Ada Aka

3720 Walnut St. Philadelphia, PA 19104
adaaka@wharton.upenn.edu | https://adaaka.com

EDUCATION

The Wharton School, University of Pennsylvania 2019 – 2023
Ph.D. Joint in Marketing and Psychology

University of Pennsylvania 2018 – 2019
M.A. in Psychology

Duke University 2012 – 2016
B.A. with honors in Psychology; Minor in Neuroscience, Markets & Management

RESEARCH INTERESTS

Computational models of consumer judgment and decision making with a strong emphasis on memory, machine learning techniques, and natural language processing to study consumer behavior.

PUBLICATIONS

Bhatia, Sudeep and **Ada Aka** (2022), "Cognitive Modeling with Representations From Large-Scale Digital Data," *Current Directions in Psychological Science*.

Aka, Ada and Sudeep Bhatia (2021), "Machine Learning Models for Predicting, Understanding and Influencing Health Perception," *Journal of Association for Consumer Research*.

Aka, Ada and Sudeep Bhatia (2021), "What I Like Is What I Remember: Memory Modulation and Preferential Choice," *Journal of Experimental Psychology: General*.

Aka, Ada, Tung D. Phan, and Michael J. Kahana (2021), "Predicting Recall of Words and Lists," *Journal of Experimental Psychology: Learning, Memory, & Cognition*, 47(5), 765.

Ezzyat, Youssef, Paul Wanda, Deborah F. Levy, Alison Kadel, **Ada Aka**, et al. (2018), "Closed-Loop Stimulation of Temporal Cortex Rescues Functional Networks and Improves Memory," *Nature Communications*, 9(1), 365.

BOOK CHAPTERS

Kahana, Michael J., Nick B. Diamond, and **Ada Aka** (in press), Laws of Human Memory. In *Oxford Handbook of Memory*. Oxford University Press.

Aka, Ada and Sudeep Bhatia (in press), Word and Sentence Embedding Methods for Studying Human Behavior. In G. Pogrebna T. Hills (Eds.), *Cambridge Handbook of Behavioral Data Science*. Cambridge University Press.

WORKING PAPERS (Including Papers Under Revision)

* Papers are available at https://www.adaaka.com/)

Aka, Ada, Sudeep Bhatia, and John P. McCoy, "Semantic Determinants of Memorability," invited for second round revision at *Cognition*.

Richie, Russell, **Ada Aka**, and Sudeep Bhatia, "Free Association in Bidirectional Memory Networks," under second round review at *Psychological Review*.

Kahana, Michael J., Lynn J. Lohnas, Karl Healey, **Ada Aka**, Adam W. Broitman, Elizabeth Crutchley,..., & Christoph T. Weidemann, "The Penn Electrophysiology of Encoding and Retrieval Study," under review at the *Journal of Experimental Psychology: General*.

Wang, Feiyi, **Ada Aka**, and Sudeep Bhatia, "Dynamics of Counterfactual Retrieval," invited for second round revision at the *Journal of Experimental Psychology: Learning, Memory, & Cognition*.

Aka, Ada, Christopher Olivola, Gideon Nave, and Sudeep Bhatia, "Leveraging Social Media, Digitized Language Data, and Machine Learning to Identify Consumer Personality Segments, Facets of Brand Image, and Predictors of Brand Liking," under revision.

Aka, Ada, Lionel Schatz, and Sudeep Bhatia, "A Framework for Modeling Naturalistic Memory-Based Decision Making," working paper.

SELECTED WORK IN PROGRESS

Aka, Ada, John P. McCoy, and Eric T. Bradlow, "Cognitive Maps of Products."

Aka, Ada and John P. McCoy, "Slogan Memorability at a Large Scale."

Epstein, Benjamin, **Ada Aka**, and Michael J. Kahana, "Memory Priming and Intertemporal Choice."

ORGANIZED SYMPOSIA

Digitized Big Data and Machine Learning Approaches to Consumer Behavior. Association for Consumer Research Conference, 2020.

Insights From Textual Data and Machine Learning Algorithms for Consumer Behavior. Association for Consumer Research Conference, 2021.

PRESENTATIONS

Aka, Ada, Christopher Olivola, Gideon Nave, and Sudeep Bhatia (2022), "Computational Consumer Segmentation and Brand Management," paper accepted for presentation at the Academy of Management Conference, Seattle, Washington.

Aka, Ada, Christopher Olivola, Gideon Nave, and Sudeep Bhatia (2022). "Computational Consumer Segmentation and Brand Management: Leveraging Social Media, Digitized Language Data, and Machine-Learning to Identify Consumer Personality Segments, Facets of Brand Image, and Predictors of Brand Liking," paper accepted for presentation at the International Association for Conflict Management Conference, Ottowa, Canada.

Aka, Ada, Lionel Schatz, and Sudeep Bhatia (2022), "A Joint Model of Memory and Decision Making," talk presented at Temple University Decision Neuroscience Symposium, Philadelphia, PA.

Aka, Ada, Lionel Schatz, and Sudeep Bhatia (2022), "A Joint Model of Memory and Decision Making," talk presented at the Context and Episodic Memory Symposium, Philadelphia, PA.

Aka, Ada (2021), "Word and Sentence Representations for Studying Human Behavior," invited presentation at the Emerging Scholars of Psychological Science Talk Series, Princeton University, Princeton, NJ.

Aka, Ada and Sudeep Bhatia (2021), "Machine Learning Models for Predicting, Understanding and Influencing Health Perception," paper presented at the Conference on Artificial Intelligence, Machine Learning, and Business Analytics.

Aka, Ada and Sudeep Bhatia (2021), "Machine Learning Models for Predicting, Understanding and Influencing Health Perception," paper presented at the Association for Consumer Research Conference.

Aka, Ada and Sudeep Bhatia (2021), "Understanding Health Judgment with Machine Learning and Vector Semantic Space," paper presented at the Society for Consumer Psychology Conference.

Aka, Ada and Sudeep Bhatia (2021), "Understanding Health Judgment with Machine Learning and Vector Semantic Space," paper presented at the Academy of Management Conference.

Aka, Ada and Sudeep Bhatia (2021),"Understanding Health Judgment with Machine Learning and Vector Semantic Space," paper presented at the International Association for Conflict Management Conference.

Aka, Ada, John P. McCoy, and Sudeep Bhatia (2021), "Modeling Memorability with Semantic Representations," paper presented at the Society for Mathematical Psychology Conference.

Aka, Ada and Sudeep Bhatia (2021), "What I Like Is What I Remember: Memory Modulation and Preferential Choice," paper presented at the European Group of Process Tracing Studies Conference.

Aka, Ada (2021), "Memorability and Preferential Choice," invited presentation at the Cognitive Science Graduate Talks, Rutgers University, New Brunswick, NJ.

Aka, Ada and Sudeep Bhatia (2020), "Studying Health Perceptions," paper presented at the Society for Judgment and Decision Making Conference.

Aka, Ada and Sudeep Bhatia (2020), "Understanding Health Judgment with Machine Learning and Vector Semantic Space," invited presentation at the Psychology Graduate Students Seminar, University of Pennsylvania, Philadelphia, PA.

Aka, Ada and Sudeep Bhatia (2019), "Modeling Memory-Based Decision Making," paper presented at the Association for Consumer Research Conference, Atlanta, GA.

Aka, Ada, Christopher Olivola, Gideon Nave, and Sudeep Bhatia (2019). "Computational Consumer Segmentation and Brand Management: Leveraging Social Media, Digitized Language Data, and Machine-Learning to Identify Consumer Personality Segments, Facets of Brand Image, and Predictors of Brand Liking," paper presented at the INSEAD-Wharton Ph.D. Consortium.

Aka, Ada and Michael J. Kahana (2017), "Predicting Recall of Words and Lists," invited presentation at the Perception & Mind Lab, Johns Hopkins University, Baltimore, MD.

Aka, Ada, Kathleen M. Arnold, and Elizabeth J. Marsh (2016), "Using Retrieval to Enhance Comprehension," paper presented at the North Carolina Cognition Group Conference, Elon, NC.

POSTER PRESENTATIONS

Aka, Ada, John P. McCoy, and Sudeep Bhatia (2022), "Zebra Is Probably More Memorable than Tick, How Accurate Are People When Making Memorability Predictions?," poster presented at the Society for Consumer Psychology Conference.

Aka, Ada, John P. McCoy, and Sudeep Bhatia (2022), "Zebra Is Probably More Memorable than Tick, How Accurate Are People When Making Memorability Predictions?," poster presented at the Society for Judgment and Decision Making Conference.

Aka, Ada and Sudeep Bhatia (2019), "Studying Health Perceptions," poster presented at the Cognitive Science Society Conference.

Aka, Ada and Sudeep Bhatia (2019), "Studying Health Perceptions," poster presented at the Psychonomic Society Conference.

Aka, Ada and Sudeep Bhatia (2020), "What I Like Is What I Remember: Memory Modulation and Preferential Choice," poster presented at the Cognitive Science Society Conference.

Aka, Ada, John P. McCoy, and Sudeep Bhatia (2022), "Modeling Memorability with Semantic Representations," poster presented at the Society for Mathematical Psychology Conference.

Aka, Ada, John P. McCoy, and Sudeep Bhatia (2020), "Using Distributed Semantic Representations to Predict Word Memorability," poster presented at the Context and Episodic Memory Symposium.

Aka, Ada and Sudeep Bhatia (2019), "Memory Modulation in Preferential Choice," poster presented at the Society for Judgment and Decision Making Conference, Montreal, Canada.

Aka, Ada and Sudeep Bhatia (2019), "Core Memory Processes in Choice Behavior," poster presented at the Society for Judgment and Decision Making Conference, Montreal, Canada.

Aka, Ada and Sudeep Bhatia (2019), "Core Memory Processes in Choice Behavior," poster presented at the Context and Episodic Memory Symposium, Philadelphia, PA.

Aka, Ada and Michael J. Kahana (2019), "Memory Is Tuned to Remember Human-Related Words," poster presented at the Psychonomic Society Conference, New Orleans, LA.

Aka, Ada and Michael J. Kahana (2018), "Predicting Recall of Words and Lists," poster presented at the Context and Episodic Memory Symposium, Philadelphia, PA.

Aka, Ada, Kathleen M. Arnold, and Elizabeth J. Marsh (2016), "Using Retrieval to Enhance Comprehension," poster presented at the Visible Thinking Conference, Durham, NC.

RESEARCH FUNDING AND AWARDS

2021 Mack Institute Research Fellowship
A Machine Learning Approach To Likeable and Memorable Brand Slogans with John P. McCoy and Sudeep Bhatia

2020 Russell Ackoff Doctoral Fellowship in Risk Management and Decision Sciences
Predicting Perceptions of Health States Using Digitized Big Data with Sudeep Bhatia

2019 Russell Ackoff Doctoral Fellowship in Risk Management and Decision Sciences
Core Memory Processes in Choice Behavior with Sudeep Bhatia

Duke University Independent Research Grants
2014 - 2016 (awarded multiple semesters)

2018 Jerome S. Bruner Award for Excellence in Undergraduate Research
Honorable Mention

TEACHING EXPERIENCE AND RECOGNITION

University of Pennsylvania Philadelphia, PA
Graduate Teaching Fellow & Teaching Assistant *Aug. 2019 – Present*

- MKTG 712: MBA Marketing Data Analysis

  52% of the MBA students rated my overall performance as "Excellent". My mean overall evaluation was 3.39/4.0, a 52% increase compared to the average rating of all other TAs who previously taught this class with the same instructor.

- PSY 101: Undergraduate Introductory Psychology (3 semesters)
- PSY 265: Undergraduate Behavioral Economics (3 semesters)
- PSY 259: Undergraduate Human Memory

University of Pennsylvania Philadelphia, PA
Recipient of the Penn Graduate Student Teaching Excellence Award *2021*

University of Pennsylvania Philadelphia, PA
Center for Teaching & Learning Graduate Fellowship for Teaching Excellence *2021*

Duke University Durham, NC
Costanzo Undergraduate Teaching Fellow *Jan. 2015 – May 2016*

- PSY 101: Undergraduate Introductory Psychology (2 semesters)

MENTORING EXPERIENCE

Volunteer mentor for University of Pennsylvania College Achievement Program

Duke Keep Exploring Mentorship Program

Research mentor for UPenn undergraduate and graduate students: Benjamin Epstein, Liat Gradstein, Naveen Mirapuri, Andres Mondragon, Lionel Smoler Schatz, Feiyi Wang, Geshi Yeung

RESEARCH EXPERIENCE PRIOR TO GRADUATE SCHOOL

University of Pennsylvania — Philadelphia, PA
Electroencephalography Lab Manager & Research Specialist — *May 2016 – June 2018*

Duke University — Durham, NC
Research Assistant in Multiple Research Labs — *Aug. 2013 – May 2016*

Deloitte — Istanbul, Turkey
Business Analyst Intern — *June 2014 – Aug. 2014*

National Geographic and NTV Media Group — Istanbul, Turkey
Magazine & News Editor — *June 2013 – Aug. 2013*

OTHER HONORS & AWARDS

UPenn School of Arts & Sciences Fellowship 2018 - 2023

2015 Philip R. Costanzo Undergraduate Teaching Fellowship, Duke University

Member of Psi Chi (National Psychology Honors Society) and Order of Omega (National Greek Leadership Honors Society)

AD HOC REVIEWING

Journal of Experimental Psychology: Learning, Memory, and Cognition
Memory & Cognition
Computational Brain & Behavior
Cognitive Science Society
Wharton - INSEAD PhD Consortium

MEMBERSHIPS & AFFILIATIONS

Association for Consumer Research
Society for Judgment and Decision Making
Society for Consumer Psychology
Cognitive Science Society

Psychonomic Society
Association for the Advancement of Artificial Intelligence
UPenn Social and Behavioral Science Initiative
Wharton Risk Management and Decision Processes Center
Wharton Mack Institute for Innovation Management
UPenn MindCORE

SELECT RESEARCH ABSTRACTS

Aka, Ada, Lionel Schatz, and Sudeep Bhatia, "A Framework for Modeling Naturalistic Memory-Based Decision Making," working paper.

[WILL CHANGE AFTER] We study how people retrieve and choose between hundreds of common choice items stored in memory. Our approach combines established theories of consideration set formation and memory search, with new techniques from natural language processing (which use text data to derive representations and associations for choice items) and recommender systems (which provide algorithms for capturing individual-specific preferences and retrieval tendencies for such items). We show that our approach successfully describes the items that are retrieved from memory, and can thus accurately predict choice even when memory processes are not directly observed. Our framework also provides data-driven insights into the cognitive mechanisms at play in everyday memory-based decisions, and how these mechanisms may vary across individuals. For this reason, it can quantitatively capture the effects of situational variables (like decision context or item primes) and individual differences (like decision styles) on memory, and on the downstream decision. We showcase the power of our approach in three sets of studies, each with several different types of naturalistic decision prompts. In doing so, we demonstrate how established theories in marketing and psychology can be combined with new computational techniques, to explain and predict complex everyday decisions.

Aka, Ada and Sudeep Bhatia (2021), "Machine Learning Models for Predicting, Understanding and Influencing Health Perception," Journal of Association for Consumer Research.

Lay perceptions of medical conditions and treatments determine people's health behaviors, guide biomedical research funding, and have important consequences for both individual and societal well-being. Yet it has been nearly impossible to quantitatively predict lay health perceptions for hundreds of everyday diseases due to the myriad psychological forces governing health-related attitudes and beliefs. Here we present a data-driven approach that uses text explanations on healthcare websites, combined with large-scale survey data, to train a machine learning model capable of predicting lay health perception. We use our model to analyze how language influences health perceptions, interpret the psychological underpinnings of health judgment, and quantify differences between different descriptions of disease states. Our model is accurate, cost-effective, and scalable and offers researchers and practitioners a new tool for studying health-related attitudes and beliefs.

Aka, Ada and Sudeep Bhatia (2021), "What I Like Is What I Remember: Memory Modulation and Preferential Choice," Journal of Experimental Psychology: General.

Memory is a crucial component of everyday decision making, yet little is known about how memory and choice processes interact and whether or not established memory regularities persist during memory-based decision making. In this paper, we introduce a novel experimental paradigm to study the differences between memory processes at play in standard list recall versus in preferential choice. Using computational memory models, fit to data from 2 preregistered experiments, we find that some established memory regularities (primacy, recency, semantic clustering) emerge in preferential choice, whereas others (temporal clustering) are significantly weakened relative to standard list recall. Notably, decision-relevant features, such as item desirability, play a stronger role in guiding retrieval in choice. Our results suggest memory processes differ across preferential choice and standard memory tasks, and that choice modulates memory by differentially activating decision-relevant features such as what we like.

Aka, Ada, Sudeep Bhatia, and John P. McCoy, "Semantic Determinants of Memorability," invited for second round revision at Cognition.

We examine why some words are more memorable than others by using predictive machine learning models applied to word recognition and recall datasets. Our approach provides considerably more accurate out-of-sample predictions for recognition and recall than previous psychological models, and outperforms human participants in new studies of memorability prediction. Our approach's predictive power stems from its ability to capture the semantic determinants of memorability in a data-driven manner. We identify which semantic categories are important for memorability and show that, unlike features such as word frequency that influence recognition and recall differently, the memorability of semantic categories is consistent across recognition and recall. Our paper sheds light on the complex psychological drivers of memorability, and in doing so illustrates the power of machine learning methods for psychological theory development.

Aka, Ada, Christopher Olivola, Gideon Nave, and Sudeep Bhatia, "Leveraging Social Media, Digitized Language Data, and Machine-Learning to Identify Consumer Personality Segments, Facets of Brand Image, and Predictors of Brand Liking," working paper.

Changes in technology have altered the ways in which consumers interact with brands, and in turn, the ways in which researchers can study the relationships between brands and consumers. It is now possible to obtain detailed psychographic information for thousands of consumers, analyze the ways in which brands are discussed in millions of news articles and social media posts, and build powerful machine learning models capable of quantifying brand images and analyzing consumer profiles. In this paper, we illustrate the value of these new datasets and computational methods. Our first study uses machine learning models trained on large-scale digitized language data and Facebook 'likes' data to predict consumer personality profiles for hundreds of brands. In Study 2, we show how our 'black box' models can be interpreted in terms of the images associated with brands liked by particular consumer personality segments. Finally, in Study 3, we use our approach to test for, and analyze, self-congruity effects in consumer brand liking. Overall, our

paper sheds light on the relationship between consumer personality and brand liking as revealed in large online datasets. In doing so, we showcase a novel approach to conducting brand research in the era of big data.

Bhatia, Sudeep, and Ada Aka (2022), "Cognitive Modeling with Representations From Large-Scale Digital Data," Current Directions in Psychological Science.

Deep-learning methods can extract high-dimensional feature vectors for objects, concepts, images, and texts from large-scale digital data sets. These vectors are proxies for the mental representations that people use in everyday cognition and behavior. For this reason, they can serve as inputs into computational models of cognition, giving these models the ability to process and respond to naturalistic prompts. Over the past few years, researchers have applied this approach to topics such as similarity judgment, memory search, categorization, decision making, and conceptual knowledge. In this article, we summarize these applications, identify underlying trends, and outline directions for future research on the computational modeling of naturalistic cognition and behavior.

Aka, Ada, Tung D. Phan, and Michael J. Kahana (2021), "Predicting Recall of Words and Lists," Journal of Experimental Psychology: Learning, Memory, & Cognition, 47(5), 765.

For more than a half-century, lists of words have served as the memoranda of choice in studies of human memory. To better understand why some words and lists are easier to recall than others, we estimated multivariate models of word and list recall. In each of the 23 sessions, subjects (N 98) studied and recalled the same set of 576 words, presented in 24 study-test lists. Fitting a statistical model to these data revealed positive effects of animacy, contextual diversity, valence, arousal, concreteness, and semantic structure on recall of individual words. We next asked whether a similar approach would allow us to account for list-level variability in recall performance. Here we hypothesized that semantically coherent lists would be most memorable. Consistent with this prediction, we found that semantic similarity, weighted by temporal distance, was a strong positive predictor of list-level recall. Additionally, we found significant effects of average contextual diversity, valence, animacy, and concreteness on list-level recall. Our findings extend previous models of item-level recall and show that aggregate measures of item recallability also account for variability in list-level performance.

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