Risks in neural machine translation

Article in Translation Spaces · August 2020

DOI: 10.1075/ts.00021.can

CITATION READS
1

2 authors:

Carmen Canfora Johannes Gutenberg-Universität Mainz 39 PUBLICATIONS 77 CITATIONS

SEE PROFILE

READS
150

Angelika Ottmann
Die Risiko Scouts
28 PUBLICATIONS 24 CITATIONS

SEE PROFILE

SEE PROFILE

Some of the authors of this publication are also working on these related projects:

Project Best Practices in Translating and Interpreting View project

Who's afraid of translation risks? View project

Risks in Neural Machine Translation

Carmen Canfora* and Angelika Ottmann**

*Johannes Gutenberg-Universität Mainz

**Die RisikoScouts GbR

Translation Spaces vol.9, issue 1, p.58-77

Abstract

The new paradigm of neural machine translation is leading to profound changes in the translation industry. Surprisingly good results have led to high expectations; however, there are substantial risks that have not yet been sufficiently taken into account. Risks exist on three levels: first, what kind of damage can clients and end users incur in safety-critical domains if the NMT result contains errors; second, who is liable for damage caused by the use of NMT; third, what cyber risks can the use of NMT entail, especially when free online engines are used. When establishing sustainable measures to reduce such risks, we also need to consider general principles of human behaviour if we want to make sure that all agents comply with provisions and requirements.

Keywords

Neural machine translation; Translation risks; Risk management; Sustainability; Cognitive biases

References:

Akerlof, George, and Rachel E. Kranton. 2010. *Identity Economics: How Identities Shape Our Work, Wages, and Well-Being*. New Jersey: Princeton University Press.

Algorithmenethik. 2018. "Roboter sind auch nur Menschen!? [Robots are only

Humans!?]" Algorithmenethik Blog. Accessed 19 February 2020,

https://algorithmenethik.de/2018/10/30/roboter-sind-auch-nur-menschen-ein-juristischer-blick-auf-die-haftung-fuer-kuenstliche-intelligenz/.

Allianz. 2019. "Allianz Risk Barometer. Top Business Risks for 2019." *Allianz Reports*. Accessed 19 February 2020,

https://www.agcs.allianz.com/content/dam/onemarketing/agcs/agcs/reports/Allianz-Risk-Barometer-2019.pdf.

Arthur, Philip, Graham Neubig, and Satoshi Nakamura. 2016. "Incorporating Discrete Translation Lexicons into Neural Machine Translation." *Proceedings of the 2016 Conference on Empirical Methods in Natural Language Processing*, 1557–1567. DOI 10.18653/v1/D16-1162.

BaFin (Bundesanstalt für Finanzdienstleistungsaufsicht [German Federal Financial Supervisory Authority]). 2018. "Big data meets artificial intelligence. Challenges and implications for the supervision and regulation of financial services." *Bafin – Publications & Data*. Accessed 19 February 2020,

https://www.bafin.de/SharedDocs/Downloads/EN/dl_bdai_studie_en.html.

Balebako, Rebecca, Pedro Leon, Hazim Almuhimedi, Patrick Kelley, Jonathan Mugan, Alessandro Acquisti, Lorrie Cranor, and Norman Sadeh. 2011. "Nudging Users Towards Privacy on Mobile Devices." *Proceedings of the 2nd International Workshop on Persuasion, Influence, Nudge & Coercion Through Mobile Devices. Vancouver, Canada, May 8, 2011*, 23–26. Accessed 19 February 2020, http://ceur-ws.org/Vol-722/paper6.pdf. Bowker, Lynne, and Jairo Buitrago Ciro. 2019. *Machine Translation and Global Research: Towards Improved Machine Translation Literacy in the Scholarly Community*. Bingley, UK: Emerald Publishing.

Canfora, Carmen, and Angelika Ottmann. 2018. "Of Ostriches, Pyramids, and Swiss Cheese: Risks in Safety-Critical Translations." *Translation Spaces* 7 (2): 167–201. DOI 10.1075/ts.18002.can.

Canfora, Carmen, and Angelika Ottmann. 2019. "Who's Afraid of Translation Risks?" In *Challenging Boundaries: New Approaches to Specialized Communication*, edited by

Heike Elisabeth Jüngst, Lisa Link, Klaus Schubert, and Christiane Zehrer. 73–92. Berlin: Frank & Timme.

Castilho, Sheila, Joss Moorkens, Federico Gaspari, Iacer Calixto, John Tinsley, and Andy Way. 2017. "Is Neural Machine Translation the New State of the Art?" *The Prague Bulletin of Mathematical Linguistics* 108: 109–120. Accessed 19 February 2020, https://www.degruyter.com/downloadpdf/j/pralin.2017.108.issue-1/pralin-2017-0013.pdf.

Castilho, Sheila, Joss Moorkens, Federico Gaspari, Rico Sennrich, Vilelmini Sosoni, Panayota Georgakopoulou, Pintu Lohar, Andy Way, Antonio Valerio Miceli Barone, and Maria Gialama. 2017. "A Comparative Quality Evaluation of PBSMT and NMT using Professional Translators." *Proceedings of MT Summit XVI*, vol. 1: Research Track. Nagoya, September 8–11, 2017, 116–131. Accessed 19 February 2020, http://doras.dcu.ie/23083/.

Cebula, James J., and Lisa R. Young. 2010. "A Taxonomy of Operational Cyber Security Risks." *Software Engineering Institute. Technical Note CMU/SEI-2010-TN-028*.

Daems, Joke, and Lieve Macken. 2019. "Interactive adaptive SMT versus interactive NMT: a user experience evaluation." *Machine Translation* 33: 117–134.

DOI 10.1007/s10590-019-09230-z.

Daems, Joke, Sonia Vandepitte, Robert J. Hartsuiker, and Lieve Macken. 2017. "Identifying the Machine Translation Errors with the Greatest Impact on Post-editing Effort." *Frontiers in Psychology* 8: 282. DOI 10.3389/fpsyg.2017.01282. Dannewitz Linder, Mats. 2018. "How (Un)Safe is Machine Translation?". *SDL Trados Studio. The Manual Blog*. Accessed 19 February 2020, http://tradosstudiomanual.com/?p=1448.

DeepL Pro. n.d. "Allgemeine Geschäftsbedingungen [Terms of Service]". Accessed 19 February 2020, https://www.deepl.com/pro-license.html#pro.

DeepL Translator. n.d. "Allgemeine Geschäftsbedingungen [Terms of Service]". Accessed 19 February 2020, https://www.deepl.com/pro-license.html.

DePalma, Don. 2014. "Free Machine Translation Can Leak Data." *tcworld e-magazine* July 2014. Accessed 19 February 2020, http://www.tcworld.info/e-magazine/translation-and-localization/article/free-machine-translation-can-leak-data/.

Downie, Jonathan, and Angela Dickson. 2019. "Unsound Evaluations of Medical Machine Translation Risk Patient Health and Confidentiality." *JAMA Internal Medicine* 179 (7): 1001. Accessed 19 February 2020, https://jamanetwork.com/journals/jamainternalmedicine/article-abstract/2737506.

Elkington, John. 1998. *Cannibals with Forks: The Triple Bottom Line of 21st Century Businesses*. Gabriola Island, B.C., Canada: New Society Publishers.

European Commission. 2012. "Studies on Translation and Multilingualism. Language and Translation in International Law and EU Law." *Directorate-General for Translations* (European Commission). DOI 10.2782/64020.

European Commission. 2018. "Commission Staff Working Document: Liability for Emerging Digital Technologies." Accessed 19 February 2020, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018SC0137&from=en.

European Commission. 2019. "Ethics Guidelines for Trustworthy AI." *High-Level Expert Group on Artificial Intelligence*. Accessed 19 February 2020, https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai.

European Parliament. 2001. Directive 2001/95/EC of the European Parliament and the Council of 3 December 2001 on General Product Safety.

European Parliament. 2006. Directive 2006/42/EC of the European Parliament and the Council of 17 May 2006 on Machinery, and amending Directive 95/16/EC (recast).

European Parliament. 2008. Decision 768/2008/EC of the European Parliament and of the Council of 9 July 2008 on a Common Framework for the Marketing of Products (New Legislative Framework). Accessed 19 February 2020, https://ec.europa.eu/growth/single-market/goods/new-legislative-framework_en.

European Parliament. 2017. "Report with Recommendations to the Commission on Civil Law Rules on Robotics (2015/2103 [INL])." *Committee on Legal Affairs*. Accessed 19 February 2020, http://www.europarl.europa.eu/doceo/document/A-8-2017-0005_EN.pdf.

FDA (Food and Drug Administration). 2015. "Warning Letter – Smith & Nephew Inc. MARCS-CMS 457814 – April 30, 2015." *FDA Warning Letters*. Accessed 19 February 2020, https://www.fda.gov/inspections-compliance-enforcement-and-criminal-investigations/warning-letters/smith-nephew-inc-457814-04302015.

Galai, Dan, and Orly Sade. 2005. "The Ostrich effect and the Relationship between the Liquidity and the Yields of Financial Assets." *The Journal of Business* 79 (5): 2741–2759. DOI 10.1086/505250.

Gartner. 2018. "5 Trends Emerge in the Gartner Hype Cycle for Emerging Technologies, 2018". *Gartner Blog*. Accessed 19 February 2020,

https://www.gartner.com/smarterwithgartner/5-trends-emerge-in-gartner-hype-cycle-for-emerging-technologies-2018/.

Gigerenzer, Gerd. 2008. "Why Heuristics Work." *Perspectives on Psychological Science* 3 (1): 20–29. DOI 10.1111/j.1745-6916.2008.00058.x.

Google. 2017. "Google Privacy & Terms – Terms of Service". Accessed 19 February 2020, https://policies.google.com/terms?hl=en&gl=ZZ#toc-content.

Grizzo, Sara. 2018. "DeepL Pro – Pro Produktivität und Vertraulichkeit [DeepL Pro – Pro Productivity and Confidentiality]." *MDÜ* 2/2018: 33–35.

Hillson, David. 2006. "Integrated Risk Management as a Framework for Organisational Success." *Paper presented at PMI® Global Congress 2006*, Seattle, WA. Accessed 19 February 2020, https://www.pmi.org/learning/library/integrated-risk-management-framework-organizational-success-7980.

Iansiti, Marco, and Karim R. Lakhani. 2017. "The Truth about Blockchain." *Harvard Business Review* January-February 2017: 118–127. Accessed 19 February 2020, https://hbr.org/2017/01/the-truth-about-blockchain.

IEC (International Electrotechnical Committee). 2019. *IEC* 82079-1:2019 Preparation of Information for Use (Instructions for Use) of Products – Part 1: Principles and General Requirements. Paris: ISO.

IRM (Institute of Risk Management). 2018. "A Risk Practitioners Guide to ISO 31000:2018." *IRM Resource Centre*. Accessed 19 February 2020, https://www.theirm.org/news/standard-deviations-a-risk-practitioner-guide-to-iso-31000/.

ISO (International Standardization Organization). 2010. ISO 12100:2010 Safety of Machinery – General Principles for Design – Risk Assessment and Risk Reduction. Paris: ISO.

ISO (International Standardization Organization). 2013. *ISO/IEC 27001:2013 Information technology – Security techniques – Information security management systems – Requirements*. Paris: ISO.

ISO (International Standardization Organization). 2015. *ISO 17100:2015 Translation Services – Requirements for Translation Services*. Paris: ISO.

ISO (International Standardization Organization). 2016. *ISO 13485:2016 Medical Devices – Quality Management Systems – Requirements for Regulatory Purposes*. Paris: ISO.

ISO (International Standardization Organization). 2017. *ISO 18587:2017 Translation Services – Post-Editing of Machine Translation Output – Requirements*. Paris: ISO.

ISO (International Standardization Organization). 2019. *ISO* 20607 Safety of Machinery – *Instruction Handbook – General Drafting Principles*. Paris: ISO.

Joyce, William. 2006. "Accounting, Purchasing and Supply Chain Management". *Supply Chain Management: An International Journal* 11 (3): 202–207.

DOI 10.1108/13598540610662095.

Kahneman, Daniel. 2011. Thinking, Fast and Slow. New York: Farrar, Straus and Giroux.

Kahneman, Daniel, and Amos Tversky. 1982. "The Psychology of Preferences." *Scientific American* 246 (1): 160–173. Accessed 19 February 2020, https://www.jstor.org/stable/24966506?seq=1#page_scan_tab_contents.

Karlsson, Niklas, George Loewenstein, and Duane Seppi. 2009. "The Ostrich Effect: Selective Attention to Information." *Journal of Risk and Uncertainty* 38 (2): 95–115. DOI 10.1007/s11166-009-9060-6.

Khoong, Elaine, Eric Steinbrook, Cortlyn Brown, and Alicia Fernandez. 2019. "Assessing the Use of Google Translate for Spanish and Chinese Translations of Emergency Department Discharge Instructions." *JAMA Internal Medicine* 179 (4): 580– 82. Accessed 19 February 2020,

https://jamanetwork.com/journals/jamainternalmedicine/article-abstract/2725080.

Koehn, Phillip, and Rebecca Knowles. 2017. "Six Challenges for Neural Machine Translation." *Proceedings of the 1st Workshop on Neural Machine Translation*, Vancouver, BC, Canada, 28–39. Accessed 19 February 2020, http://arxiv.org/abs/1706.03872.

Krüger, Ralph. 2019. "Augmented Translation – eine Bestandsaufnahme des rechnergestützten Fachübersetzungsprozesses [Augmented Translation – A Survey of Computer-aided Technical Translation Processes]." *trans-kom* 12 (1): 142–81. Accessed 19 February 2020, http://www.trans-kom.eu/bd12nr01/trans-kom_12_01_10_Krueger_Augmented.20190816.pdf.

Kwon, Ik-Whan G., and Taewon Suh. 2004. "Factors Affecting the Level of Trust and Commitment in Supply Chain Relationships." *Journal of Supply Chain Management* 40 (1): 4–14. DOI 10.1111/j.1745-493X.2004.tb00165.x 10.1111/j.1745-493X.2004.tb00165.x.

Leite, Fernando Ochoa, Catarina Cochat, Henrique Salgado, Mariana Pinto da Costa, Marta Queirós, Olga Campos, and Paulo Carvalho. 2016. "Using Google Translate in the Hospital: A Case Report." *Technology and Health Care* 24 (6): 965–968. DOI 10.3233/THC-161241.

Lenssen, Joris-Johann, Nikolay A. Dentchev, and Ludwig Roger. 2014. "Sustainability, Risk Management and Governance: Towards an Integrative Approach." *Corporate Governance International Journal of Business in Society* 14 (5): 670–84. DOI 10.1108/CG-07-2014-0077.

Moberly, Tom. 2018. "Doctors Choose Google Translate to Communicate with Patients Because of Easy Access." *British Medical Journal* 2018 (362): k3974.

DOI 10.1136/bmj.k3974.

Moorkens, Joss. 2017. "Under Pressure: Translation in Times of Austerity." *Perspectives Studies in Translation Theory and Practice* 25 (3): 464–77.

DOI 10.1080/0907676X.2017.1285331.

Moorkens, Joss. 2019. "Human Factors in Neural Machine Translation." *Paper presented at Université Paris Diderot*, 15 March 2019. Accessed 19 February 2020, https://www.ea-anglais.univ-paris8.fr/IMG/pdf/paris-2019-moorkens.pdf.

Moorkens, Joss, and Dave Lewis. 2019. "Research Questions and a Proposal for the Future Governance of Translation Data." *Jostrans – The Journal of Specialised Translation* 32: 2–25. Accessed 19 February 2020, http://www.jostrans.org/issue32/art_moorkens.pdf.

Moorkens, Joss, and Dave Lewis. 2020. "Chapter 28. Copyright and the Reuse of Translation Data." In *The Routledge Handbook of Translation and Technology*, edited by Minako O'Hagan. Abingdon: Routledge, 469–481.

Morgan, Robert M., and Shelby D. Hunt. 1994. "The Commitment-Trust Theory of Relationship Marketing." *Journal of Marketing* 58 (3): 20–38. DOI 10.1177/002224299405800302.

Nitzke, Jean, Silvia Hansen-Schirra, and Carmen Canfora. 2019. "Risk management and post-editing competence." *Jostrans – The Journal of Specialised Translation* 31: 239–59. Accessed 19 February 2020, http://www.jostrans.org/issue31/art_nitzke.pdf.

Nunes Vieira, Lucas, and Elisa Alonso. 2019. "Translating Perceptions and Managing Expectations: An Analysis of Management and Production perspectives on Machine

Translation." *Perspectives Studies in Translation Theory and Practice*. DOI 10.1080/0907676X.2019.1646776.

Nurminen, Mary, and Maarit Koponen. 2018. "Governments, NGOs, MT and Accessibility." *Presentation held at Kites/ELRC Workshop*, 24 October 2018, Helsinki, Finland. Accessed 19 February 2020,

https://solecris.tuni.fi/crisyp/disp/_/en/cr_redir_all/fet/fet/sea?direction=5&id=45640950.

Pairaphrase. 2019. "End User License Agreement." Accessed 19 February 2020, https://www.pairaphrase.com/terms-of-use/.

Proz.com. 2017. "Fate of crossTank and crossTerm Entries in Remote Client Mode."

Proz.com Translation Industry Discussion Forums. Accessed 19 February 2020, https://www.proz.com/forum/across_support/311173- fate of crosstank and crossterm entries in remote client mode.html.

Proz.com. 2018. "Is Translation a Field I Can Work in Despite the Rise of MT?" *Proz.com Translation Industry Discussion Forums*. Accessed 19 February 2020, https://www.proz.com/forum/machine_translation_mt/323333-is_translation_a_field_i_can_work_in_despite_the_rise_of_mt.html.

Proz.com. 2019. "Anyone Want to Go on STRIKE?" *Proz.com Translation Industry Discussion Forums*. Accessed 19 February 2020, https://www.proz.com/forum/business_issues/337346-anyone_want_to_go_on_strike-page2.html.

Reason, John. 1990. Human Error. New York, NY: Cambridge University Press.

Sakamoto, Akiko. 2019. "Unintended Consequences of Translation Technologies: From Project Managers' Perspectives." *Perspectives Studies in Translation Theory and Practice* 27: 58–73. DOI 10.1080/0907676X.2018.1473452.

Sakamoto, Akiko, and Masaru Yamada. 2019. "Promoting Ethical and Sustainable Use of MT in the Translation Industry: A Case in Japan." *Paper presented at the Fair MT Workshop, MT Summit 2019, Dublin City University*. Accessed 19 February 2020, https://drive.google.com/file/d/liZWVpq1mYxDlqwWiMwLDKaYKUDk_vRlL/view.

Sakamoto, Akiko, Begoña Rodríguez de Céspedes, Sarah Berthaud, and Jonathan Evans. 2017. "When Translation meets Technology. Language Service Providers (LSPs) in the Digital Age." *Focus Group Report* (October 2017). Accessed 19 February 2020, https://www.iti.org.uk/attachments/article/1087/Portsmouth%20Focus%20Group%20Report.pdf.

Skoglösa, Örjan. 2019. "Vad tycker vi översättare om maskinöversättning? [What Do We Translators Think about Machine Translation?]" *Facköversättaren* 1: 16–19. Accessed 19 February 2020, https://sfoe.se/wp-content/uploads/fackoversattaren 2019 1.pdf.

Slator. 2017. "Translate.com Exposes Highly Sensitive Information in Massive Privacy Breach." *Slator.com Blog*. Accessed 19 February 2020, https://slator.com/technology/translate-com-exposes-highly-sensitive-information-massive-privacy-breach/.

Sutcliffe, Laura, Anja Maier, James Moultrie, and John Clarkson. 2009. "Development of a Framework for Assessing Sustainability in New Product Development." *Proceedings of the International Conference on Engineering Design* 58 (7): 24–27 August 2009, Palo Alto, CA, USA. Accessed 19 February 2020,

 $\underline{\text{https://www.designsociety.org/publication/28789/Development+of+a+framework+for+as}}\\ \underline{\text{sessing+sustainability+in+new+product+development}}.$

Systran. 2016. "Is Your Team Violating Data Compliance Laws with Online Translation Tools?" *Systran Blog*. Accessed 19 February 2020, https://blog.systransoft.com/is-your-team-violating-data-compliance-laws-with-online-translation-tools/.

Toft, Yvonne, Prue Howard, and David Jorgensen. 2003. "Changing Paradigms for Professional Engineering Practice towards Safe Design – An Australian Perspective." *Safety Science* 41 (2–3): 263–276. DOI 10.1016/S0925-7535(02)00006-1.

Tversky, Amos, and Daniel Kahneman. 1973. "Availability: A Heuristic for Judging Frequency and Probability." *Cognitive Psychology* 5 (2): 207–232. DOI 10.1016/0010-0285(73)90033-9".

Tversky, Amos, and Daniel Kahneman. 1974. "Judgement under Uncertainty: Heuristics and Biases." *Science* 185 (4157): 1124–1131. DOI 10.1126/science.185.4157.1124.

Vaezian, Helia, and Mahmoud Akbari. 2018. "Common Risks in the Translation Industry. A Sequential Exploratory Study." *The Journal of Internationalization and Localization* 5 (2): 95-113. DOI 10.1075/jail.00012.vae.

Van Brussel, Laura, Arda Tezcan, and Lieve Macken. 2018. "A Fine-Grained Error Analysis of NMT, PBMT and RBMT Output for English-to-Dutch." *Proceedings of the Eleventh International Conference on Language Resources and Evaluation, May 2018, Miyazaki, Japan*, 3799–3804. Accessed 19 February 2020, https://biblio.ugent.be/publication/8561558/file/8563576.pdf.

Vashee, Kirti. 2017. "Data Security Risks with Generic and Free Machine Translation." *Empty Pages Blog*. Accessed 19 February 2020, http://kv-emptypages.blogspot.com/2017/09/data-security-risks-with-generic-and.html?m=1. Way, Andy. 2019. "Chapter 14. Machine Translation: Where Are We at Today?" In *The Bloomsbury Companion to Language Industry Studies*, edited by Eric Angelone, Maureen Ehrensberger-Dow, and Gary Massey. London: Bloomsbury.

WBCSD (World Business Council for Sustainable Development). 2016. "Sustainability and Enterprise Risk Management: The First Step Towards Integration." WBCSD Reports.

Accessed 19 February 2020, https://www.wbcsd.org/Programs/Redefining-Value/Business-Decision-Making/Measurement-Valuation/Resources/Sustainability-and-enterprise-risk-management-The-first-step-towards-integration.

Weinmann, Markus, Christoph Schneider, and Jan vom Brocke. "Digital Nudging" *Business & Information Systems Engineering* 58 (6): 433–436. DOI 10.1007/s12599-016-0453-1.

World Economic Forum. 2017. "Global Risks of Highest Concern for Doing Business." World Economic Forum Reports. Accessed 19 February 2020, http://reports.weforum.org/global-risks-2017/global-risks-of-highest-concern-for-doing-business-2017/.

Zajonc, Robert B. 2001. "Mere Exposure. A Gateway to the Subliminal." *Current Directions in Psychological Science* 10 (6): 224–228. DOI 10.1111/1467-8721.00154.

Authors' Address

Dr. Carmen Canfora

Johannes Gutenberg-Universität Mainz

Special Department Translation (FTSK Germersheim)

An der Hochschule 2

D-76726 Germersheim

Germany

canfora@uni-mainz.de

Angelika Ottmann

Die RisikoScouts GbR

Kornblumenstr. 15

D-68309 Mannheim

Germany

ottmann@risikoscouts.de