# Tomas Singliar

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## Current role

**(Nov 2019 – )** *Principal Applied Scientist, Supply Chain Optimization Technologies (SCOT), Amazon.com*

**What I do:** I am Amazon’s point person on creating knowledge of product substitution and applying to business decisions. I led scientists, engineers and economists from all Amazon Stores divisions to deliver >$500M annual profit improvement.

* Invented three datasets describing customer **substitution** across 18M items worldwide. Led development from a script prototype into regularly running, well-defined, ticket-supported products. More than 300 internal teams onboarded as consumers. Full scope ownership: product, science, tech, business and legal.
* Translated academic research in **substitution-aware optimal assortment** into Ops systems (in prod, $80M/yr profit improvement). Motivating launch customer and heaviest user for a new selection experimental platform to rigorously A/B-test assortment policies (owned 30+ worldwide experiments, resulting in 3 program launches).
* Ideated, prototyped, and launched in prod the reactive selection component of [**Amazon regionalization**](https://www.amazon.science/news-and-features/how-amazon-reworked-its-fulfillment-network-to-meet-customer-demand), a high-frequency decision system controlling which items should remain available by long-zone fulfillment when local inventory runs out. Launched early Q2 2024 with annual ship cost savings of $90M. Tech enabled another $100M/yr launch in Q3.
* **Specify requirements, testing protocols, and acceptance criteria** for new substitution models developed outside of my team, and plan their integration into production supply chain decision systems.
* Defined a **substitution-based program for a new customer experience** with potential ~$1B annual profit increment and positive revenue impact (design complete). Ran customer survey panels to ascertain customer interest.
* **Provide overall vision** for research topics, system quality, and business integration to org of ~100 people (~20 scientists). Define the concepts, process and standards for internal research, balancing pace of progress with quantitative rigor. Set science standard by publishing in competitive internal conferences.
* Quarterly report to, **influence and recommend course of action** to Stores CEO level in the areas of substitution, optimal selection, search ranking, and customer downstream impacts.
* **Organizer and Track Chair of Amazon annual internal conference** Customer Science Summit (~100 accepted papers, 20% acceptance rate, running since 2014). Redesigned the reviewing process and reflected it in software, operationally own the Amazon-InfoSec-compliant internal conference management system.

## Previous professional experience

**(Nov 2015 – Oct 2019)** *Senior🡪 Principal Data Scientist, Microsoft Cloud AI.*

* Python [automated machine learning SDK for forecasting](https://azure.microsoft.com/en-us/blog/new-automated-machine-learning-capabilities-in-azure-machine-learning-service/).
* Designed the AzureML Package For Forecasting – “FTK” and led the project team.

[**[azuremlftk @ PyPI]**](https://pypi.org/project/azuremlftk/) [**[FTK at Build 2018]**](https://www.youtube.com/watch?v=m-xoVtSdJs0)

* Designed cloud software installable by anyone, thus driving usage of Business-AI-in-Azure. Owned the [Interactive Price Analytics](https://gallery.cortanaintelligence.com/Solution/Interactive-Price-Analytics) solution and operationalized [Demand Forecasting for Shipping and Distribution](https://gallery.cortanaintelligence.com/Solution/Demand-Forecasting-for-Shipping-and-Distribution-2), shipped publicly June 2017.
* Create bespoke advanced analytics proof-of-concept solutions for selected pilot business customers, mainly pricing and forecasting applications.
* Expand mind-share: represent Microsoft at trade conferences like [Strata](https://conferences.oreilly.com/strata/strata-ca/public/schedule/speakers), extremeCRM, and connect with the academic community, e.g. at [UAI](http://bmaw2017.azurewebsites.net/), [KDD](https://www.kdd.org/kdd2018/hands-on-tutorials/view/active-learning-and-transfer-learning-at-scale-with-r-and-python).

**(Sep 2013 – Oct 2015)** *Research Scientist III, Search and Discovery, Amazon.com, Seattle*

**(Feb 2009 – Aug 2013)** *Advanced Technologist 4, Boeing, Seattle, WA*

## Peer-reviewed publications (most recent first)

### In Conferences

* C. Song, T. Singliar. CRSR: Regional Substitution-Aware Assortment Planning. Amazon Consumer Science Summit, 2024. [internal publication]
* C. Song, L. Yang, T. Singliar. Correcting Search-Result Based Substitution Relations by Co-Click Signal. Amazon Consumer Science Summit, 2024. [internal publication]
* C. Song, T. Singliar. Attribute-based Replaceability Index. Amazon Consumer Science Summit, 2022. [internal publication]
* C. Song, L. Fu, T. Singliar. On validation of counterfactual cross-ASIN relations. Amazon Consumer Science Summit, 2022. [internal publication]
* H. Topaloglu, S. Humair, T. Singliar, C. Song. Low-rank approximation of substitution matrix via customer choice model. Amazon Consumer Science Summit, 2021. [internal publication]
* G. Herman, Z. Liu, T. Singliar, J. Jonker. Substitutable Product Groups Using Customer Search Behavior. Amazon Consumer Science Summit, 2021. [internal publication]
* Z. Wang, T. Singliar, I. Giannakakis, H. Hong. Serial Correlation, Non-stationarity and Regression-based Experiment Inference. Amazon Consumer Science Summit, 2021. [internal publication]
* T. Singliar. Learnings from Substitution Experiments. Amazon Consumer Science Summit, 2021. [internal publication]
* T. Singliar. An agile substitutability matrix derived from Amazon Choice data. Consumer Science Summit, 2020. [internal publication]
* J.-M. Agosta, O. Liakhovich, R. Horton, M. Inchiosa, J. Ormont, V. Paunić, S. Ramesh, T. Singliar, A. Zaidi, and H. Zhang: Active learning and transfer learning at scale with R and Python (Tutorial), KDD 2018
* M. Inchiosa, V. Paunic, R. Horton, J.-M. Agosta, D. GuhaThakurta, A. Zaidi, T. Singliar: Using R and Python for Scalable Data Science (Tutorial), Machine Learning, and AI. Strata + Hadoop World, March 2018, San Jose
* T. Singliar, M. Goldman, E. Wright: Buying from an AI: Surface holiday promotion design as optimization over price. MS Machine Learning and Data Science (MLADS) conference, Fall 2017. [internal publication]
* R. Horton, V. Paunic, M. Inchiosa, T. Singliar, D. GuhaThakurta, J. Chang: Custom Image Classification Tutorial: Building Domain-Specific Image Classifiers Using Deep Learning and Transfer Learning with Microsoft ML Server. MLADS Fall 2017. [internal publication]
* T. Singliar, M. Goldman. The Pricing Engine: make pricing decisions with Azure-based causal inference. MLADS Spring 2017. [internal publication]
* T. Singliar, F. Moerchen: DELi: A framework for measuring customer impact of catalog changes, Amazon Machine Learning Conference AMLC’2015 [internal publication]
* N. Rose, A. Dutta, T. Singliar: A quasi-A/B technique for ASIN experiments, Amazon Machine Learning Conference AMLC’2015 [internal publication]
* T. Singliar, F. Moerchen: Quantifying impact of sourcing catalog data, Amazon Machine Learning Conference AMLC’2014 [internal publication]
* T. Singliar, D. Dash: Efficient Inference in Persistent Dynamic Bayesian Networks; 24th Conference on Uncertainty in Artificial Intelligence, 2008
* T. Singliar, M. Hauskrecht: Approximation Strategies for Routing in Dynamic Stochastic Networks; 10th International Symposium on Artificial Intelligence and Mathematics, 2008
* T. Singliar, M. Hauskrecht: Learning to Detect Adverse Traffic Events from Noisily Labeled Data; 11th European Conference on Principles and Practice of Knowledge Discovery in Databases, 2007
* T. Singliar, M. Hauskrecht: Modeling Highway Traffic Volumes; 18th European Conference on Machine Learning, 2007
* T. Singliar, D. Dash: COD: Online Temporal Clustering for Outbreak Detection; 22nd Conference on Artificial Intelligence, 2007
* T. Singliar, M. Hauskrecht: Variational Learning for Noisy-OR Component Analysis; SIAM Conference on Statistical Data Mining, 2005
* M. Hauskrecht, T. Singliar: Monte-Carlo optimization for resource allocation problems in stochastic network systems; International Conference on Uncertainty in Artificial Intelligence, 2003
* G. Juhas, R. Lorenz, T. Singliar: On synchronicity and concurrency in Petri Nets; Proceedings of Applications and Theory of Petri Nets, 2003

### In Journals

* T. Singliar, M. Hauskrecht: Noisy-OR Component Analysis and its Application to Link Analysis. Journal of Machine Learning Research, vol. 7, October 2006
* T. Singliar, M. Hauskrecht: Learning to detect incidents from noisily labeled data, Machine Learning Journal, vol. 79, pages 335-354, September 2010

### In Workshop Proceedings

* T. Singliar, D. Margineantu: Scaling up Inverse Reinforcement Learning through Instructed Feature Construction, The “Snowbird” Learning Workshop, 2011
* T. Singliar, M. Hauskrecht: Towards a Learning Incident Detection System. Workshop on Machine Learning for Surveillance and Event Detection, International Conference on Machine Learning 2006
* T. Singliar, M. Hauskrecht: Modeling Large Stochastic Networks. Workshop on Robust Communication in Complex Networks; Neural Information Processing Systems 2003

## Service on conference and journal editorial committees

* Track Chair and Website Chair, Amazon CSS 2021-2024
* Area Chair, Amazon ML Conference AMLC 2023; Senior Area Chair, AMLC 2024
* Senior Program Committee Member, AAAI-10 and -12, KDD 2015
* Program committee member/Reviewer for all major conferences in the AI and ML domains: AAAI, AISTATS, IJCAI, UAI, ECML/PKDD, KDD and several journals
* MSFT internal ML conferences – MLADS. MS Journal of Applied Research.
* Co-Chair (local arrangements) for ICML 2011 (28th International Conference on Machine Learning)

## Patents

* T. Singliar, W. Murray, R. Cranfill, D. Margineantu: Natural language interface for systems reasoning about observed behavior, granted 2017
* T. Singliar, D. Margineantu: Intent estimation method and system for agents of limited perception. US Patent #8,959,042. Amends USP#8,756,177.
* T. Singliar, D. Margineantu: Methods and system for estimating subject intent from surveillance, US Patent #8,756,177, issued June 2014
* T. Singliar: Monitoring the state-of-health information for components, US Patent #8,533,133, issued Sep 2013

## Education

* **2008** PhD in Computer Science, University of Pittsburgh. Machine Learning in transportation networks, traffic flow prediction and route planning.
* **2005** MS in Computer Science, University of Pittsburgh. Statistical Machine Learning.
* **2001** MSc (“magister”) in Informatics, Comenius University, Bratislava, Slovakia. Formal methods, software and systems engineering.

## Personal

* Citizen of USA and Slovak Republic
* Languages: Slovak/Czech native, English native level, French basic
* Interests: mountaineering, astronomy, books