

Katja (Ekaterina) Ovchinnikova

Curriculum Vitae

Research interests

- computational natural language understanding
- human and automated reasoning
- computational analysis of mass media
- language and vision
- photo identification
- knowledge representation and extraction

Education

- 2007–2011 **PhD**, *Institute of Cognitive Science, University of Osnabrück, Germany*, summa cum laude honor, OLB first prize.
- 2001–2002 **Exchange student**, *Department of Computational Linguistics, University of Tübingen, Germany*.
- 1998–2003 **M.Sc.**, *Department of Mathematical, Applied and Computational Linguistic, Saint Petersburg State University, Russia*, diploma with distinction.

Professional positions

- Nov. 2014– **Half-time researcher**, *European Molecular Biology Laboratory, Heidelberg, Germany*.
- Nov. 2014– **Guest researcher**, *Institute of Computational Linguistics, Heidelberg University, Germany*.
- 2014–2016 **Half-time researcher**, *High Performance Humanoid Technologies Lab, Institute for Anthropomatics, Karlsruhe Institute of Technology, Germany*.
- 2012–2014 **Computer scientist**, *Information Sciences Institute, USC, Los Angeles, USA*.
- 2010–2011 **Visiting student researcher**, *Information Sciences Institute, USC, Los Angeles, USA*.
- 2001–2006 **Half-time researcher/researcher (HiWi/WiMi)**, *University of Tübingen, Germany*.

Projects

current

2014–Present **Mediator: Computational Analysis of Mass Media**, <http://mediaanalysistools.github.io>.

This is a pilot study project on computational analysis of mass media. Our long-term goals are to develop tools for 1) tracking distribution of media content, i.e. looking for information sources, citations, and modifications, 2) finding contradicting and supporting evidence for news statements, 3) detecting media bias, 4) detecting manufactured spread of opinions.

2015–Present **Coral Health**, <https://github.com/alexandrovteam/spatial-corals>.

This project is on analysing coral disease based on statistical analysis of the lesion distribution as well as on photo identification of the coral colonies. In collaboration with UH Hilo Hawaii.

past

2014–2016 **XPERIENCE: Robots Bootstrapped through Learning from Experience**, www.xperience.org.

The goal of the project is to extend state-of-the-art enactive systems by using structural bootstrapping to generate new knowledge. Xperience implements, adapts, and extends a complete robot system for automating introspective, predictive, and interactive understanding of actions and dynamic situations. In this project, I work on a dialog system, planning, and domain-specific knowledge extraction from corpora.

2013–2014 **Photo Identification of Whale Images**, <https://github.com/eovchinn/socialwhales>.

This project is on developing a web service for uploading and annotating photographs of whales, matching new images against the accumulated whale catalogue, acquiring statistics about whale migration paths and population distributions. The main algorithm for automatic matching of whale images can be found at https://github.com/eovchinn/WhalePhotoID_MATLAB.

2013–2014 **Heider-Simmel Interactive Theater**, USC/ISI, USA, <http://narrative.ict.usc.edu/heider-simmel-interactive-theater.html>.

This project is on interpretation and narrativization of simple two-dimensional videos in terms of goals, plans, beliefs, and emotions. In this project, I work on application of probabilistic abduction to scene recognition.

2012–2014 **Metaphor Interpretation for Cultural Schemas**, USC/ISI, USA, <https://github.com/eovchinn/Metaphor-ADP>.

This project is on detecting linguistic metaphors in English, Spanish, Russian, and Farsi texts, and mapping them to conceptual metaphors. I supervised a group (6 people) responsible for development of an abduction-based metaphor interpretation pipeline and corpus-based knowledge extraction.

2010–2011 **Machine Reading**, USC/ISI, USA.

This project is on acquiring knowledge by machine reading. I worked on turning lexical-semantic databases like WordNet and FrameNet into machine-readable FOL axioms applicable for reasoning.

2005–2006 **Adaptive Ontologies on extreme Markup Structures**, University of Tübingen, Germany, <http://coli.lili.uni-bielefeld.de/Texttechnologie/Forscherguppe/Ontologies/index.html>.

This project is on automatic extraction of ontological knowledge from text and updating existing knowledge bases. I developed algorithms for non-monotonic ontology updates including automatic resolution of ontological inconsistencies.

2003-2005 **Distributional Idiosyncrasies**, *SFB 441 at the University of Tübingen, Germany*, <http://www.english-linguistics.de/sfb441/a5/>.

This project is on studying how syntactic, semantic, and selectional properties constraint lexical elements in their contexts of use. I worked on developing a similarity measure for comparing grammatical structures and on implementing a web service for psycholinguistic experiments.

2001-2002 **Grammar Formalisms and Parsing**, *Department of Linguistics, University of Tübingen, Germany*, <http://www.sfs.uni-tuebingen.de/~fr/current/textbook.html>.

This project is on developing an online course for teaching grammar formalisms and parsing. I developed the Morph Moulder graphical tool for visualizing formal grammars.

Publications

Books Ovchinnikova, E. (2012): *Integration of World Knowledge for Natural Language Understanding*, Atlantis Press, Springer.

Book Chapters Inoue, N., Ovchinnikova, E., Inui, K., Hobbs, J. R. (2014): Weighted Abduction for Discourse Processing Based on Integer Linear Programming. In: *Plan, Activity, and Intent Recognition*, Eds. Sukthankar, G., Goldman, R. P., Geib, S., Pynadath, D. V., Hung, H. B., 33-55.

Ovchinnikova, E., Montazeri, N., Alexandrov, T., Hobbs, J. R., McCord, M. C., Mulkar-Mehta, R. (2014): Abductive Reasoning with a Large Knowledge Base for Discourse Processing. In: *Computing Meaning*, Eds. Hunt, H., Bos, J., Pulman, S., vol. 47, 107-127.

Wandmacher, T., Ovchinnikova, E., Mönnich, U., Michaelis, J., Kühnberger, K.-U. (2011): Adaptation of Ontological Knowledge from Structured Textual Data. In: *Modeling, Learning, and Processing of Text Technological Data Structures*, Eds. Mehler, A., Kühnberger, K.-U., Lobin, H., Lungen, H., Storrer, A. and Witt, A., 129-153.

Journal Articles Aksoy, E., E. Ovchinnikova, A. Orhan, Y. Yang and T. Asfour (2017): Unsupervised Linking of Visual Features to Textual Descriptions in Long Manipulation Activities. In *IEEE Robotics and Automation Letters*, accepted for publication.

Burns, J., T. Alexandrov, E. Ovchinnikova, R. D. Gates and M. Takabayashi (2016): Investigating the spatial distribution of Growth Anomalies affecting *Montipora capitata* corals in a 3-dimensional framework. In: *Journal of Invertebrate Pathology*, 140:51-57.

Burns, J., T. Alexandrov, E. Ovchinnikova, R. D. Gates and M. Takabayashi (2016): Data for spatial analysis of growth anomaly lesions on *Montipora capitata* coral colonies using 3D reconstruction techniques. In: *Data Brief*, 9:460-462.

Palmer, A., E. Ovchinnikova, M. Thune, R. Lavigne, B. Guevel, A. Dyatlov, O. Vitek, C. Pineau, M. Boren and T. Alexandrov (2015): Using collective expert judgements to evaluate quality measures of mass spectrometry images. In: *Bioinformatics (special issue ISMB/ECCB'15)*, 31(12):375-384.

Zock, M., Wandmacher, T., Ovchinnikova, E. (2010): Are vector-based approaches a feasible solution to the "tip-of-the-tongue" problem? *eLexicography in the 21st century: New challenges, New applications*, 7:355–365.

Ovchinnikova, E., Kühnberger, K.-U. (2007): Automatic Ontology Extension: Resolving Inconsistencies. *GLDV-Journal for Computational Linguistics and Language Technology*, 22(2):19–33.

Ovchinnikova, E., Wandmacher, T., and Kühnberger, K.-U. (2007): Solving Terminological Inconsistency Problems in Ontology Design. *International Journal of Interoperability in Business Information Systems (IBIS)*, 2(1):65–80.

Ovchinnikova, E. and Richter, F. (2007): Morph Moulder: Graphical Software for Teaching and Visualizing Logic for HPSG and Description Logics. *Logic Journal of IGPL*, 15(4):333–345.

Refereed Proceedings Ovchinnikova, E., M. Wächter, V. Wittenbeck, and T. Asfour (2015): Multi-Purpose Natural Language Understanding Linked to Sensorimotor Experience in Humanoid Robots. In: *Proc. of Humanoids*, 365–372.

Ovchinnikova, E., Israel, R., Wertheim, S., Zaytsev, V., Montazeri, N., and Hobbs, J. (2014): Abductive Inference for Interpretation of Metaphors. In: *Proc. of ACL Workshop on Metaphor in NLP*. Baltimore, 33–41.

Ovchinnikova, E., A. Gordon, J. R. Hobbs (2013): Abduction for Discourse Interpretation: A Probabilistic Framework. In: *Proc. of IWCS*, 42–50.

Inoue, N., E. Ovchinnikova, K. Inui, and J. R. Hobbs (2012): Coreference Resolution with ILP-based Weighted Abduction. In: *Proc. COLING*, 1291–1308.

Peñas, A. and Ovchinnikova, E. (2012): Unsupervised Acquisition of Axioms to Paraphrase Noun Compounds and Genitives. In: *Proc. of CICLing*, vol. 7181, 388–401.

Ovchinnikova, E., Montazeri, N., Alexandrov, T., Hobbs, J., McCord, M. C., and Mulkar-Mehta, R. (2011): Abductive Reasoning with a Large Knowledge Base for Discourse Processing. In: *Proc. of IWCS*, 225–234.

Ovchinnikova, E., Borgo, S., Oltramari, A., Vieu, L., and Alexandrov, A. (2010): Data-Driven and Ontological Analysis of FrameNet for Natural Language Reasoning. In: *Proc. of LREC*, 3157–3164.

Ovchinnikova, E., Alexandrov, T., and Wandmacher, T. (2009): Automatic acquisition of the argument-predicate relations from a frame-annotated corpus. In: *Proc. of EMNLP*, 1388–1397.

Wandmacher, T., Ovchinnikova, E., and Alexandrov, T. (2008): Does Latent Semantic Analysis reflect Human Associations? In: *Proc. of the Lexical Semantics workshop at ESSLLI 2008*.

Wandmacher, T., Ovchinnikova, E., Krumnack, U.m, and Dittmann, H. (2007): Extraction, evaluation and integration of lexical-semantic relations for the automated construction of a lexical ontology. In: *Proc. of the Australasian Ontology Workshop*, vol. 85, 61–69.

- Krumnack, U., Ovchinnikova, E., and Wandmacher, T. (2007). LexO: Constructing a lexical ontology from heterogenous resources. In: *Proc. of the Lexicon/Ontology Interface Workshop (OntoLex)*.
- Kühnberger, K.-U., Wandmacher T., Schwering, A., Ovchinnikova, E., Krumnack, U., Gust, H. and Geibel, P. (2007): I-Cog: A Computational Framework for Integrated Cognition of Higher Cognitive Abilities. In: *Proc. of MICAI*, LNAI 4827, vol. 4827, 203–214.
- Kühnberger, K.-U., Wandmacher, T., Ovchinnikova, E., Krumnack, U., Gust, H. and Geibel, P. (2007): Modeling Human-Level Intelligence by Integrated Cognition in a Hybrid Architecture. In: *Foundations of Artificial Intelligence (FAInt), Workshop at KI 2007, CEUR-WS*, vol. 277, 1–15.
- Mönnich, U., Michaelis, J., Ovchinnikova, E., Wandmacher, T. and Kühnberger, K.-U. (2007): Information Extraction from Annotation Graphs Serving for the Adaptation of Ontologies - Position Paper. In: *Proc. of the Workshop on Learning from Non-Vectorial Data in conjunction with KI 2007*.
- Ovchinnikova, E. and Kühnberger, K.-U. (2007): Automatic Ontology Extension: Resolving Inconsistencies - Extended Abstract . In; *Proc. of the Workshop "Ontologies and Text Technology: Approaches to Extract Semantic Knowledge from Syntactic Information"*, PICS, vol. 2007-1, 93–98.
- Azarova, I., Ivanov, V., Ovchinnikova, E., and Sinopalnikova, A. (2006): RussNet as a Semantic Component of the Text Analyser for Russian. In: *Proc. of the Third International WordNet Conference (GWC)*, 19–27.
- Azarova, I., Ivanov V., and Ovchinnikova, E. (2006): Inheritance of the Valency Frames in RussNet Thesaurus for the Automatic Text Analysis. In: *Proc. of the international conference "Dialog"*, 18–25.
- Ovchinnikova, E. and Richter, F. (2006): Morph Moulder: Graphical Software for Teaching and Visualizing RSRL and Description Logics. In *Proc. of SICTTL*, 143–147.
- Azarova, I. and Ovchinnikova, E. (2006): Semantic Interpretation of the Noun Phrases in Russian Corpora. In: *Proc. of the International Conference on Corpus Linguistics*.
- Ovchinnikova, E. and Kühnberger, K.-U. (2006): Adaptive ALE-TBox for Extending Terminological Knowledge. In: *Proc. of Australian Joint Conference on Artificial Intelligence*, vol. 4304, 1111–1115.
- Ovchinnikova, E. and Kühnberger, K.-U. (2006): Aspects of Automatic Ontology Extension: Adapting and Regeneralizing Dynamic Updates. In: *Proc. of the Australasian Ontology Workshop (AOW), Conferences in Research and Practice in Information Technology*, vol. 72, 52–60.
- Azarova, I., Ivanov, V., and Ovchinnikova, E. (2005): Semantic Structure of the Proposition in the Procedure Extracting Facts from Russian Texts. In: *Proc. of the international conference "Dialog"*, 6–11.

Richter, F., Ovchinnikova, E., Trawinski, B., and Meurers, D. (2002): Interactive Graphical Software for Teaching the Formal Foundations of Head-Driven Phrase Structure Grammar. In: *Proc. of Formal Grammar 2002*, 137–148.

Other Ovchinnikova, E., Zaytsev, V., Wertheim, S., Israel, R. (2014): Generating Conceptual Metaphors from Proposition Stores. *arXiv preprint arXiv:1409.7619*.

Gordon, A., Hobbs, J., Ovchinnikova, K., Roemmele, M., and Morency, L. (2013): Abduction of mental states with a formal theory of commonsense psychology. Abstract. In: *Workshop on Mental model ascription by language-enabled intelligent agents*, July 31, 2013, Berlin, Germany.

Theses

PhD thesis.

Title *Integration of Word Knowledge for Natural Language Understanding*
Year 2011
Advisor Prof. Dr. Kai-Uwe Kühnberger
Institution Institute of Cognitive Science, University of Osnabrück

Diploma thesis.

Title *Interactive graphical visualization of the mathematical foundations of the formal grammars*
Year 2003
Advisor Dr. Irina V. Azarova
Institution Department of Mathematical, Applied and Computational Linguistics, St.Petersburg State University

Teaching

- 2009 Concepts and Words: Theoretical and Empirical Perspectives Interdisciplinary seminar, University of Osnabrück, Teacher
- 2008 Lexicons and Ontologies Independent Study Course, University of Osnabrück, Teacher
- 2001 Grammar Formalisms and Parsing Lectures and Seminar, University of Tübingen, Teaching Assistant

Selected Invited Talks

- Jul. 2014 Natural Language Understanding with World Knowledge and Inference (tutorial), 14th International Conference on Principles of Knowledge Representation and Reasoning, Vienna, Austria
- Jan. 2014 Inference-Based Natural Language Understanding, Allen Institute for AI, Seattle, USA
- Nov. 2013 Heider-Simmel Interactive Theater, Laboratory for Applied Ontology, Trento, Italy
- Feb. 2012 ILP-based Weighted Abduction for Natural Language Understanding, Universidad Nacional de Educacion a Distancia, Madrid, Spain

- May 2011 World Knowledge for Natural Language Understanding using Abductive Reasoning, Seminar für Sprachwissenschaft, Tübingen, Germany
- Mar. 2011 World Knowledge for Natural Language Understanding using Abductive Reasoning, Informatiekunde Rijksuniversiteit Groningen, Groningen, Netherlands

Academic service (committees, reviewer)

AAAI'15, AGI'13'14, CILing'12'13'14'15, COLING'12'14, Co-SLI-3, IWCS'13'15, LREC'10'11'12'13'14, MICAI'14, NLPAR'15, OTT'06, STARTSEM'13, Concept Types and Frames (book chapter review), NSF grant proposal review.

Awards

- 2012 The PhD thesis won the OLB first prize (<https://www.olb.de/dieolb/16532.php>) (5.000 Euro award)
- 2007 The PhD project was supported by a 3-year scholarship from the German Academic Exchange Service (DAAD)

Programming and web-oriented skills

Python, Perl, Java, Prolog, OWL and other Semantic-Web-related standards, XML, HTML, JavaScript

Languages

Russian (Mothertongue)
English (Fluent)
German (Fluent)
Italian (Conversational)
Spanish (Basic)

References

Tamim Asfour, *Institute for Anthropomatics, Karlsruhe Institute of Technology*, Adenauerring 2, 76131 Karlsruhe, Germany, Telefon: +49 721 608 47379, Fax: +49 721 608 44077, Email: asfour@kit.edu.

Jerry Hobbs, *Institute of Information Sciences, University of Southern California*, 4676 Admiralty Way, Marina del Rey, CA 90292, USA, Telefon: 1-310-448-9140, Fax: 1-310-811-0751, Email: hobbs@isi.edu.

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