Yonatan Belinkov, Ph.D.

The Henry and Marilyn Taub Faculty of Computer Science
Technion – Israel Institute of Technology

1. Personal Details

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2. Academic Degrees

2018 **Ph.D. in Electrical Engineering and Computer Science**, MIT, Cambridge, MA
Thesis: On Internal Language Representations in Deep Learning: An Analysis of Machine Translation and Speech Recognition
Advisor: James Glass, Senior Research Scientist, Computer Science and Artificial Intelligence Laboratory (CSAIL), and Faculty Member, Harvard-MIT Health Sciences & Technology

2014 **M.A. in Arabic and Islamic Studies** (*summa cum laude*), Tel Aviv University, Israel

2009 **B.Sc. in Mathematics** (*magna cum laude*) and **Arabic and Islamic Studies** (*summa cum laude*), Tel Aviv University, Israel

3. Academic Appointments

2020– **Senior Lecturer** (Assistant Professor), Faculty of Computer Science, Technion, Haifa, Israel

2018–20 **Postdoctoral Fellow in Computer Science**, SEAS, Harvard University, Cambridge, MA
Faculty Host: Stuart Shieber, Professor of Computer Science

2018–20 **Postdoctoral Associate in Computer Science**, CSAIL, MIT, Cambridge, MA
Faculty Host: James Glass, Senior Research Scientist, CSAIL, and Faculty Member, Harvard-MIT Health Sciences & Technology

4. Professional Experience

2010–2012 Software Engineer, Intuview Ltd., Israel

5. Research Interests

Natural Language Processing, Machine Learning, Deep Learning, Interpretability, Robustness, Emergent Communication.

6. TEACHING EXPERIENCE

Lecturer, Technion, Haifa, Israel

- CS236299: Introduction to Natural Language Processing (Fall 2020, Spring 2022, Spring 2023)
- CS236756: Introduction to Machine Learning (Fall 2021, Fall 2022)
- CS236817: Seminar in Natural Language Processing (Spring 2021, Fall 2021, Fall 2022)

Co-Instructor, MIT, Cambridge, MA (2020)

- Structure and Interpretation of Deep Networks

Co-Instructor, Harvard University, Cambridge, MA (2019)

- Curricular Design for Computer Science: Computational Linguistics and Natural-language Processing

Lecturer, Tel Aviv University, Israel

- Fundamentals of Grammar (2009–2011)
- Arabic II (2009-2011)
- Grammar I (2010)

Teaching Assistant, MIT, Cambridge, MA (2015)

- Introduction to Computer Science and Programming in Python
- Introduction to Computational Thinking and Data Science

Guest Lecturer

- Natural Language Processing, Princeton, Princeton, NJ (2021)
- Advanced Natural Language Processing, MIT, Cambridge, MA (2020)
- Language, Structure, and Cognition, Harvard, Cambridge, MA (2019)
- Automatic Speech Recognition, MIT, Cambridge, MA (2019)
- Machine Translation and Sequence-to-sequence Models, CMU, Pittsburgh, PA (2018)
- NLP and the Humanities, Hebrew University, Jerusalem, Israel (2015)

Pedagogical Training, MIT, Cambridge, MA (2015)
Kaufman Teaching Certificate Program, Teaching and Learning Laboratory

7. TECHNION ACTIVITIES

8. DEPARTMENTAL ACTIVITIES

2022–	Counselor for students with an unsatisfactory academic status, Computer Science, Technion
2021–	Faculty Search Committee, Computer Science, Technion
2015–18	Graduate Admissions Committee Member, EECS, MIT

9. PUBLIC PROFESSIONAL ACTIVITIES

Workshop Organizer
BlackboxNLP (at *ACL* 2019, *EMNLP* 2020, *ACL* 2021, and *EMNLP* 2022), *Robustness Task* (at *WMT* 2019 and *WMT* 2020), *RobustML* (at *ICLR* 2021)

Senior Area Chair
Interpretability and Analysis of Models for NLP track at *NAACL* (2021), *Interpretability and Analysis of Models for NLP track* at *ACL* (2022), *Ethical and Sustainable NLP track* at *EACL* (2023)

Area Chair
Interpretability and Analysis of Models for NLP track at *ACL* (2020, 2021), *Interpretability and Analysis of Models for NLP track* at *EMNLP* (2020, 2021), *CoNLL* (2020), *NeurIPS* (2021, 2022)

Reviewer

- **Journals**: *Computational Linguistics* (2021, 2022), *TACL* (2020–2022), *IEEE TASL* (2014, 2016, 2018), *Computer Speech and Language* (2017), ACM Surveys (2022)
- **Conferences**: *ACL Rolling Review* (2021), *ACL* (2018, 2019, 2023), *EMNLP* (2015, 2017, 2018 [best reviewer], 2019, 2022), *NAACL* (2018, 2019), *NeurIPS* (2019, 2020), *ICLR* (2019 [outstanding reviewer], 2020, 2021 [outstanding reviewer], 2022), *EACL* (2021), *Coling* (2018 [outstanding reviewer]), *CoNLL* (2016–2018, 2021), *IJCAI* (2019)
- **Workshops**: Various NLP workshops
- **Grant proposals**: Israeli Science Foundation (2021), Hasler Foundation (2021), Swiss National Science Foundation (2022), Czech Science Foundation (2022), Israeli Ministry of Science and Technology (2022)

Tutorial Instructor
Tutorial on *Interpretability and Analysis in Neural NLP* at *ACL* (2020) (video)

10. MEMBERSHIP IN PROFESSIONAL SOCIETIES

- The Association for Computational Linguistics

11. FELLOWSHIPS, AWARDS, AND HONORS

Fellowships

2020–23	Azrieli Early Career Faculty Fellowship
2020–23	Viterbi Fellowship, Center for Computer Engineering, Technion
2018–20	Mind, Brain, and Behavior Postdoctoral Fellowship, Harvard University
2018	Moore-Sloan Data Science Fellow, NYU (*declined*)

Awards and Honors

2021	AAAI New Faculty Highlights Program, AAAI
2019	ICLR Travel Award, New Orleans, LA
2017	NeurIPS Travel Award, Long Beach, CA
2016	Coling Student Support Program, Osaka, Japan
2013	Elie Shaio Memorial Award, MIT
2012	Konard Adenauer Master's Thesis Scholarship, Tel Aviv University
2010–11	Puzis Academic Achievements Award, Faculty of Humanities, Tel Aviv University
2010	The Rina Drori Excellence Scholarship, Faculty of Humanities, Tel Aviv University
2010	Excellence scholarship, Department of Arabic and Islamic Studies, Tel Aviv University
2009	Excellence Scholarship, The Wolf Foundation
2009	Excellence Award, School of Mathematical Sciences, Tel Aviv University

12. Graduate Students

Completed PhD theses

Completed MSc theses

- Reda Igbaria, MSc student, Technion, *Debiasing Natural Language Understanding Models Through Biased Internal Components* (2021–2023)
- Omer Antverg, MSc student, Technion, *Analyzing Individual Neurons in Contextual Word Representations from Neural Language Models* (2021–2022)
- Michael Mendelson, MSc student, Technion, *How Debiasing Affects Internal Representations in Natural Language Understanding Models* (2020–2021)
- Yana Dranker, MSc student, Technion, *Invariant Risk Minimization for Natural Language Inference* (2020–2022)
- Dimion Asael, MSc student, Technion, *A Generative Approach for Mitigating Structural Biases in Natural Language Inference* (2020–2021)
- Michal Kessler, MSc student, Hebrew University, *Machine Learning for Judeo-Arabic* (2019–2021) (Co-advisor with Omri Abend)
- Rami Manna, MEng student, MIT, *Low Resource Speech-to-text Translation from Arabic to English* (2019–2021) (Co-advisor with James Glass)

PhD theses in progress

- Itay Itzhak, PhD student, Technion, *Cognitive Biases of Language Models* (2023–) (Co-advisor with Gabi Stanovsky)
- Boaz Carmeli, PhD student, Technion, *Learning to Communicate* (2022–) (Co-advisor with Ron Meir)
- Hadas Orgad, PhD student, Technion, *Explaining, Improving and Evaluating Robustness in NLP Models* (2022–)
- Michael Hanna, PhD student, University of Amsterdam (2022–) (Co-advisor with Sandro Pezzelle)

MSc theses in progress

- Rotem Ben-Zion, MSc student, Technion, *Interpreting Emergent Communication by Translation to Natural Language*, (2023–)
- Yanay Soker, MSc student, Technion, *Early Identification of Difficulties in Model Editing* (2023–)
- Tal Haklay, MSc student, Technion, *Direct and Optimization-free Model Editing* (2022–)
- Shadi Iskander, MSc student, Technion, *Bias Mitigation with Bias-Adversarial Loss* (2022–) (Co-advisor with Kira Radinsky)
- Shachar Katz, MSc student, Technion *Noise Injection for Decoding Language Models* (2022–)

- Michael Toker, MSc student, Technion, *Metaphor Detection in Hebrew* (2022–) (Co-advisor with Benny Kimelfeld)
- Zachary Bamberger, MSc student, Technion, *Persuasive Language and Discourse* (2022–)
- Adir Rahamim, MSc student, Technion, *Improved Similarity-based Analysis for Analyzing Language Models* (2022–)

PhD thesis reader / committee member
- Shalev Shaer, PhD student, Technion (2022) (PhD committee member)
- Yoav Levine, PhD student, Hebrew University, *Theoretical Insights on the Application of Deep Neural Networks in the Fields of Many-Body Quantum Physics and Natural Language Processing* (2022) (PhD thesis reader)
- Ido Galil, PhD student, Technion (2022) (PhD committee member)
- Damián Pascual Ortiz, PhD student, ETH Zurich, *Leveraging and Understanding Deep Learning Models from Brain Activity to Language Processing* (2022) (PhD thesis reader)
- James M. Fiacco, PhD student, Carnegie Melon University, *Functional Components as a Paradigm for Neural Model Design and Explainability* (2022) (PhD committee member)
- Naomi Saphra, PhD student, University of Edinburgh, *Training Dynamics of Neural Language Models* (2021) (PhD thesis reader)

Master's thesis reader
- Shaked Meirom, Master's student, Technion, *Geometric and Topological approaches for Natural Language Processing* (2023)
- Adi Simhi, Master's student, Technion, *Interpreting Embedding Spaces by Conceptualization* (2022)
- Ben Finkelshtein, Master's student, Technion, *Robustness and Rotation Equivariance in Geometric Deep Learning* (2022)
- Mohammed Dabbah, Master's student, Technion, *Using Fictitious Class Representations to Boost Discriminative Zero-Shot Learners* (2022)
- Itay Itzhak, Master's student, Tel Aviv University, *Models In a Spelling Bee: Language Models Implicitly Learn the Character Composition of Tokens* (2021)
- Daniel Rosenberg, Master's student, Technion, *On the Robustness of Visual Question Answering Systems* (2021)
- Gal Sadeh-Kenigsfield, Master's student, Technion, *Leveraging Auxiliary Text for Deep Recognition of Unseen Visual Relationships* (2021)
- Tomer Wullach, Master's student, Haifa University, *Generalized Hate Speech Detection on Social Media* (2021)
- Ram Yazdi, Master's student, Technion, *Perturbation Based Learning for Structured NLP Tasks with Application to Dependency Parsing* (2021)
- Shunit Haviv Hakimi, Master's student, Technion, *Deep Neural Models for Jazz Improvisations* (2021)
- Elia Turner, Master's student, Technion, *Charting and Navigating the Space of Solutions for Recurrent Neural Networks* (2021)
- Tom Beer, Master's student, Technion, *Causal Inference with Mismeasured and Spurious Covariates* (2020)
- Muhammad Majadly, Master's student, Haifa University, *Dynamic Ensembles in Named Entity Recognition for Historical Arabic Texts* (2020)

Bachelor's thesis reader
- Mirac Suzgun, BA student, Harvard University, *Formal Language Theory as a Framework for Understanding the Limitations of Recurrent Neural Networks* (2020), Winner of the Hupes Prize
- Christine Jou, BA student, Harvard University, *Connecting Language Representations in Humans and Machines* (2020)

- Abdul Saleh, BA student, Harvard University, *Towards Social and Interpretable Neural Dialog Systems* (2020)

Other advising experience

- Mentor for seven undergraduate students at MIT (2017–2019)
- Mentor for six undergraduate students at Harvard SEAS (2018–2020)

13. Sponsored Long-Term Visitors and Post-Doctoral Associates

14. Grants

Competitive

2020–24   Israel Science Foundation Personal Research Grant no. 448/20. *Interpretability and Robustness in Neural Natural Language Processing.* Grant amount: 920,000 NIS (approx. $270,000).

2020–23   Israel Science Foundation New Faculty Equipment Grant no. 449/20. *Interpretability and Robustness in Neural Natural Language Processing.* Grant amount: 647,000 NIS (approx. $200,000).

Industrial and Other Sources

2022–24   Open Philanthropy Grant. *Initiative for the Interpretable Control of AI.* Co-PI: David Bau. Grant amount: $1M.

2021–24   Ministry of Science and Technology Research Grant no. 0002215. *Automatic Detection of Figurative Language in Hebrew across the Eras.* Co-PIs: Benny Kimelfeld and Ophir Münz-Manor. Grant amount: 599,990 NIS (approx. $189,000).

2020–23   Azrieli Faculty Fellowship Research Grant. *Information Storage in Models of Human Language.* Grant amount: $209,440.

2018–22   International Collaborator on Israel Science Foundation Grant no. 1191/18. *Linguistic Analysis of Algerian Judeo-Arabic Corpora Assisted by Machine Learning.* PI: Ofra Tirosh-Becker, Hebrew University. Grant amount: 520,000 NIS (approx. $143,000).

2019   Harvard Mind, Brain, Behavior Fellow Award. *Language Representations in Humans and Machines* ($5000).

PUBLICATIONS

Theses

2018   PhD Thesis: On Internal Language Representations in Deep Learning: An Analysis of Machine Translation and Speech Recognition
Electrical Engineering and Computer Science, MIT, Cambridge, MA
Advisor: James Glass

2014   MA Thesis: The Arabic Dialect of Ǧisir izZarga: Linguistic description and a preliminary classification, with sample texts
Arabic and Islamic Studies, Tel Aviv University, Israel
Advisor: Nasir Basal

Journal Articles

[1]   Arts, T., **Y. Belinkov**, N. Habash, A. Kilgarriff, and V. Suchomel. arTenTen: Arabic Corpus and Word Sketches. *Journal of King Saud University – Computer and Information Sciences*. 2014.

[2]   **Belinkov, Y.**, T. Lei, R. Barzilay, and A. Globerson. Exploring Compositional Architectures and Word Vector Representations for Prepositional Phrase Attachment. *Transactions of the Association for Computational Linguistics (TACL)*. 2014.

[3]   Romeo, S., G. Da San Martino, **Y. Belinkov**, A. Barrón-Cedeño, M. Eldesouki, K. Darwish, H. Mubarak, J. Glass, and A. Moschitti. Language processing and learning models for community question answering in Arabic. *Information Processing & Management (IPM)*. 2017.

[4]   Adi, Y., E. Kermany, **Y. Belinkov**, O. Lavi, and Y. Goldberg. Analysis of sentence embedding models using prediction tasks in natural language processing. *IBM Journal of Research and Development*. 2017.

[5]   **Belinkov, Y.** and J. Glass. Analysis Methods in Neural Language Processing: A Survey. *Transactions of the Association for Computational Linguistics (TACL)*. 2019.

[6]   **Belinkov, Y.***, A. Magidow*, A. Barrón-Cedeño, A. Shmidman, and M. Romanov. Studying the History of the Arabic Language: Language Technology and a Large-Scale . *Language Resources and Evaluation*. 2019.

[7]   **Belinkov, Y.***, N. Durrani*, F. Dalvi, H. Sajjad, and J. Glass. On the Linguistic Representational Power of Neural Machine Translation Models. *Computational Linguistics*. 2020.

[8]   **Belinkov, Y.**. Probing Classifiers: Promises, Shortcomings, and Advances. *Computational Linguistics*. 2022.

[9]   Tirosh-Becker, O.*, M. Kessler*, O. Becker, and **Y. Belinkov**. Part-of-Speech and Morphological Tagging of Algerian Judeo-Arabic. *Northern European Journal of Language Technology*. 2022.

Refereed Conference Papers

[10] Sajjad, H., K. Darwish, and **Y. Belinkov**. Translating Dialectal Arabic to English. In: *Proceedings of the 51st Annual Meeting of the Association for Computational Linguistics (ACL)*, 2013.

[11] **Belinkov, Y.** and J. Glass. Arabic Diacritization with Recurrent Neural Networks. In: *Proceedings of the 2015 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2015.

[12] Romeo, S., G. Da San Martino, A. Barrón-Cedeño, A. Moschitti, **Y. Belinkov**, W. Zhu, Y. Zhang, M. Mohtarami, and J. Glass. Neural Attention for Learning to Rank Questions in Community Question Answering. In: *Proceedings of the 26th International Conference on Computational Linguistics (Coling)*, 2016.

[13] Adi, Y., E. Kermany, **Y. Belinkov**, O. Lavi, and Y. Goldberg. Fine-grained Analysis of Sentence Embeddings Using Auxiliary Prediction Tasks. In: *Proceedings of the International Conference on Learning Representations (ICLR)*, 2017.

[14] **Belinkov, Y.**, N. Durrani, F. Dalvi, H. Sajjad, and J. Glass. What do Neural Machine Translation Models Learn about Morphology?. In: *Proceedings of the 55th Annual Meeting of the Association for Computational Linguistics (ACL)*, 2017.

[15] Sajjad, H., F. Dalvi, , N. Durrani, A. Abdelali, **Y. Belinkov**, and S. Vogel. Challenging Language-Dependent Segmentation for Arabic: An Application to Machine Translation and Part-of-Speech Tagging. In: *Proceedings of the 55th Annual Meeting of the Association for Computational Linguistics (ACL)*, 2017.

[16] Khurana, S., M. Najafian, A. Ali, T. Al Hanai, **Y. Belinkov**, and J. Glass. QMDIS: QCRI-MIT Advanced Dialect Identification System. In: *Proceedings of Interspeech*, 2017.

[17] Dalvi, F., N. Durrani, H. Sajjad, **Y. Belinkov**, and S. Vogel. Understanding and Improving Morphological Learning in the Neural Machine Translation Decoder. In: *Proceedings of the 8th International Joint Conference on Natural Language Processing (IJCNLP)*, 2017.

[18] **Belinkov, Y.**, L. Màrquez, H. Sajjad, N. Durrani, F. Dalvi, and J. Glass. Evaluating Layers of Representation in Neural Machine Translation on Part-of-Speech and Semantic Tagging Tasks. In: *Proceedings of the 8th International Joint Conference on Natural Language Processing (IJCNLP)*, 2017.

[19] **Belinkov, Y.** and J. Glass. Analyzing Hidden Representations in End-to-End Automatic Speech Recognition Systems. In: *Advances in Neural Information Processing Systems (NeurIPS)*, 2017.

[20] **Belinkov, Y.*** and Y. Bisk*. Synthetic and Natural Noise Both Break Neural Machine Translation. In: *Proceedings of the International Conference on Learning Representations (ICLR, Oral presentation)*, 2018.

[21] Poliak, A., **Y. Belinkov**, B. Van Durme, and J. Glass. On the Evaluation of Semantic Phenomena in Neural Machine Translation Using Natural Language Inference. In: *Proceedings of the 16th Annual Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies (NAACL-HLT)*, 2018.

[22] Suzgun, M., **Y. Belinkov**, and S. M. Shieber. On Evaluating the Generalization of LSTM Models in Formal Languages. In: *Proceedings of the Society for Computation in Linguistics (SCiL)*, 2019.

[23] Dalvi, F., A. Nortonsmith, D. A. Bau, **Y. Belinkov**, H. Sajjad, N. Durrani, and J. Glass. NeuroX: A Toolkit for Analyzing Individual Neurons in Neural Networks. In: *Proceedings of the Thirty-Third AAAI Conference on Artificial Intelligence (AAAI): Demonstrations Track*, 2019.

[24] Dalvi, F., N. Durrani, S. Sajjad, **Y. Belinkov**, ,A. Bau, and J. Glass. What Is One Grain of Sand in the Desert? Analyzing Individual Neurons in Deep NLP Models. In: *Proceedings of the Thirty-Third AAAI Conference on Artificial Intelligence (AAAI)*, 2019.

[25] Bau, A.*, **Y. Belinkov***, S. Sajjad, N. Durrani, F. Dalvi, and J. Glass. Identifying and Controlling Important Neurons in Neural Machine Translation. In: *Proceedings of the International Conference on Learning Representations (ICLR)*, 2019.

[26] Liu, N., M. Gardner, **Y. Belinkov**, M. Peters, and N. Smith. Linguistic Knowledge and Transferability of Contextual Representations. In: *Proceedings of the 17th Annual Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies (NAACL-HLT)*, 2019.

[27] **Belinkov, Y.***, A. Poliak*, S. M. Shieber, B. Van Durme, and A. M. Rush. On Adversarial Removal of Hypothesis-only Bias in Natural Language Inference. In: *Proceedings of the Eighth Joint Conference on Lexical and Computational Semantics (*SEM, Oral presentation)*, 2019.

[28] Durrani, N., F. Dalvi, H. Sajjad, **Y. Belinkov**, and P. Nakov. One Size Does Not Fit All: Comparing NMT Representations of Different Granularities. In: *Proceedings of the 17th Annual Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies (NAACL-HLT)*, 2019.

[29] Luo, H., L. Jiang, **Y. Belinkov**, and J. Glass. Improving Neural Language Models by Segmenting, Attending, and Predicting the Future. In: *Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics (ACL)*, 2019.

[30] **Belinkov, Y.***, A. Poliak*, S. M. Shieber, B. Van Durme, and A. M. Rush. Don't Take the Premise for Granted: Mitigating Artifacts in Natural Language Inference. In: *Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics (ACL)*, 2019.

[31] Li, X., P. Michel, A. Anastasopoulos, **Y. Belinkov**, N. Durrani, O. Firat, Ph. Koehn, G. Neubig, J. Pino, and H. Sajjad. Findings of the First Shared Task on Machine Translation Robustness. In: *Proceedings of the Fourth Conference on Machine Translation (WMT)*, 2019.

[32] Hahn, M., F. Keller, Y. Bisk, and **Y. Belinkov**. Character-based Surprisal as a Model of Human Reading in the Presence of Errors. In: *Proceedings of the 41st Annual Meeting of the Cognitive Science Society (CogSci, Oral presentation)*, 2019.

[33] **Belinkov, Y.**, A. Ali, and J. Glass. Analyzing Phonetic and Graphemic Representations in End-to-End Automatic Speech Recognition. In: *Proceedings of Interspeech*, 2019.

[34] Rosenfeld, J., A. Rosenfeld, **Y. Belinkov**, and N. Shavit. A Constructive Prediction of the Generalization Error Across Scales. In: *Proceedings of the International Conference on Learning Representations (ICLR)*, 2020.

[35] Abdou, M., V. Ravishankar, M. Barrett, **Y. Belinkov**, D. Elliott, and A. Søgaard. The Sensitivity of Language Models and Humans to Winograd Schema Perturbations. In: *Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics (ACL)*, 2020.

[36] Mahabadi, R. K., **Y. Belinkov**, and J. Henderson. End-to-End Bias Mitigation by Modelling Biases in Corpora. In: *Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics (ACL)*, 2020.

[37] Wu, J.M.*, **Y. Belinkov***, S. Sajjad, N. Durrani, F. Dalvi, and J. Glass. Similarity Analysis of Contextual Word Representation Models. In: *Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics (ACL)*, 2020.

[38] Specia, L., Zh. Li, J. Pino, V. Chaudhary, F. Guzmán, G. Neubig, N. Durrani, **Y. Belinkov**, Ph. Koehn, H. Sajjad, P. Michel, And X. Li. Findings of the WMT 2020 Shared Task on Machine Translation Robustness. In: *Proceedings of the Fifth Conference on Machine Translation (WMT)*, 2020.

[39] Durrani, N., S. Sajjad, Dalvi, F., and **Y. Belinkov**. Analyzing Individual Neurons in Pretrained Language Models. In: *Proceedings of the 2020 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2020.

[40] Dalvi, F., S. Sajjad, N. Durrani, and **Y. Belinkov**. Analyzing Redundancy in Pretrained Transformer Models. In: *Proceedings of the 2020 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2020.

[41] Vig, J.*, S. Gehrmann*, **Y. Belinkov***, S. Qian, D. Nevo, Y. Singer, and S. Shieber. Investigating Gender Bias in Language Models Using Causal Mediation Analysis. In: *Advances in Neural Information Processing Systems (NeurIPS, Spotlight presentation)*, 2020.

[42] Ravichander, A., Y. Belinkov, and E. Hovy. Probing the Probing Paradigm: Does Probing Accuracy Entail Task Relevance?. In: *Proceedings of the 16th Conference of the European Chapter of the Association for Computational Linguistics (EACL)*, 2021.

[43] Mahabadi, R. K., **Y. Belinkov**, and J. Henderson. Variational Information Bottleneck for Effective Low-Resource Fine-Tuning. In: *Proceedings of the International Conference on Learning Representations (ICLR)*, 2021.

[44] Sanh, V., Th. Wolf, **Y. Belinkov**, and A. M. Rush. Learning from others' mistakes: Avoiding dataset biases without modeling them. In: *Proceedings of the International Conference on Learning Representations (ICLR)*, 2021.

[45] Chung, Y., **Y. Belinkov**, and J. Glass. Similarity Analysis of Self-Supervised Speech Representations. In: *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2021.

[46] Finlayson, M.*, A. Mueller*, S. Gehrmann, S. Shieber, T. Linzen, and **Y. Belinkov**. Causal Analysis of Syntactic Agreement Mechanisms in Neural Language Models. In: *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics (ACL)*, 2021.

[47] Mendelson, M. and **Y. Belinkov**. Debiasing Methods in Natural Language Understanding Make Bias More Accessible. In: *Proceedings of the 2021 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2021.

[48] Dranker, Y., H. He, and **Y. Belinkov**. IRM—when it works and when it doesn't: A test case of natural language inference. In: *Advances in Neural Information Processing Systems (NeurIPS)*, 2021.

[49] Stacey, J., **Y. Belinkov**, and M. Rei. Supervising Model Attention with Human Explanations for Robust Natural Language Inference. In: *Proceedings of the Thirty-Sixth AAAI Conference on Artificial Intelligence (AAAI)*, 2022.

[50] Antverg, Omer and **Y. Belinkov**. On the Pitfalls of Analyzing Individual Neurons in Language Models. In: *Proceedings of the International Conference on Learning Representations (ICLR)*, 2022.

[51] Orgad, H., S. Goldfarb-Tarrant, and **Y. Belinkov**. How Gender Debiasing Affects Internal Model Representations, and Why It Matters. In: *Proceedings of the 2022 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies (NAACL-HLT)*, 2022.

[52] Asael, D., Z. Ziegler, and **Y. Belinkov**. A Generative Approach for Mitigating Structural Biases in Natural Language Inference. In: *Proceedings of the Eleventh Joint Conference on Lexical and Computational Semantics (*SEM)*, 2022.

[53] Meng, K.*, D. Bau*, A. Andonian and **Y. Belinkov**. Locating and Editing Factual Associations in GPT. In: *Advances in Neural Information Processing Systems (NeurIPS)*, 2022.

[54] Bansal, R., D. Pruthi, and **Y. Belinkov**. Measures of Information Reflect Memorization Patterns. In: *Advances in Neural Information Processing Systems (NeurIPS)*, 2022.

[55] Zaman, K. and **Y. Belinkov**. A Multilingual Perspective Towards the Evaluation of Attribution Methods in Natural Language Inference. In: *Proceedings of the 2022 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2022.

[56] Carmeli, B., R. Meir, and **Y. Belinkov**. Emergent Quantized Communication. In: *Proceedings of the Thirty-Seventh AAAI Conference on Artificial Intelligence (AAAI)*, 2023.

[57] Dotan, E., **Y. Belinkov**, O. Avram, E. Wygoda, N. Ecker, M. Alburquerque, O. Keren, G. Loewenthal, and T. Pupko. Multiple sequence alignment as a sequence-to-sequence learning problem. In: *Proceedings of the International Conference on Learning Representations (ICLR)*, 2023.

[58] Meng, K., A.S. Sharma, A.J. Andonian, **Y. Belinkov**, and D. Bau. Mass-Editing Memory in a Transformer. In: *Proceedings of the International Conference on Learning Representations (ICLR, notable-top-25%)*, 2023.

Refereed Workshop Papers

[59] **Belinkov, Y.**, M. Mohtarami, S. Cyphers, and J. Glass. VectorSLU: A Continuous Word Vector Approach to Answer Selection in Community Question Answering Systems. In: *Proceedings of the 9th International Workshop on Semantic Evaluation (SemEval)*, 2015.

[60] **Belinkov, Y.**, A. Barrón-Cedeño, and H. Mubarak. Answer Selection in Arabic Community Question Answering: A Feature-Rich Approach. In: *Proceedings of the Second Workshop on Arabic Natural Language Processing (ANLP)*, 2015.

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Edited Collections

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Non-Refereed Conference Papers

[76]   **Belinkov, Y.** Large-Scale Electronic Corpora and the Study of Middle and Mixed Arabic. In: *Proceedings of the IVth AIMA International Conference (Emory University, Atlanta, GA, USA, 12–15 October 2013)*, 2021.

16. CONFERENCES

Conference Co-Organizer

The Israeli Seminar on Computational Linguistics (*ISCOL* 2021)

17. Selected Talks

2023	On Localization in Language Models – Google Research India, IBM Research Tel Aviv, Google Research Tel Aviv
2022	Out-of-Distribution NLP – Hebrew University, Israeli Statistical Association
2021	Interpretability and Robustness in Natural Language Processing – AAAI New Faculty Highlights (video)
2020	Studying the History of the Arabic Language: Language Technology and a Large-Scale Historical Corpus – The Open University (video)
2020	Interpretability and Other Highlights from NLP – Workshop on Decoding Communication in Nonhuman Species, Simons Institute, UC Berkeley
2020–21	Causal Mediation Analysis for Interpreting Neural NLP: The Case of Gender Bias – Stanford, UC Berkeley, UMass Amherst, Google, Salesforce, Amazon, NYU, Edingurgh
2019	Deep Learning Models for Language: What they learn, where they fail, and how to make them more robust – Hebrew University, Technion, Weizmann Institute, Carnegie Mellon University, University of Pennsilvenia
2018	Internal Representations in Neural Machine Translation – Amazon MT team, Pittsburgh
2018	Internal Representations in Deep Learning for Language and Speech Processing – Johns Hopkins University, University of Washington, Allen Institute for Artificial Intelligence, Toyota Technological Institute at Chicago, Radcliffe Institute for Advanced Study
2017	Understanding Internal Representations in Deep Learning Models for Language and Speech Processing – Machine Learning for Language, NYU, New York
2017	On Learning Form and Meaning in Neural Machine Translation Models – Computational Data Science Seminar, Technion; CompLang Discussion Group, MIT
2017	What do Neural Machine Translation Models Learn about Morphology? – Data Science Summit Europe, Jerusalem
2017	Language Technologies for Arabic: Historical Documents, Web Forums, and Machine Translation – Qatar Computing Research Institute, Doha
2016	A Computational Analysis of Judeo-Arabic Translations of the Passover Hagaddah – International Jewish Languages Conference, Hebrew University of Jerusalem, Jerusalem
2015	Deep Learning for Sentence Representation – IBM Research, Tel Aviv
2015	Exploring Compositional Architectures and Word Vector Representations for Prepositional Phrase Attachment – Tel Aviv University, Tel Aviv

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