, in which we pretested several methods of setting up the survey. The main study asked subjects to rate the degree of abstractness - concreteness, the degree of specificity, sensory perceptibility, “drawability” and comprehensibility. All in all, more than 10,000 judgments per informant were collected for 2011 words.

Using regression analyses, the results show that concreteness / abstractness was mostly predicted by the notion of sensory perceptibility. Regression analyses also showed that the predictive values of the various determinants differ between the three word classes, and that our scores on abstractness and concreteness correlate highly with the concreteness scores collected by Brysbaert et al. (2014). Implications for the study of concreteness effects will be discussed.
Are abstract concepts rooted in bodily mimesis?

A. Jelec
Adam Mickiewicz University in Poznań, Poland

Research demonstrates that a vast majority of abstract concepts is represented in concrete terms both in speech and gesture, (e.g. Cienki and Müller 2008), and many abstract subjects are commonly described as sensorimotor experiences (cf. Lakoff and Johnson 2003). Although there is some consensus regarding the emergence of meaning as a process that depends on the interactions with the world, there is little clarity as to how non-physical abstract concepts are built on physical experience. Perhaps then the origins of abstract conceptualisation can be sought in the body itself. Bodily mimesis, the use of the body for representational means (Donald 1991, 2001), is one plausible link between action and mental representation. A particular act of cognition or communication is an act of bodily mimesis if and only if it fulfils certain conditions: cross-modality, volition, representation and communicative function. For this paper I analysed two recordings of a congenitally blind girl explaining a set of concepts to a computer, which were gathered in the space of three years as part of a longitudinal study of blind children’s gesture (Jelec 2014). The gestural, verbal and vocal performance of the child in the first interview showed a remarkable overlap of features with Donald’s definition of mimesis. Interestingly, most of the mimetic behaviours have been replaced almost exclusively by verbal descriptions three years later. These results go in line with the findings of Zlatev (2014) who hypothesised that bodily mimesis grounds but does not constitute linguistic meaning (Zlatev 2007:327), and that is a stepping stone for the child’s conceptual development (2014).
When epidemics become real:
An LCM-based analysis of tweets about ebola

L. van Lent, M. Janssen, L. de Jong, M. Kuiper, J. van de Laar, C. Swagten & E. Das
Radboud University Nijmegen, The Netherlands

Construal Level Theory (CLT) describes that concreteness of language is related to psychological distance: the closer a stimulus, the more concrete (low-level construal) the stimulus is experienced, and the more concrete language is used when talking or writing about that stimulus. We assessed the relevance of CLT in explaining public responses to epidemic outbreaks.

We manually coded 7,500 Dutch tweets about the 2014 Ebola epidemic for psychological distance (varying from (1) the Netherlands to (11) Asia and Oceania) and concreteness to test whether the language used in tweets becomes more concrete as the epidemic is explicitly linked to areas closer to the Netherlands. Based on the Linguistic Category Model (LCM), we distinguished four categories of concreteness to count per tweet: (1) Descriptive action verbs; (2) Interpretive action verbs; (3) State (action) verbs; and (4) Adjectives. An average level of concreteness was assigned per tweet (i.e. the higher, the more abstract).

A one-way ANOVA for the average concreteness with distance as factor, shows some significant differences between the areas, but lacks a systematic relation. Findings confirm that events in close areas (i.e. Netherlands, neighboring countries and West Europe) are represented concretely and in detail, but only few findings confirm that events further away were represented abstractly. Using LCM to assess the level of concreteness in tweets proved problematic. Because of the limit of 140 characters, verbs are often omitted in tweets, while LCM is based largely on verbs.

A new model is required to better analyze tweets for levels of abstraction.
Metaphoric concepts’ representations are both linguistic and simulated

P. Liu, L. Connell & D. Lynott
Lancaster University, United Kingdom

In research on conceptual representation and processing, concrete concepts are widely studied and understood to be processed by simulating sensorimotor and affective experiences, although previous work has also shown that linguistic distributional information (i.e., how words are distributed in relation to one another in language) plays a critical role in their processing.

However, metaphoric concepts, which abstract away from the concrete literal meanings of words, are less well understood, particularly when it comes to linguistic distributional information.

In the current study, we investigated the extent to which situated simulation versus linguistic distributional information is involved in the representation of perceptual properties (e.g., colourful, cool, quiet, etc.) when they are used in an abstract metaphoric context (e.g., Stories can be colourful). Critically, we operationalized ease of simulation using a new norming method that indirectly measured successful representation of each item’s meaning by asking people to rate the sensibility, usability and imaginability of each item and producing a composite measure.

Using standard metaphor comprehension tasks (i.e. sensibility judgement and interpretation generation), we found that both linguistic distributional frequency and ease of simulation affect the likelihood of successfully processing abstract metaphoric concepts. We also find that ease of simulation contributes to the speed of processing in both tasks, while linguistic distributional frequency has an effect predominantly in the sensibility judgement task which involves relatively shallow processing. In conclusion, we argue that the representation of abstract metaphoric concepts – like concrete concepts – utilises both linguistic distributional and situated simulation information.
Abstract concepts and the activation of the hand and mouth effectors

C. Mazzuca 1,2 & A. M. Borghi 1,2

(1) Institute of Cognitive Sciences and Technology, CNR, Italy
(2) University of Bologna, Italy

While it is now established that we comprehend concrete words simulating their meaning through our sensorimotor system (Barsalou, 2008; Meteyard et al., 2012), abstract words are still object of debate (Pecher et al, 2011). According to the Words As social Tools (WAT) proposal (Borghi and Cimatti, 2009; Borghi and Binkofski 2014), not only sensorimotor but also linguistically conveyed information counts in abstract words processing. If this is the case, then the simulation of their meaning should involve the activation of the mouth (Topolinski & Strack, 2009; Ghio et al., 2016; Granito et al., 2015; Borghi & Zarcone, 2016).

We tested 40 Italian speakers on two go-nogo tasks, in succession: a lexical decision task and a recognition task. We selected from the database by Della Rosa et al. (2010) a list of 16 ABSTRACT, 16 CONCRETE and 16 EMOTIVE words. Participants pressed a pedal if the word was an Italian one and if they had previously read it; for the 24 catchtrials they pressed a button they held with the mouth or the hand. In the lexical decision task we found a concreteness effect, but no interaction with the effector. In the recognition task abstract words yielded less errors in the MOUTH than in the HAND condition, while concrete words were more accurate in the HAND condition. Results suggest that in the recognition task, but not in the lexical decision one, mouth and hand differently influence abstract and concrete concepts also when the two effectors are not directly used to respond.
Prototype-based categorization of abstract concepts

L. Melnyk
University of Erfurt, Germany

Whereas the prototype theories are extensively tested on the concrete concepts with the definition of the concept properties, the similar distinction is difficult to handle out in the case of the abstract concepts (Barsalou & Wiemer-Hastings, 2005).

The following presentation seeks to fill the afore outlined research gap through the analysis of the intrinsic properties of the abstract concepts along with the subjective characteristics they are vested with. Wiemer-Hastings and Xu (2004) point out that the difference between the properties of abstract and concrete concepts is that the second ones have more easily identifiable intrinsic features. Therefore, the study will strive to sort out the most common out of the subjective properties that were listed by the individuals.

The study will be based on the quantitative research method that will be implemented via the multiple-choice questionnaires, in which the participants will have to allocate the properties associated with the concept. Further on, the effect of radial structures will be applied to distinguish between central and peripheral elements of the category. Therefore, the study contributes to the investigation of differences in the content of abstract and concrete concepts and provides the significant insight into the theoretical approach to categorization. The findings of the study might be applied to the development of methods of second language learning and language acquisition.
Making invisible "trouble" visible:
Self-repair increases abstraction in dialogue

G. Mills & G. Redeker
University of Groningen, The Netherlands

A central finding in dialogue research is that interlocutors rapidly converge on referring expressions which become progressively abstract. However, there is currently no consensus on which mechanisms underpin convergence: The interactive alignment model (Pickering and Garrod) favours alignment processes, the grounding model (Clark, 1996) prioritizes positive feedback, while Healey (2002) demonstrates the importance of miscommunication. To investigate convergence we report a variant of the “maze-task”. Participants communicate with each other via a text-based chat tool which selectively transforms participants' private turn-revisions into public self-repairs that are made visible to the other participant. For example, if a participant, A types:

A: "Go to the square on the left, next to the big block on top"

and then before sending, A revises the turn to:

A: "Go to the square on the left, next to the third column"

The chat server automatically detects the revised text and inserts a self-repair marker (e.g. "umm" or "uhhh" immediately preceding the revision). This would yield the following turn, sent to B:

A: "Now go to the square on the left next to the big block on top umm I meant next to the third column"

Dyads who received these artificially transformed turns used more abstract, systematized referring expressions, but performed worse at the task. We argue this is due to self-repairs having a beneficial effect of amplifying naturally occurring miscommunication, while also a deleterious effect of decreasing participants' confidence in the referring conventions established during the task.
Acceptability properties of abstract senses in copredication

E. Murphy
University College London, United Kingdom

Copredication is standardly defined as a syntactic construction in which two predicates simultaneously apply to the same argument. The nominal within the Determiner Phrase consequently has no fixed interpretation, but takes multiple contradictory predicates, as when event and object readings apply to lunch, creating an ‘impossible’ entity: “Lunch was delicious but took forever“.

I will explore the acceptability properties of copredication and to what extent they can inform debates both about the cost of putative type-shifting operations which generate copredications and formal theories of its structure. Across a number of acceptability judgement experiments, I tested whether copredication in book-, lunch- and city-type nominals is difficult across-the-board or depends on sense order. It has been argued in the literature that sense order may modulate acceptability, as in: “The translation that lies on the table was difficult”; “#The translation that was difficult lies on the table”.

The results suggest that Concrete-Abstract items were significantly more acceptable than Abstract-Concrete items, such that placing the more abstract adjective first yields degraded results. An ‘Extended Mereological’ (EM) model is consequently proposed under which multiple senses are stored on single representations of complex nominals and ease of interpretability is based on a semantic type hierarchy, with processing being easiest (and acceptability being highest) when semantically more complex senses follow less complex ones.
Metaphor in action: Action verbs and abstract meaning

A. Panunzi
University of Florence, Italy

The most frequent action verbs are “general”, i.e. they are able to refer to cognitively different physical actions (“primary variation”). As a matter of fact, action verbs are also widely used to refer to abstract concepts (e.g. “to grasp an idea”, “to push someone to do something”): from a corpus estimation, around 40% of action verb occurrences refer to non-physical events (“marked variation”).

In the action verb domain, metaphorical processes operate on the basis of the action schemas identified by the primary variation of a predicate; in other words, general action verbs convey various concrete images which are exploited by different metaphorical uses. More generally, action verbs are involved in mechanisms by which we conceptualize and linguistically codify figurative and abstract meanings, mostly in connection with a high-level conceptualization provided by a cognitive metaphor.

Our research focuses on the categorization of metaphorical uses of high-frequency general action verbs within the IMAGACT project framework (www.imagact.it). The IMAGACT multilingual ontology identifies the action categories referred to by general verbs by means of prototypical scenes (1010 scenes in total). The annotation regarded 20 high-frequency action verb and more than 1000 occurrences extracted from a corpus of spoken Italian (about 1,600,000 tokens). The marked variation of such predicates was categorized with respect to the type of marked use (metaphors, metonymies, idioms). Each metaphor was then related to the scenes in the primary variation and, when possible, to one cognitive metaphor.
The concreteness effect disappears
under conditions that should maximise it

L. Pollock
University College London, United Kingdom.

Concreteness is an intuitively appealing psycholinguistic construct that has been shown repeatedly to affect performance in many different experimental tasks. However, I argue that there are problems with the way that concreteness is operationalised in psycholinguistic experiments. For a large class of items in the recently published Brysbaert et al. (2013) concreteness norm database, mean concreteness values do not reflect the judgments that individual participants made about them. For items located in the middle of the scale, participants were really making binary judgments and disagreeing with each other about whether a word was concrete or abstract.

Furthermore, a survey of experiments employing various paradigms shows that the stimuli in the ‘abstract’ conditions in these experiments are exactly those stimuli whose mean concreteness values do not reflect participants’ judgments. This is worrying: it allows scope for doubt whether concreteness effects have really been demonstrated because concrete stimuli were not actually compared with abstract stimuli.

I report my replications of two memory paradigms that a) maximised the contrast between concrete and abstract stimuli, b) controlled for the ‘midscale’ problem, and c) controlled other stimuli confounds present in various previously conducted experiments. My results suggest no statistically significant difference between memory for concrete and abstract words under conditions that should have maximised this difference. I do not wish to argue that concreteness is not a useful construct or that concreteness effects do not exist. Rather, I wish to highlight a problem that I believe is relevant to researchers conducting empirical concreteness research.
Abstract concepts in development
Spontaneous production of novel word-formation
in Swedish child language

M. Rosenberg
Umeå University, Sweden

This study examines abstract concepts expressed through novel word-formation, predominantly NN compounds, spontaneously produced by one typically developing monolingual Swedish child (age 1;9–3;6), and taken down as diary notes. Many recent findings on children’s language processing concern comprehension, and mismatch with production measures (Naigles & Bavin 2015). To complement experimental data with spontaneous data is essential: the latter are easily obtained and detailed, and reflect familiar, daily language use (Bryant 2015; Fletcher & O’Toole 2016).

Theoretically, the study assumes that innate cognitive learning mechanisms intervene in children’s language constructing (Dressler et al. 2010; Tomasello 2015; Waxman 2015). In contrast to the focus on input (frequency of occurrence) of many usage-based accounts (cf. Berman 2009), we lean on Elbers’ (2000) ‘output-as-input hypothesis’, stating that the child’s linguistic analysis operates primarily on her own production, taken as input for reanalysis. Form (morphotax, phonology) can in this way be detected before meaning (Dressler et al. 2003), rhyming well with distributional accounts. Hence, children’s production of abstract words can facilitate children’s grasping of abstract concepts (cf. Clark 2006).

Equally important, children are creative with language (Gelman & Gottfried 2016), and can start out from concrete, perception-based entities to form abstract conceptual combinations, where shape and metaphor, inter alia, intervene (cf. Lynott & Connell 2010; Jamrozik et al. 2016). In sum, this study does not conflict with abstract concepts being embodied, but furthermore, seeks to combine distributional and embodied accounts (Andrews et al. 2014; cf. Mahon 2015).
The contents and structure of semantic networks have been the focus of much recent research, with major advances in the development of distributional models. In parallel, connectionist modeling has extended our knowledge of the processes engaged in semantic activation. However, these two lines of investigation have rarely been brought together.

Here, starting from a standard textual model of semantics, we allow activation to spread throughout its associated semantic network, as dictated by the patterns of semantic similarity between words. We find that the activation profile of the network, measured at various time points, can successfully account for response times in the lexical decision task, and for subjective concreteness and imageability ratings. We also show that the number of semantic neighbor is a strong predictor of accuracy and response times in a semantic decision task, in contrast to a number of previous studies, which report a null effect.

Our results seem to indicate that the concreteness and imageability of a word are strongly reflected in the structure and dynamics of its associated semantic network. We offer a tentative explanation for this findings, based on network connectivity differences between concrete and abstract words.
A study on abstract concepts
with the extrinsic Simon task

E. Scerrati, L. Lugli, A. Borghi, R. Nicoletti
University of Bologna, Italy

Abstract concepts – concepts the referents of which are not material, perceivable, single, concrete entities such as “freedom” or “justice” – constitute a challenge for embodied and grounded accounts of knowledge.

A recent proposal on abstract concepts: the Words As Social Tools theory (WAT: Borghi & Cimatti, 2009 and Borghi & Binkofski, 2014) posits that while both concrete and abstract concepts activate sensorimotor networks, the linguistic network is activated more by abstract than by concrete concepts given that the mode of acquisition of abstract concepts relies more on language. Indeed, it is possible that when we think of abstract words we internally reproduce their sound, re-enact the experience of their acquisition, and explain to ourselves their meaning. As a consequence, the acoustic modality should be relevant for abstract concepts since the correspondent words and the verbal explanation of their meaning would be activated.

To test this hypothesis we conducted an experiment with the Extrinsic Simon Task (De Houwer, 2003). Participants classified visual and auditory white words (e.g., “bright”, “echoing”) on the basis of their meaning and concrete and abstract colored words (e.g., “horse”, “culture”) on the basis of their color. Reaction Times for the colored words conveying abstract concepts were faster when the correct response was the response that was also assigned to auditory white words (p < .05). This constitutes an implicit evidence that abstract concepts are grounded in sensory modalities and activate the acoustic modality.
The role of ambiguity and abstractness in multi-modal models of German noun compounds and particle verbs

S. Schulte im Walde & M. Köper
University of Stuttgart, Germany

A standard multi-modal model integrating (a) corpus-based textual co-occurrence features from a large German web corpus, and (b) images downloaded from bing.de, is exploited to automatically predict the degree of compositionality for German noun-noun compounds (such as Feuerwerk ‘fireworks’) and German particle verbs (such as anstrahlen ‘beam/smile at’). Our models confirm previous insights that combining linguistic and perceptual data outperforms the usage of the individual information (Andrews et al., 2009), and that the imageability of the target multi-word expressions plays an important role for the quality of the predictions (Kiela et al., 2014). At the same time, we were surprised that the model obtains better results for the particle verbs, which are more ambiguous and less concrete than the noun compounds.

Our contribution to the symposium will explore the lexical, empirical and perceptual properties of the German particle verbs (PVs) that might play a role in predicting the degrees of compositionality:

(i) corpus frequencies of the PVs;
(ii) the degree of PV ambiguity, and the influence of the predominant sense;
(iii) the concreteness vs. abstractness of associations to PV images; and
(iv) the impact of imageability.

Our analyses rely on large-scale web corpus data, dictionary entries of the number and definition of senses, a new collection of associations to verb images, and a semi-automatic resource of affective norms (Köper & Schulte im Walde, 2016). We capture particle verbs across four selected particles: ab, an, auf and aus.
Concrete words usually show a processing advantage when compared with abstract words.

The present study investigated whether the conceptual information of words, and in particular the semantic information of abstract and concrete words, is processed automatically.

In a Stroop task, participants saw abstract and concrete words of high and low frequency presented in different colors. In addition, participants saw color words (e.g., rojo, ‘red’), color associates (e.g., tomate, ‘tomato’), and form-related words (e.g., roca, ‘rock’) that were presented in an incongruent color (e.g., green).

Participants had to ignore the meaning of the word and name the color of its script. Relative to symbols (e.g., §§§§§) or matched unrelated control words (e.g., copa, ‘glass’), incongruent color words, color associates, and form-related words interfered with color naming. Most importantly, the naming of concrete words was significantly delayed relative to abstract words, though this effect emerged only for low frequency words.

The finding of a concreteness effect indicates that the semantic information of words is processed automatically. However, the interaction with frequency indicates that lexical processing precedes the processing of meaning. We discuss these results in relation to present semantic models.
We assume that particles in German particle verbs (PVs) – compositions of particles (P) and base verbs (BV), such as anstrahlen ‘beam at’ – represent concepts, which receive their meanings through the verbal context. Furthermore, we assume that a P concept is spatially grounded and therefore derived from concrete perceptions. For example, the P ab in spatial contexts introduces separation: abziehen ‘pull off’. In a more abstract communication context, separation is abstracted into a denial: Sie spricht ihm diese Fähigkeit ab ‘She denies his skill’.

Based on a data collection where experiment participants were asked to provide example sentences for systematically composed existing and non-existing PVs, we will demonstrate that such adjustments of spatially grounded P concepts are a common phenomenon.

Furthermore, we will show that the compositional meaning of PV neologisms evolves in a non-arbitrary way, when combining the constraints provided by the constituents with the constraints provided by the contexts. For example, the sentence Diese Idee werde ich ihm wieder abreden ‘This idea I will talk him off’ including the PV neologism abreden, indicates that the abstraction of ab’s separation is defined through rules and contextual compatibility.
Various studies on metaphor and gesture, particularly those from a cognitive linguistic perspective, have shown that conceptual metaphor is fundamentally expressed in both spoken and manual modalities (e.g., Calbris, 2003; Cienki, 1998; McNeill, 1992; Sweetser, 1998). In particular, gesture is capable of visually representing embodied aspects of abstract concepts, for example: specific source domain information which is not expressed in speech (e.g., gesture can show exactly how “big” a big question is). Whereas co-speech referential gestures depicting literal concepts can be straightforward and specific via iconic representation, it remains unclear how specific gestures depicting metaphorical concepts usually are (e.g., gestures with pull the rope versus to politically pull Clinton to the right).

Given that the domain of action is likely to give rise to gestures (Hostetter & Alibali, 2008), this research investigates the conceptualization of action represented in gestural forms of expression using a corpus-based approach. The current research aims to answer the following research question: To what extent are co-speech referential gestures depicting literal or metaphorical action related to, or different from, each other? Using manual action words (e.g., pull, push, lift, pick, hold) as a point of departure, the frequency and the form features of co-speech referential gestures depicting literal versus metaphorical actions will be compared.
The development of abstract scientific concepts in a naturalistic classroom setting

S. Zacharias

University of Glasgow, United Kingdom

One principle aim of science education is to develop students’ abstract thinking of scientific concepts. Patterns of actual language use from a lesson on 'heat transfer' will be presented, which involved a group of learners (12-13 years) and their teacher in a secondary classroom, in school located in the UK.

The language patterns which emerged during a series of classroom activities (e.g. a demonstration, a simulated roleplay, a problem solving task and a writing activity) were analysed using some key principles from cognitive linguistics (e.g. Text World Theory (Werth, 1999), image schemas (Lakoff and Johnson, 1999) and Conceptual Integration Theory (Fauconnier and Turner, 2002).

It will be argued that the contextual, social and cognitive dimensions of these principles provide researchers with a multi-dimensional approach to thinking about the development of abstract thought in multimodal, naturalistic settings.