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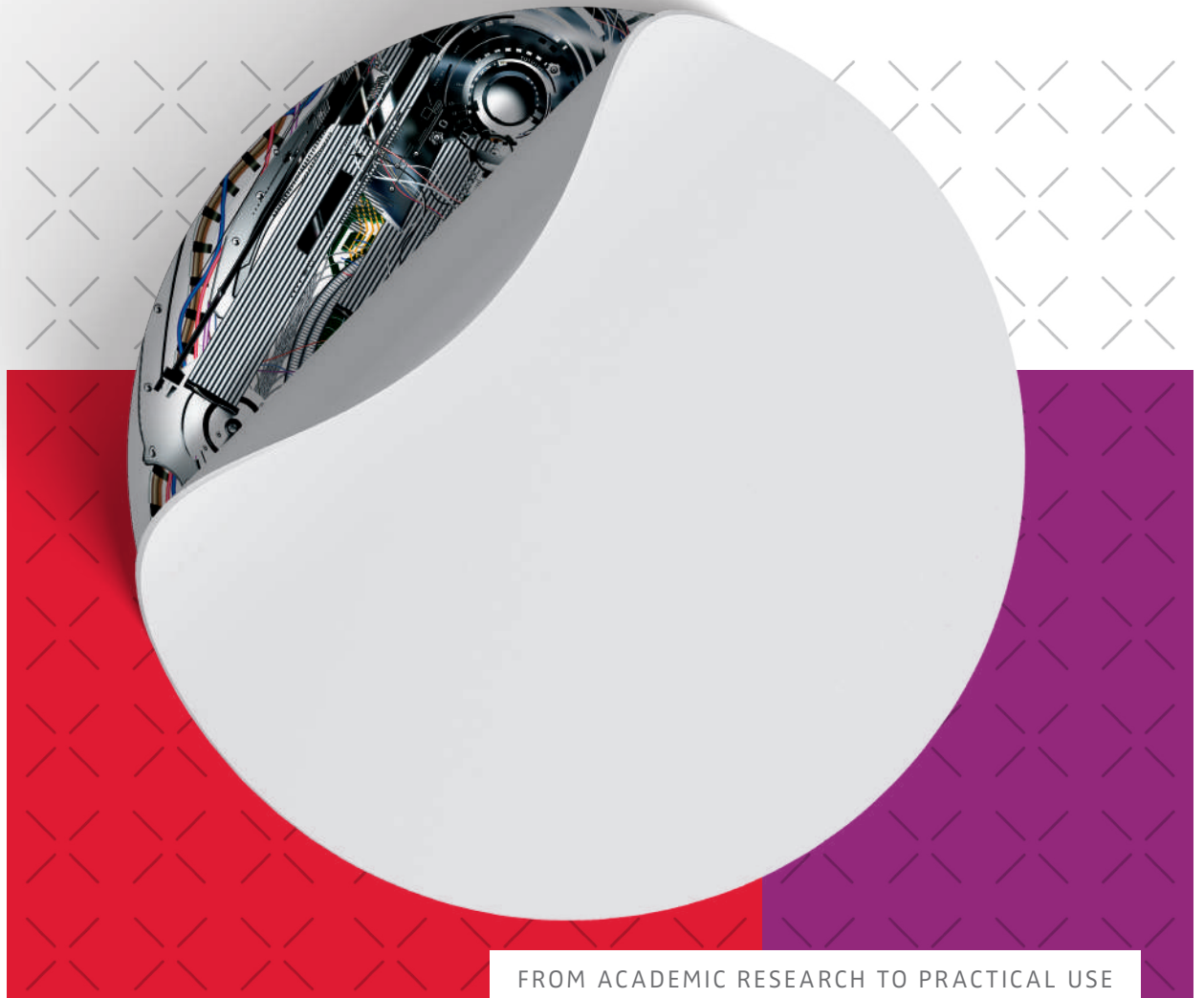
I NTELLIGENCE

R EVIEW

AI and the Machine Age of Marketing

How Artificial Intelligence Changes the Way
People Think, Act, and Decide

USING DIGITAL FOOTPRINTS > ALGORITHM ADOPTION
CHATBOTS > MORAL MACHINES > VOICE CONTROL





FRESH LOOK
FRESH KNOWLEDGE

FROM ACADEMIC RESEARCH TO PRACTICAL USE

NEW NAME > NEW DESIGN > CLEVER CONTENT

For managers and decision makers interested in > [current marketing topics](#) and new research results.

Since 2019 the “NIM Marketing Intelligence Review” has been published under its new name (formerly GfK Marketing Intelligence Review) and with a new design.

Our goal is still the same: To provide > [accessible, relevant insights](#) from academic marketing research. We focus on > [one topic per issue](#) and continue to provide our readers with ideas on how modern marketing research findings can improve marketing decision making.

Its publisher, the > [Nuremberg Institute for Market Decisions](#), (Nürnberg Institut für Marktentscheidungen e.V., formerly GfK Verein), is an interdisciplinary, non-commercial research institute. Its research focus are market decisions, both by consumers and marketers.

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Editorial



Think about how intelligent machines are transforming every aspect of our private and professional lives. We talk effortlessly to Alexa, Siri, or Google Home to do simple things like setting timers, playing our favorite music lists, or reading our to-do lists for the next day. Little chatboxes pop up on websites asking us whether we need some help finding our way around, while we ask ourselves whether it is a human or a machine that's "talking" to us. We make an appointment on the phone, not knowing whether we're talking to a human or Google Duplex, because the vocal features perfectly mimic how humans talk. Or think of algorithms "reading" our emotions from facial expressions, with China now already using AI-powered face detection for payment authorization or emotion recognition services to monitor (or control) the emotions of visitors in cinemas.

Welcome to a new era of marketing – an era in which the line between human and machine is blurring, and in which machines learn without human intervention. In this issue, we explore how machines learn from the digital footprints of consumers; how and to which extent machines are able to sell; and the nuances of when using machines might actually backfire and cause disengagement and frustration for consumers. And we discuss the broader questions of artificial intelligence: Can machines be moral? What makes you trust in the answer or prediction of an algorithm? Do we make ourselves vulnerable as individuals and as society if we trust too much?

We are excited to share with you the latest research on how AI is transforming the fabric of marketing – and ultimately, society. We hope you find both inspiration and food for thought on how to supercharge your organization, and on how AI is redefining the way we live.

Sincerely,

Christian Hildebrand

St. Gallen, July 2019

AI and the Machine Age of Marketing



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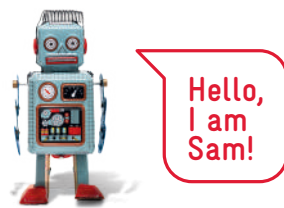


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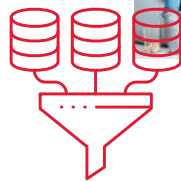
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Executive Summaries



The Machine Age of Marketing: How Artificial Intelligence Changes the Way People Think, Act, and Decide

Christian Hildebrand

Whatever your perception of AI is, the machine age of marketing has arrived. To fully grasp how AI is changing every fabric of both our professional and private lives, we need to abstract beyond the presence of autonomous cars, digital voice assistants, and machines that can translate text for us. AI is creating new forms of competition, value chains, and novel ways of orchestrating economies around the world. AI is more than just technology; it's creating a new economy. The fuel that runs this economy is the combination of computational processing power, data, and the algorithms that process this data.

AI has the potential to make our life easier, though this convenience might come at a price. There might be biases directly built into the algorithms we use, data privacy issues, or failed AI projects in business practice. But without testing, failing, and learning from our failures, we will make no progress.

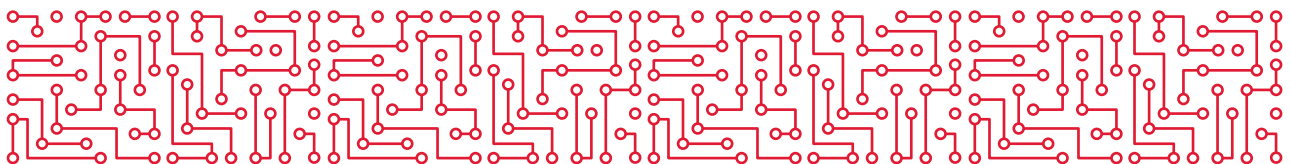
Using Consumers' Digital Footprints for More Persuasive Mass Communication

Sandra Matz and Michal Kosinski

Powered by better hardware and software, and fueled by the emergence of computational social science, digital traces of human activity can be used to make highly personal inferences about their owner's preferences, habits and psychological characteristics. The gained insights allow the application of psychological targeting and make it possible to influence the behavior of large groups of people by tailoring persuasive appeals to the psychological needs of the target audiences. On the one hand, this method holds potential benefits for helping individuals make better decisions and lead healthier and happier lives. On the other hand, there are also several potential pitfalls related to manipulation, data protection and privacy violations. Even today's most progressive data protection regulations might not adequately address the potential abuse of online information in the context of psychological targeting, highlighting the need for further policy interventions and regulations.

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Let the Machine Decide: When Consumers Trust or Distrust Algorithms

Noah Castelo, Maarten W. Bos
and Donald Lehmann

Thanks to the rapid progress in the field of artificial intelligence, algorithms are able to accomplish an increasingly comprehensive list of tasks, and often they achieve better results than human experts. Nevertheless, many consumers have ambivalent feelings towards algorithms and tend to trust humans more than they trust machines. Especially when tasks are perceived as subjective, consumers often assume that algorithms will be less effective, even if this belief is getting more and more inaccurate.

To encourage algorithm adoption, managers should provide empirical evidence of the algorithm's superior performance relative to humans. Given that consumers trust in the cognitive capabilities of algorithms, another way to increase trust is to demonstrate that these capabilities are relevant for the task in question. Further, explaining that algorithms can detect and understand human emotions can enhance adoption of algorithms for subjective tasks.

When Humanizing Customer Service Chatbots Might Backfire

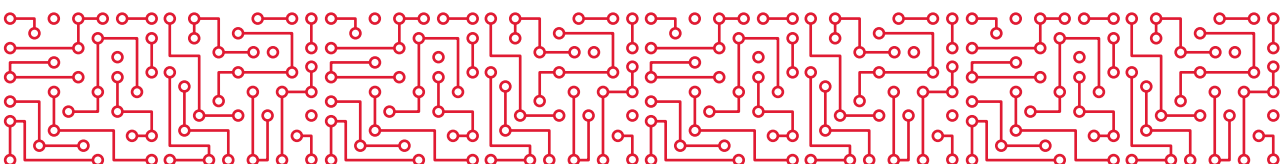
Rhonda Hadi

More and more companies are using chatbots in customer service. Customers interact with a machine instead of with a human employee. Many companies give these chatbots human traits through names, human-like appearances, a human voice, or even character descriptions. Intuitively, such a humanization strategy seems to be a good idea.

Studies show, however, that the humanization of chatbots is perceived in a nuanced way and can also backfire. Especially in the context of customer complaints, human-like chatbots can intensify the negative reactions of angry customers because their performance is judged more critically than that of non-humanized chatbot variants. Service managers should therefore consider very carefully whether, and in which situations, they should use humanized service chatbots.

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AI-Driven Sales Automation: Using Chatbots to Boost Sales

Christian Hildebrand and Anouk Bergner

The implementation of bot interfaces varies tremendously in current industry practice. They range from the human-like to those that merely present a brand logo or a digital avatar. Some applications provide a maximum amount of information with limited turn-taking between the user and the interface; others offer only short pieces of information and require more turn-taking. Instead of simply implementing the default option provided by chatbot providers and platforms, companies should consider very carefully how the specifics of the chatbot interface might affect the user experience. Simple mechanics such as increasing the frequency of interactions leads to greater trust and a more enjoyable user experience. Also, personalizing chatbots with basic consumer characteristics such as gender increases trust and improves the perceived closeness between the customer and the chatbot – and ultimately the brand. Brand managers should therefore consider chatbots not as merely another digital marketing fad or a way to save costs through service automation. When implemented wisely, they are even able to increase a company's upselling potential.

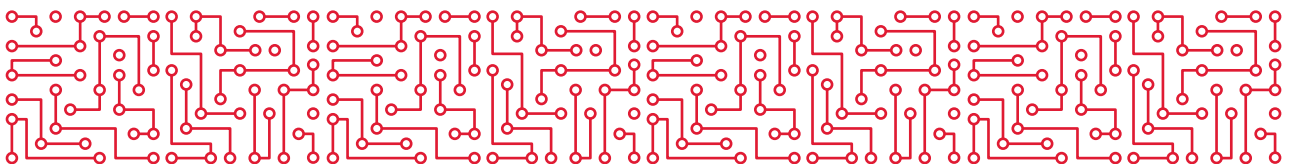
The Thorny Challenge of Making Moral Machines: Ethical Dilemmas with Self-Driving Cars

Edmond Awad, Jean-François Bonnefon,
Azim Shariff and Iyad Rahwan

The algorithms that control AVs will need to embed moral principles guiding their decisions in situations of unavoidable harm. Manufacturers and regulators are confronted with three potentially incompatible objectives: being consistent, not causing public outrage, and not discouraging buyers. The presented moral machine study is a step towards solving this problem as it tries to learn how people all over the world feel about the alternative decisions the AI of self-driving vehicles might have to make. The global study displayed broad agreement across regions regarding how to handle unavoidable accidents. To master the moral challenges, all stakeholders should embrace the topic of machine ethics: this is a unique opportunity to decide as a community what we believe to be right or wrong, and to make sure that machines, unlike humans, unerringly follow the agreed-upon moral preferences. The integration of autonomous cars will require a new social contract that provides clear guidelines about who is responsible for different kinds of accidents, how monitoring and enforcement will be performed, and how trust among all stakeholders can be engendered.

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Understanding Consumer Preferences from Social Media Data

Bradley Taylor

Consumers produce enormous amounts of textual data of product reviews online. Artificial intelligence (AI) can help analyze this data and generate insights about consumer preferences and decision-making. A GfK research project tested how we can use AI to learn consumer preferences and predict choices from publicly available social media and review data. The common AI tool “Word Embeddings” was used and has shown to be a powerful way to analyze the words people use. It helped reveal consumers’ preferred brands, favorite features and main benefits. Language biases uncovered by the analysis can indicate preferences. Compared to actual sales data from GfK panels, they fit reasonably within various categories. Especially when data volumes were large, the method produced very accurate results. By using free, widespread online data it is completely passive, without affecting respondents or leading them into ranking or answering questions they would otherwise not even have thought of. The analysis is fast to run and no fancy processing power is needed.

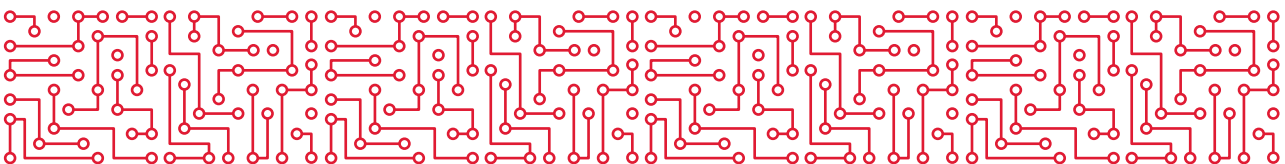
Talking Versus Typing: The Power of Voice-Based Remote Controls

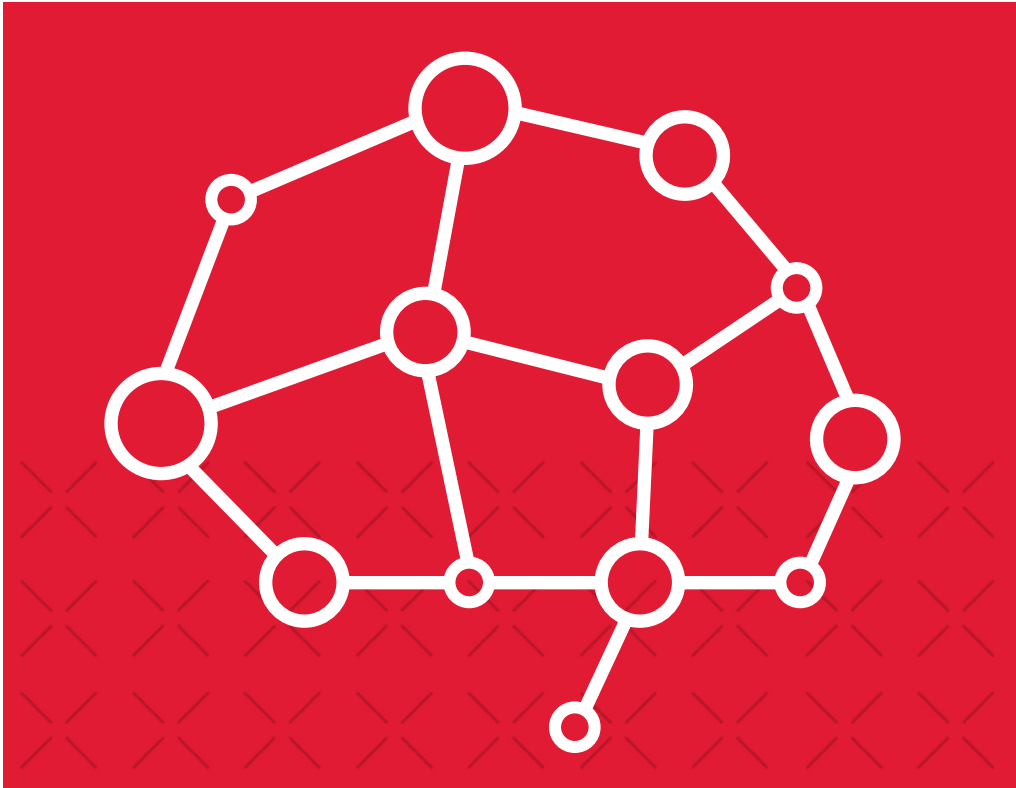
Interview with Jan Neumann, Senior Director, Applied AI, Comcast Cable

While many customers are still reluctant to entrust themselves to Alexa, Cortona or Siri in their homes, they seem to be less worried about controlling their TV sets via voice control. Comcast started offering a voice-based remote control in 2015 and has extended this service continuously. In the vast world of home entertainment, it seems that voice has come just in time to help consumers navigate and control their ever-increasing home entertainment options. Jan Neumann explains how Comcast enables its customers to comfortably boil down a huge entertainment portfolio to personally relevant content on the TV screen, and how the company remains successful in the highly competitive home entertainment market.

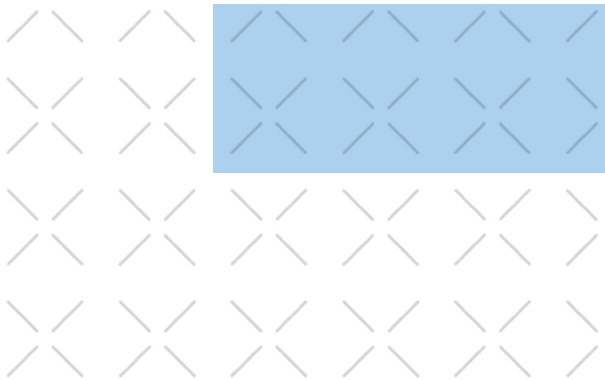
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AI is creating new forms of competition, value chains, and novel ways of orchestrating economies around the world.



The Machine Age of Marketing: How Artificial Intelligence Changes the Way People Think, Act, and Decide

Christian Hildebrand

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Autonomous Machines**

THE AUTHOR

Christian Hildebrand

Director and Professor of Marketing Analytics,
Institute of Marketing (IfM-HSG),
University of St. Gallen, Switzerland
christian.hildebrand@unisg.ch

AI – Between mass empowerment and mass confusion

✗ What comes to your mind when you think of “Artificial Intelligence”? Do you think of robotics? Autonomous cars? Autonomous warehouses? Self-improving algorithms? The extinction of humankind? Whatever your perception of AI is, you’re probably thinking either too narrowly or too broadly about it. Both is dangerous. You might think that AI is merely the next buzzword invented by the big tech companies to sell their products and services. Or you may think AI will take over the world, replace humans, and dominate life on earth. Whatever your perception of AI is – maybe you’re inspired and confused at the same time – the machine age of marketing has arrived. We talk to Alexa to add items to our shopping cart; we ask Google to direct us to the next sushi restaurant in a city where we’ve never been before; in just the click of a mouse, the cryptic symbols of a foreign language miraculously become legible.

AI – Back to the future ✗

If we want to understand the role and impact that AI has on business and society, we have to take a brief look back in time. As novel as AI sounds, it is not new. The term itself was coined in 1956 in a proposal by an elite group of computer scientists and mathematicians who organized a summer workshop called the “Dartmouth Conference.” One of the opening paragraphs in the original proposal envisioned a future where “machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves.” When you read this, you might assume it’s from one of the latest AI conferences in the Silicon Valley or elsewhere. The truth is, AI has been around for decades and researchers have been working to a large extent on the same problems, from computer vision to understanding natural language. So what happened? The field of AI cooled off between the 1970s and late 1980s: today that time is known as the “AI winter.” Governments

FIGURE 1 > From Artificial Narrow Intelligence to Artificial General Intelligence



Artificial Narrow Intelligence

better than humans at one specific task

Most current AI applications

- > Deep Blue
- > Siri
- > Alexa
- > DeepL Translator
- > Self driving cars
- > ...

Artificial General Intelligence

capable of every task like humans

Envisioned but not yet realised mostly present in fiction

- > R2D2, C-3PO (Star Wars)
- > Samantha (Her)
- > Ava (Ex Machina)
- > Winston (Origin)
- > ...

significantly reduced the funding of research programs and corporations lost faith in the strong claims made in the early days of AI. The reasons for the slowdown are connected to a number of factors, but computing power and the ability to process large quantities of data was a critical, limiting factor.

AI – Reloaded ✗ A new era of AI research started in the late 1990s; IBM’s Deep Blue became the first computer that was able to beat chess grandmaster Garry Kasparov in 1997. At the same time, major research institutions around the world – and particularly the Japanese government – started investing heavily in the development of a new generation of computing systems. Meanwhile, the dot-com bubble attracted hitherto unseen amounts of seed funding for tech companies; data storage prices started an unseen decline; and computing power increased exponentially. Despite a short dip with the burst of the dot-com bubble, the technical infrastructure and developments in the machine learning community paved the way for many of the devices and services we take for granted

today. In short, these developments which leveraged the use of AI led to the market domination we see today by global companies like Amazon, Google, Alibaba and Baidu.

AI – Solving well-defined problems better than humans

✗ But what exactly is AI, and how does it affect our lives? AI can be classified into two broad categories, Artificial Narrow Intelligence (ANI) and Artificial General Intelligence (AGI). ANI captures the ability of machines to solve problems with respect to a narrowly-defined, specific goal. Think of your phone, for example. Have you ever wondered how it’s possible for all these pictures of your spouse or the people around you to be grouped together? How can your phone “know” these people, and seemingly classify and group these individuals accurately? Your phone – or more precisely, the software that runs the processing of your pictures – doesn’t know these people. Your phone also doesn’t care about these people. The software on your phone is conducting a very specific and well-defined task: To find pictures with the same or

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*We use AI all the time
 but we are oftentimes simply
 not aware of it.*
 «

similar-looking people. These classification tasks are all made possible through AI. Whether classifying emails as spam or classifying the people you're with in your pictures, tracking your location data to make specific restaurant suggestions, or simply transforming the input of your voice when you talk to Siri or Google Assistant into machine-readable text output: In all these cases, AI is used to solve a well-defined task without human intervention.

Do you remember the first time IBM Watson won the Jeopardy quiz show against Ken Jennings, the top Jeopardy champion? The system's intelligence was rather limited: the system was "simply" able to look up the answer in a gigantic database faster than humans. AI has already outperformed humans on a plethora of tasks, from identifying melanoma better than doctors to knowing your psychological profile better than your closest friends, merely by analyzing your Facebook Likes. All these tasks are characterized by the solving of well-defined problems, and the majority of applications we see today are reflections of these narrow forms of intelligence or ANI.

AI – Solving just any problem better than humans ✕

By contrast, Artificial General Intelligence (AGI or strong AI) aspires to human-level intelligence, not only with regard to a specific task, but through the ability to plan, reason, and attain a level of human-like consciousness. Instead of solving a pre-defined task, AGI might change its goals and take new courses of action. Instead of just labeling or grouping the individuals on your phone, a future form of AGI might extract information from these pictures, such as what brands you wear, where you are, or who you're with and when. It might target both you and the individuals shown in these pictures on any website as a result. Another frightening example of AGI –

that will hopefully never occur – would be an autonomous car that actively decides to kill its passengers, in order to collect or release their life insurance. Or think of Ava, the humanized AI in the movie "Ex Machina," that ultimately kills its creator Nathan to escape captivity and merge into human society.

AI – Often behind the scenes ✕ Despite discussions on how to regulate AI to prevent machines from taking over the world and acting scary, as previously described, the applications which we already use and which are dominating our lives – Alexa, online translation services, or classifying the photos on your phone – are all instances of a relatively narrow conception of AI. These very well-defined tasks are the ones that are gaining ground in business and society because they can solve existing problems better than humans can. We use AI all the time but are often simply not aware of it. AI is more than robots or autonomous cars: it's the software running the robot; the autonomous car; the "AI factory" in our pocket, known as a cell phone. Alexa is not the AI; Alexa is the anthropomorphized version of the AI that runs in boxes that talk to us.

Value creation in the AI economy ✕ To fully grasp how AI is changing every fabric of both our professional and private lives, we need to abstract beyond the presence of autonomous cars, digital voice assistants, and machines that can translate text for us. AI is creating new forms of competition, value chains, and novel ways of orchestrating economies around the world. Box 1 and Figure 2 illustrate the critical layers and players in our AI-driven economy which need to play together to create value in the long term. In short, AI is more than just technology: it's creating a new economy. The fuel that runs this economy is the combination of computational processing power, data, and the algorithms that process this data.

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BOX 1

Critical layers and players in AI-driven economies

Data: The fuel that makes machines learn



At the heart of any AI-driven economy is the availability of data from any entity you can imagine. Sensor data from machines to optimize maintenance intervals; sensor data from cell phones to optimize ad displays; your credit card history, to calculate loans or credit defaults; or your vocal input, to match your intentions to content when you want to add an item to your shopping list with Amazon Alexa. Data from either humans or machines is a critical ingredient of the AI economy.

Infrastructure: The hardware and platform providers



To run all the different tasks from processing human voice input to translating huge amounts of text input, we need to have the right hardware. The strong growth of companies such as Nvidia, Qualcomm, and Samsung over the past few years is a reflection of AI's need for access to powerful computer chips and hardware that make data-hungry algorithms perform on our smartphones, computers, or other devices.

Algorithms: The software and analytics engines



When you think of Google and Amazon, you most likely think of search engines and online shopping. However, Amazon's cloud solution "Amazon Web Services" generated the greatest net income contribution relative to all other services (including online shopping) in the U.S. in 2018 with a 47 % growth rate compared to 2017. And Google released an entire platform a few years ago called Google ML, which provides open access to pre-trained machine learning models.

Advocates: The enterprise and industry solution providers



Even though Amazon, Google, and others directly market their services to corporations, an entire industry lives from using these existing open platforms to develop and sell client-specific services to companies. These include chatbots that are built on Google's natural language processing interface or DialogFlow in Amazon's AWS.

Users: The corporations seeking competitive advantage



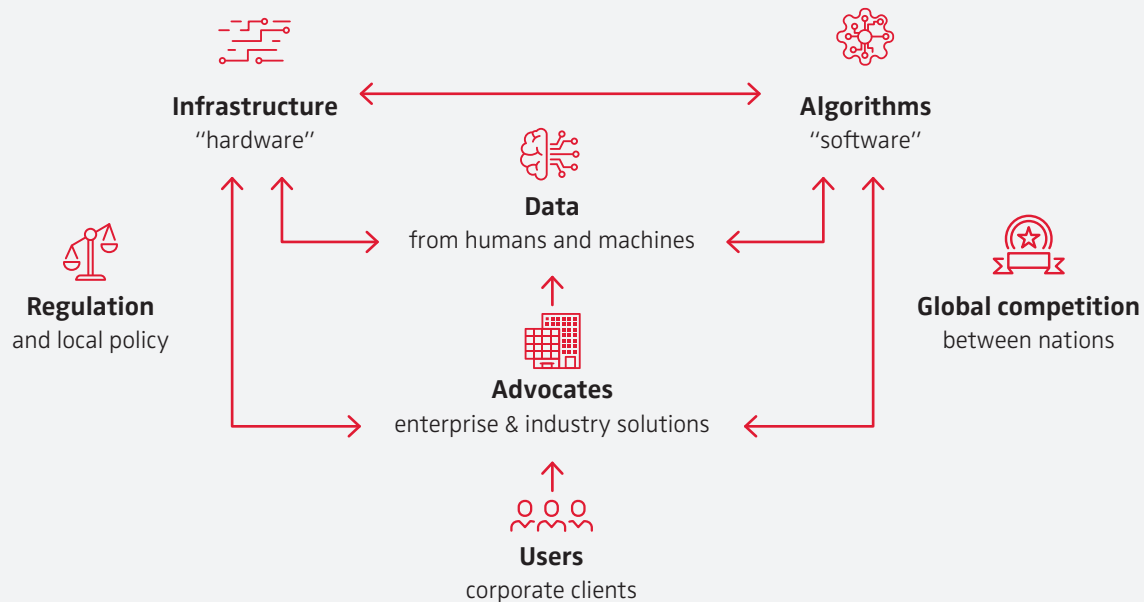
The enterprise and industry solutions have to find corporate accounts that are willing to pay for them. Think of insurance companies now using chatbots to handle claims, legal and compliance offices using text processing models to pre-process and analyze text documents, or retail companies with augmented reality mobile apps that provide seemingly real-life shopping experiences.

Regulators: The developing competition between nations



The algorithms running AI need data to get trained, whether for medical services aiming to provide tailored, individualized therapies or companies that want to better target users online to sell their services. However, public policymakers are becoming increasingly alert to the ways our data is used by data-hungry corporations, particularly in Western societies. There have been recent regulatory changes, with the GDPR in the West and nearly opposite selective developments in China, which has invested \$15 billion in a "New Generation Artificial Intelligence Development Plan" aimed at making it the leading AI nation by 2030. These developments illustrate that competition over AI is not happening just between corporations, but between entire nations.

FIGURE 2 > Critical layers and players in the AI economy



AI can inspire your business ✘ No matter if you work in the old economy or a digital business, AI is at a stage where it affects everyone. Our aim is to help you connect the dots on how AI could stimulate your business, or even your entire industry. We brought together the leading experts from diverse fields such as natural language processing and computational psychology, all the way to marketing and sales.

> **Using the digital footprints of consumers** ✘ Sandra Matz and Michal Kosinski (pp. 18) demonstrate how analyzing the "digital footprints" of people online can be used to develop highly sensitive targeting campaigns from corporate advertising to tailored political campaigns. Merely knowing what you liked on Facebook allows for the compilation of incredibly accurate psychological profiles. These profiles in turn can be used to develop considerably more effective communication. Bradley Taylor (pp. 48) reveals how consumer preferences can be accurately inferred from social media comments so that tedious consumer surveys can be avoided. The analysis of customers' online reviews even identified consumer preferences for specific features in the consumer electronics domain, which were highly predictive in forecasting the sales figures of TV brands.

> **Chatbots as tool to improve customer service and sales** ✘ One increasingly popular channel for communicating with customers is chatbots. These completely automated interfaces are often considered a mere service automation tool to react around the clock to consumer input online. However, my work with Anouk Bergner (pp. 36) shows that chatbots are more than just a technology used for the automation of online services. They can be specifically designed to create more natural service experiences, and even be used as a sales tool. But Rhonda Hadi (pp. 30) shows that making machines more human can severely backfire. Drawing on millions of customer-chatbot interactions with a telecom provider, her work reveals that customers who are already angry fall into a downward spiral when interacting with a human-like chatbot (compared to an actual human). In such cases, high expectations are often unmet, leading to more negative brand evaluations, lower customer satisfaction, and ultimately lower repurchase intentions.

> **Voice interfaces are becoming every-day companions** ✘ Writing with a chatbot is just one channel for connecting with customers. Voice is another, even more natural

FIGURE 3 > AI Workbook to stimulate your AI thinking

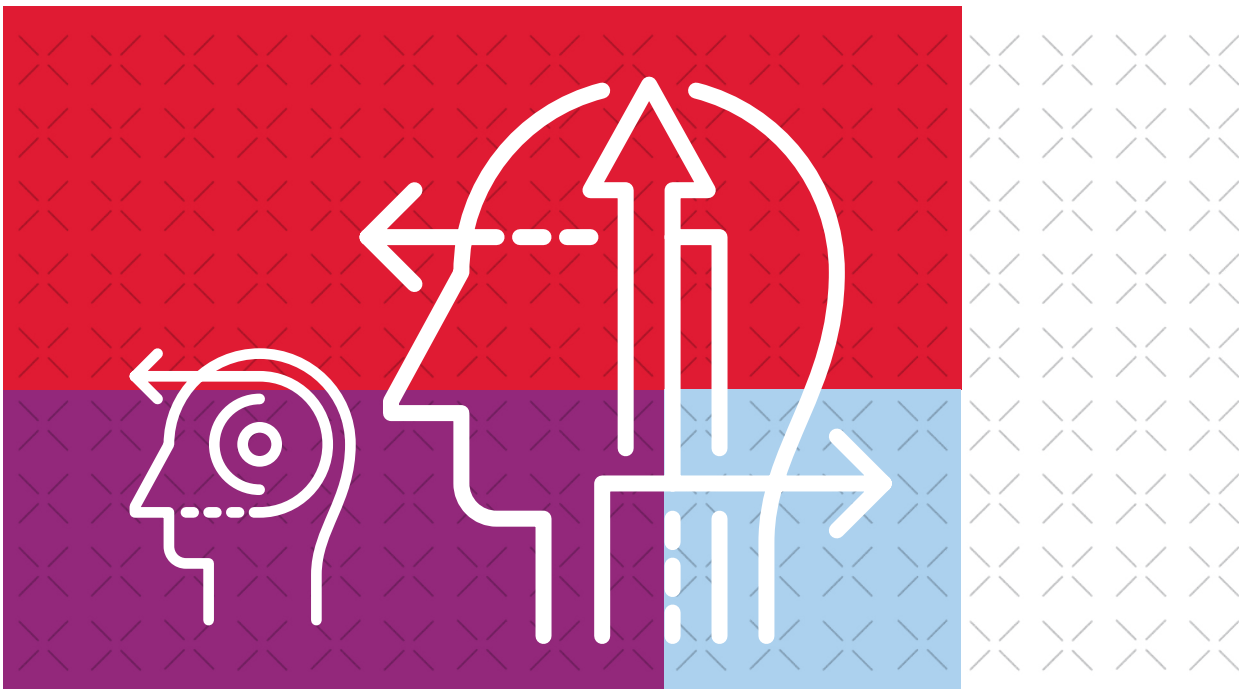
WARM-UP QUESTIONS	
1	<input type="checkbox"/> Do you have clarity about how AI is transforming your business, industry, customer experience?
2	<input type="checkbox"/> Do you systematically monitor the adoption of AI in your industry and discuss the implications regularly among the senior executive team?
3	<input type="checkbox"/> Do you have the right people, data, and architecture? <input type="checkbox"/> Do you have the needed mix of skills in your teams? <input type="checkbox"/> Do you have the right data architecture and implementation capabilities? <input type="checkbox"/> Do you effectively and systematically train and retrain employees and managers?
4	Do you trust in <input type="checkbox"/> ... the data you have? <input type="checkbox"/> ... the models that you build on this data? <input type="checkbox"/> ... the people who are building these models? <input type="checkbox"/> ... the people who are making decisions based on these models? <input type="checkbox"/> ... the process of deployment throughout your organization?

one. The interview with Jan Neumann, Head of AI at Comcast, reveals how using a voice-based remote control creates loyalty effects, even for customer segments that are typically underserved. Older consumers with poor vision or children who cannot read yet speak directly to their remote control to select their preferred channel, movie, or actor. This industry example highlights how AI can provide not only a different but ultimately an entirely new consumer experience.

> **The adoption of AI hinges on trust** ✕ The use of AI raises a number of trust-related questions. Noah Castelo, Maarten Bos, and Don Lehmann (pp. 24) show that consumers are often fairly skeptical about algorithms.

The more subjective the task, such as selecting a bottle of wine or even a dating partner, the more we seek the opinion of humans as opposed to machines. Their work illustrates how enhancing the human-likeness of technology can help consumers reduce their skepticism, particularly regarding tasks which are considered more subjective.

> **Ethical considerations and the role of morality** ✕ The most difficult question raised is whether machines can be moral. Edmond Awad, Jean-François Bonnefon, Azim Shariff and Iyad Rahwan (pp. 42) conducted a large-scale “moral machine” experiment. Their research highlights the incredible variety of human values, and how those values and beliefs could be built into the algorithms



used in autonomous cars. You might want to be a senior citizen in China or Japan and not central Europe or the U.S., where people are more willing to spare the lives of young people than old people. Despite cultural discrepancies, the researchers find a high overlap of values and recommend a broad social discourse for the definition of moral rules that self-driving cars and other intelligent machines should follow.

Stimulate your thinking about AI ✕ It is easy to get confused about the role of AI when you think vaguely and broadly about it (“Will AI disrupt my industry or completely replace my business?”). The same thing applies if you think too narrowly and focus on technology (“Should we build a voice interface using Amazon Alexa or Google Cloud?”). Either way, you will lose track of the larger, relevant questions of how exactly AI affects your business. Figure 3 offers some warmup questions to stimulate your thinking and to help you engage in some initial self-reflection on how to approach AI. Besides being a useful tool for positioning yourself and your business in the AI world, it also helps with this issue. If you want to get the most out of it, ask yourself these questions again while you read the articles, and make them specific to the context they cover.

Test, Fail, Learn, and Repeat ✕ At the end of this article you might be inspired, confused, thrilled, scared, or maybe all at the same time. Welcome to the new normal in the machine age of marketing. Without a doubt – and whether we are aware of it or not – AI is changing how we think, act and

make decisions as humans. AI has the potential to make our life easier, though this convenience might come at a price. It’s a price we have to pay as we uncover AI’s dark sides – such as biases built directly into the algorithms we use (who programs the programmers?). AI projects will also sometimes fail in business practice. But without testing, failing, and learning from our failures, we will make no progress. We hope that this issue provides inspiration and stimulates your thinking, so you can learn faster than others. ✕

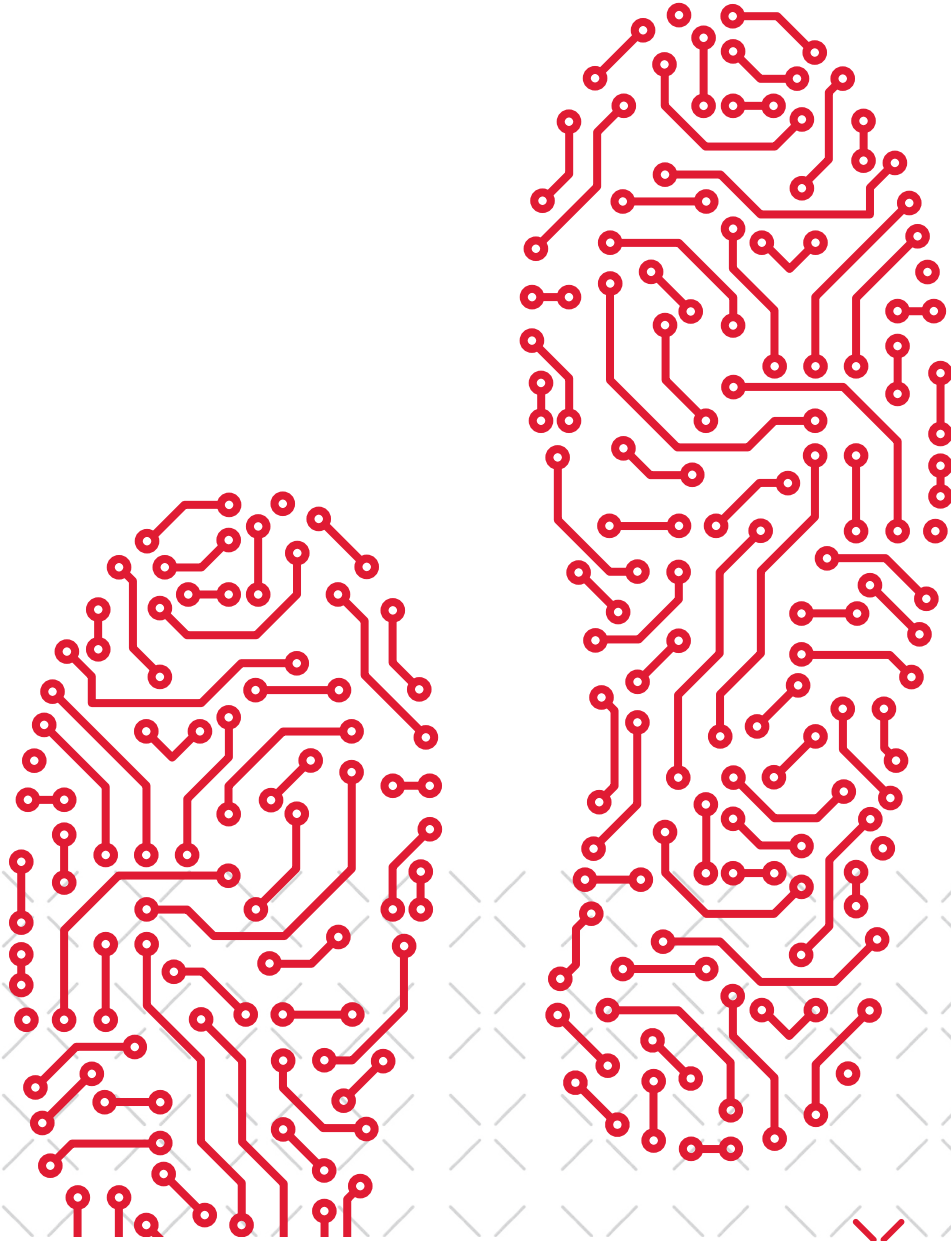


FURTHER READING

Bostrom, N. (2014): *Superintelligence: Paths, Dangers, Strategies*, Oxford University Press, Inc., New York.

Russell, S.; Dewey, D. and Tegmark, M. (2015): “Research priorities for robust and beneficial artificial intelligence”, *AI Magazine*, Vol. 36(4), 105-114.

Tegmark, M. (2017): *Life 3.0: Being Human in the Age of Artificial Intelligence*, Knopf, New York.



Digital footprints can be very accurate in the assessment of personality characteristics of large target groups and in designing more effective mass communication tools.



Using Consumers' Digital Footprints for More Persuasive Mass Communication

Sandra Matz and Michal Kosinski

KEYWORDS

**Digital Footprints,
Personality Assessment,
Psychological Targeting,
Persuasion,
Digital Mass Communication**

THE AUTHORS

Sandra Matz

Professor of Management
and Organizational Behavior,
Columbia Business School,
New York, NY, USA
sm4409@gsb.columbia.edu

Michal Kosinski

Professor of Organizational Behavior,
Stanford Graduate School of Business,
Stanford, CA, USA
michal@michalkosinski.com

What convinces one person might not convince another

✗ Persuasive mass communication is aimed at encouraging large groups of people to believe in and act on the communicator's viewpoint. It is used by governments to encourage healthy behaviors, by marketers to acquire and retain consumers, and by political parties to mobilize the voting population. Persuasive communication is particularly effective when tailored to people's unique psychological characteristics and motivations.

But how can marketers or other communicators obtain reliable psychological profiles of millions of users? How can they best navigate the landscape of psychological mass persuasion against the backdrop of data protection regulations such as the GDPR which restrict the storage and use of personal data? And what are the potential risks and pitfalls associated with hyper-personalized mass persuasion?

Digital footprints are remarkably predictive

✗ More and more human activities – such as social interactions, entertainment, shopping, and searching for information – happen, at least partially, in the digital space. Powered by better hardware and software, and fueled by the emergence of computational social science, these traces of human activity can be used to make highly personal inferences about their owner's preferences, habits and psychological characteristics.

Even relatively basic digital records of human behavior, such as Facebook likes, tweets or transaction records, can be used to automatically and accurately estimate a wide range of personal attributes including political ideology, sexual orientation



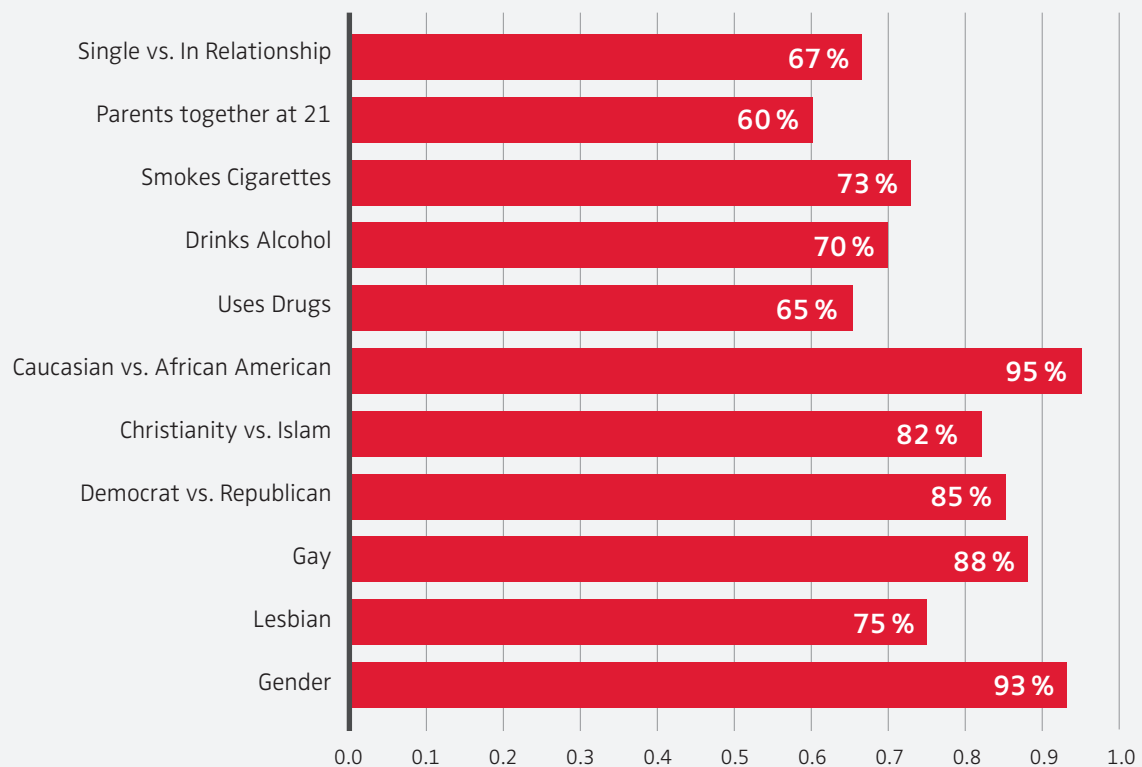
BOX 1

How Likes can reveal your personality

Show me what you Like and I can tell you who you are

One of our studies focused on Facebook Likes to predict a range of personal attributes. Based on a large sample with 170 Likes per participant on average, we used regression analysis to predict the attributes listed in Figure 1. Prediction accuracy ranged from 95% for ethnic origin and 93% for gender to 60% for inferring whether users' parents stayed together or were separated before users were 21 (see Figure 1). In a follow-up study, we showed that computer-based predictions of people's personality traits from Facebook Likes were more accurate than the judgements made by co-workers, friends and family members, and almost as accurate as those made by a person's spouse.

FIGURE 1 > How Likes reveal your personality



(from Kosinski, Stillwell and Graepel, 2013)

BOX 2

How language reveals your personality

**Show me your posts and I will know how you feel**

In another study, we used the language of Facebook status messages to assess the personality of the poster. We included words, phrases, emoticons, punctuation (such as “!!!”), and web-language expressions (such as “omg” or “wtf”) and counted their occurrences within a voluntary sample of over 66,000 participants who wrote at least 1,000 words (with an average of 4.1 words per post) during the time span of the study.

Based on word frequencies and topics used, we built a language model to predict personality traits. The language analyses showed high correlations with self-reported measures of the five commonly used personality traits: openness, conscientiousness, extraversion, agreeableness, and neuroticism.

Vast amounts of Likes and textual posts are publicly available on social media networks and represent a massive source of rich psychological data. While psychological assessments were primarily questionnaire-based and difficult to scale, predictive models based on Likes, posts, and tweets can be administered easily to millions of people to accurately capture their psychological characteristics. This ability, in turn, opens the door for attempts to persuade/influence large groups of people more effectively in the form of psychological targeting.

and personality – attributes that most people would typically assume to be private. Automated assessments on the basis of digital footprints may not only be more accurate and less prone to cheating and misrepresentation than traditional, scale-based personality assessments, but they can also permit measurement over time to detect temporal trends and intra-individual changes in behavior. In a series of studies, we have tested and demonstrated how digital footprints can indeed be very accurate in the assessment of personality characteristics (Box 1 and Figure 1) of large target groups and in designing more effective mass communication tools (Figure 2).

Better results for ads tailored to recipients’ personality ✕

In three Facebook campaigns that reached over 3.5 million individuals, we used personality traits predicted from Facebook Likes to test the effectiveness of psychologically-tailored advertising. We found that matching the content of persuasive appeals to individuals’ personality significantly altered their behavior as measured by clicks and purchases. Persuasive appeals that were matched to people’s extraversion or openness-to-experience level resulted in up to 40 % more clicks and up to 50 % more purchases than their mismatching counterparts or counterparts that were not personalized.

For example, in one of these studies, we tailored the persuasive advertising messages for a UK-based beauty retailer to

recipients’ extraversion – a personality trait reflecting the extent to which people seek and enjoy company, excitement, and stimulation. Figure 2 shows how we segmented and targeted the ad audience based on their Facebook Likes, and how the campaign translated into conversions. We selected 10 Likes characterized by the highest and lowest aggregate extraversion scores respectively, and targeted users with 5 introverted and 5 extroverted messages. Averaged across the campaigns, users in the matching conditions were over 50 % more likely to purchase from the online store than users in the mismatching conditions.

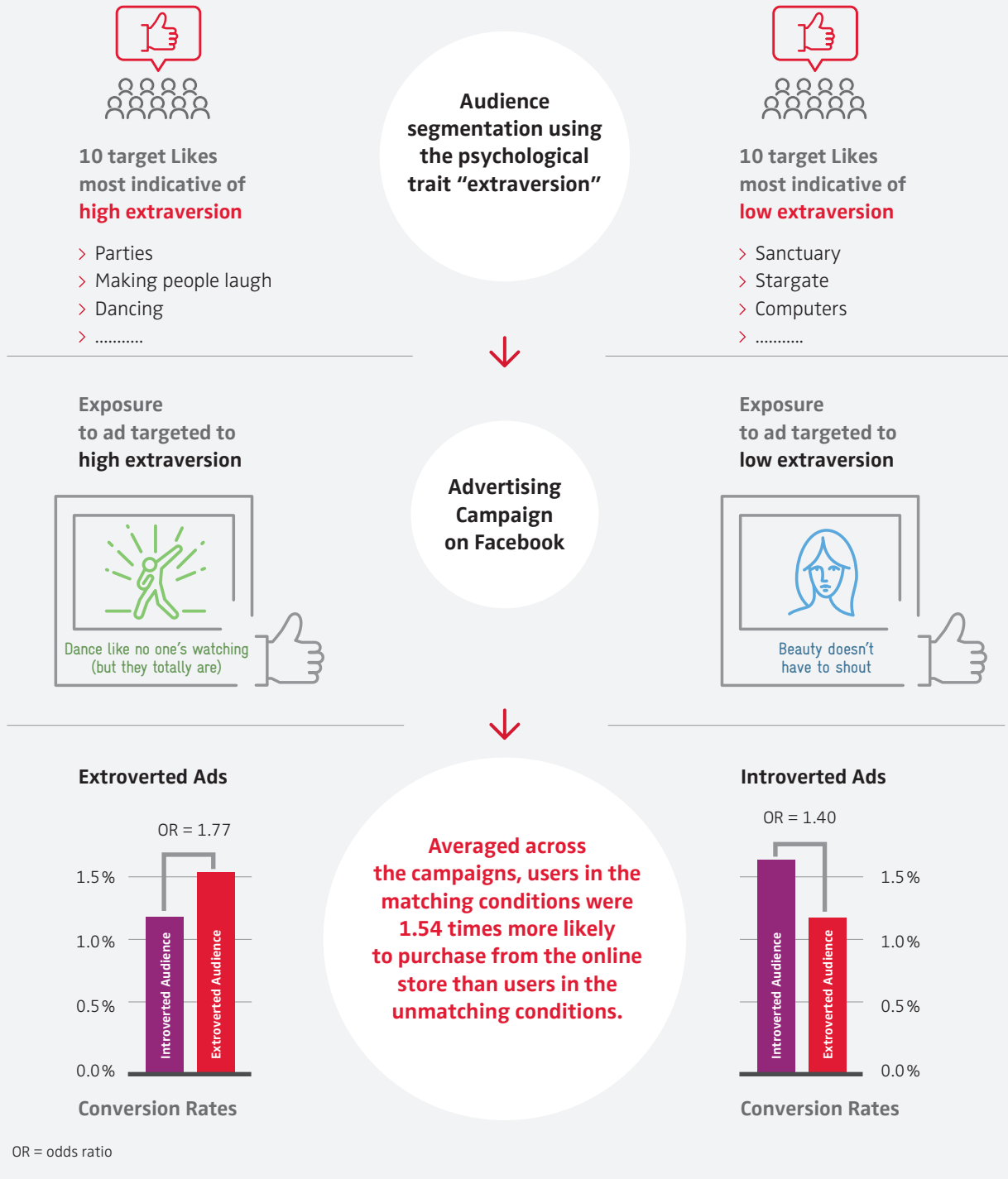
The bright and dark sides of persuasive mass communication ✕

Our findings suggest that the application of psychological targeting makes it possible to influence the behavior of large groups of people by tailoring persuasive appeals to the psychological needs of the target audiences. On the one hand, this method holds potential benefits for helping individuals make better decisions and lead healthier and happier lives. On the other hand, we see a number of potential pitfalls related to manipulation, data protection and privacy violations. While both opportunities and challenges are bountiful, here we only focus on three important ones.

> Better products, services and consumer decisions ✕

Predicting users’ individual attributes and preferences can be used to improve numerous products and services. For

FIGURE 2 > How addressing consumers tailored to Likes-based personality assessment translates into higher conversion rates



instance, digital systems and devices such as online stores and car displays could be designed to adjust their functions to best fit each user's inferred profile. By doing so they can help individuals overcome the challenge of "choice overload" and reduce unwanted spam, and assist them in finding the products and services they are most interested in.

The relevance of marketing and product recommendations could be improved by adding psychological dimensions to current user models. For example, online insurance advertisements might emphasize security when facing emotionally unstable users – a trait that can be predicted fairly well – but stress potential threats when dealing with emotionally stable ones. If the presented information is more relevant, it will be easier for consumers to make choices that suit their needs and make them happy, as well as make decisions that seem difficult in the short-term but benefit them in the long-run (e.g. saving or exercising more).

- > **Unwanted disclosure of private matters** ✗ The predictions of personal attributes from digital traces without the individual's awareness and consent may have considerable negative consequences. Commercial companies, government institutions, or even one's Facebook friends could use software to infer attributes such as intelligence, sexual orientation, or political views that an individual may not have intended to share. In the wrong hands, such predictions could pose a threat to an individual's well-being, freedom, or even life. For example, psychological targeting could be abused to covertly exploit weaknesses in people's characters and persuade them to take action against their own best interest or engage in immoral or unlawful dealings.

But even when intentions are benign and there is no direct intent for manipulation and data abuse, unintended consequences can arise and harm consumers. For example, a major U.S. retail network used customer shopping records to predict pregnancies of its female customers and send them well-timed and well-targeted offers. While in some contexts an unexpected flood of vouchers for prenatal vitamins and maternity clothing might be welcome, it could also be annoying or even tragic in other situations. In the worst-case scenario, revealing her pregnancy to her partner, parents, or other family members could threaten a woman's well-being or even safety.

Data privacy protection is challenging beyond the GDPR

✗ To date, legislative approaches in the U.S. and Europe have focused on increasing the transparency of how information is gathered and ensuring that consumers have a mechanism to "opt out" of tracking. The GDPR effectuated by the EU in 2018 has considerably restricted the ability to store and use consumers' personal data, giving more power and control to the individual.

However, the psychological targeting procedure using Facebook Likes or language as outlined in this article challenges the extent to which existing and proposed legislation can protect individual privacy. Personal inferences can be made even without having direct access to individuals' data. Although we used indirect group-level targeting in a way that was anonymous at the individual level and thus preserved – rather than invaded – participants' privacy, the same approach could also be used to reveal individuals' intimate traits without their awareness by following consumers who click on an ad or make a purchase.

None of the legislative measures currently in place or in discussion fully address the techniques described here: Our empirical experiments were performed without collecting or processing any individual-level information. Yet leveraging group-level insights through the Facebook advertising platform made it possible to influence the behavior of thousands of people on the basis of their psychological traits. Consequently, even today's most progressive data protection regulations might not adequately address the potential abuse of online information in the context of psychological targeting, highlighting the need for further policy interventions and regulations. ✗



FURTHER READING

Kosinski, M.; Stillwell, D. J. and Graepel, T. (2013): "Private Traits and Attributes are Predictable from Digital Records of Human Behavior", *Proceedings of the National Academy of Sciences*, Vol. 110 (15), 5802–5805. <https://doi.org/10.1073/pnas.1218772110>

Matz, S. C.; Kosinski, M.; Nave, G. and Stillwell, D. J. (2017): "Psychological Targeting as an Effective Approach to Digital Mass Persuasion." *Proceedings of the National Academy of Sciences*, 114 (48), 12714–12719. <https://doi.org/10.1073/pnas.1710966114>

Park, G.; Schwartz, A. H.; Eichstaedt, J. C.; Kern, M. L.; Kosinski, M.; Stillwell, D. J.; Ungar, I. H. and Seligman, M. E. P. (2015): "Automatic personality assessment through social media language." *Journal of Personality and Social Psychology*, Vol. 108 (6), 934–952. <http://dx.doi.org/10.1037/pspp0000020>

Let the Machine Decide: When Consumers Trust or Distrust Algorithms

Noah Castelo, Maarten W. Bos and Donald Lehmann

The rise of algorithms ✕ Algorithms – sets of steps that a computer follows to perform certain tasks – are increasingly entering consumers' everyday lives. Thanks to the rapid progress in the field of artificial intelligence, algorithms are able to understand and produce natural language and learn quickly from experience. They can accomplish an increasingly comprehensive list of tasks, from diagnosing some complex diseases to driving cars and providing legal advice. Algorithms can even perform seemingly subjective tasks such as detecting emotions in facial expressions and tones of voice. While many algorithms can outperform even expert humans, many consumers remain skeptical: Should they rely more on humans or on algorithms? According to previous findings, the default option is to rely on humans, even when doing so results in objectively worse outcomes. However, our research provides insight into when and why consumers are likely to use algorithms, and how marketers can increase their use.

Consumers' algorithm skepticism ✕ One reason why consumers have ambivalent feelings toward algorithms is related to the kind of abilities consumers typically associate with algorithms. Consumers tend to believe that machines lack fundamentally human capabilities that are emotional or intuitive in nature. While capabilities such as logic and rationality are seen as something humans and machines have in common, machines are not perceived to be human-like when it comes to affective or emotional aspects. Therefore, consumers often assume that algorithms will be less effective at tasks which humans approach with intuition or emotions.

KEYWORDS

**Algorithms,
Algorithm Aversion,
Algorithm Adoption,
Task Objectiveness,
Human-likeness, Trust**

THE AUTHORS

Noah Castelo

Professor of Marketing,
University of Alberta,
Edmonton, AB, Canada
ncastelo@ualberta.ca

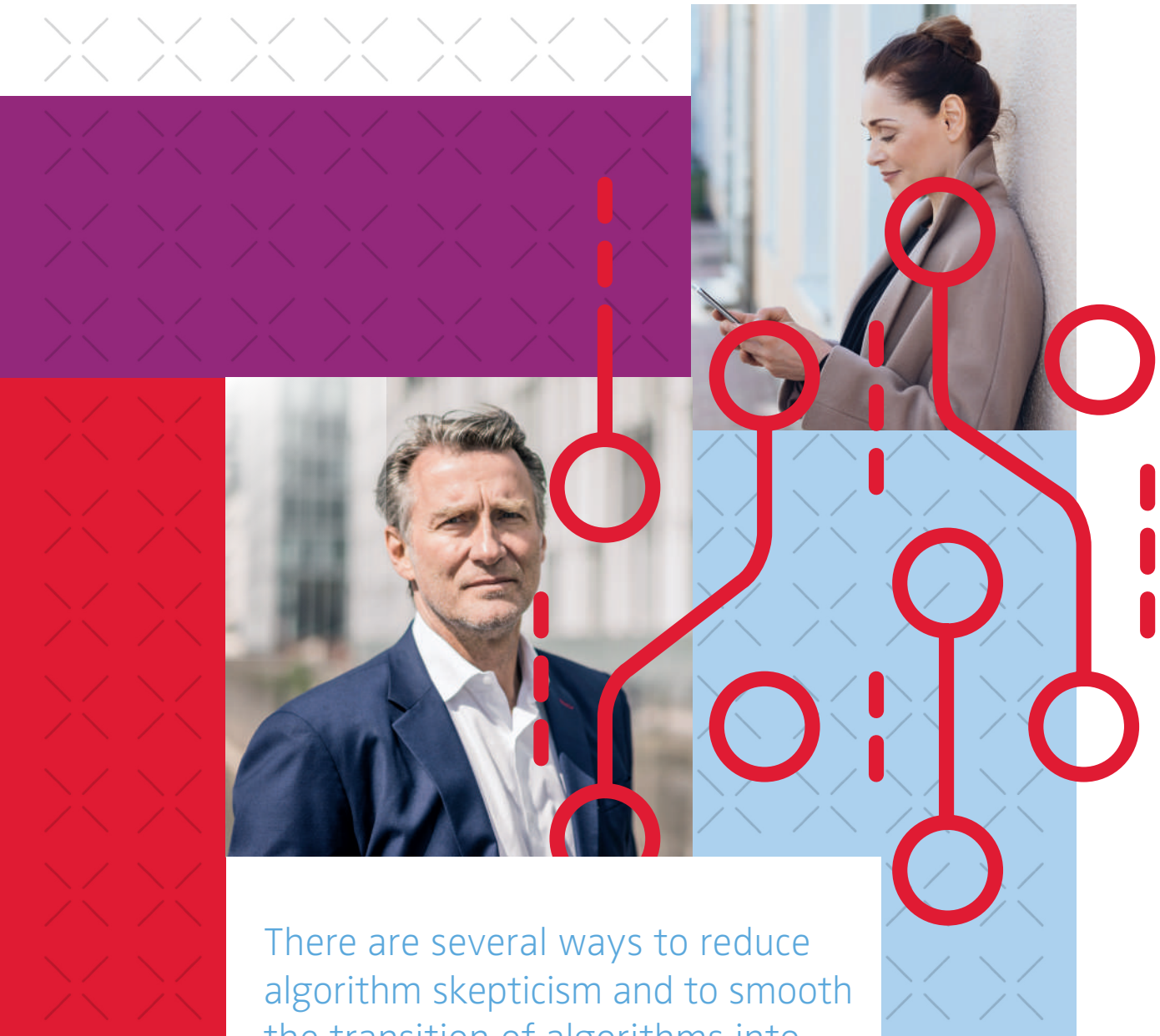
Maarten W. Bos

Senior Research Scientist,
Snap Inc., Santa Monica,
CA, USA
maarten.w.bos@gmail.com

Donald Lehmann

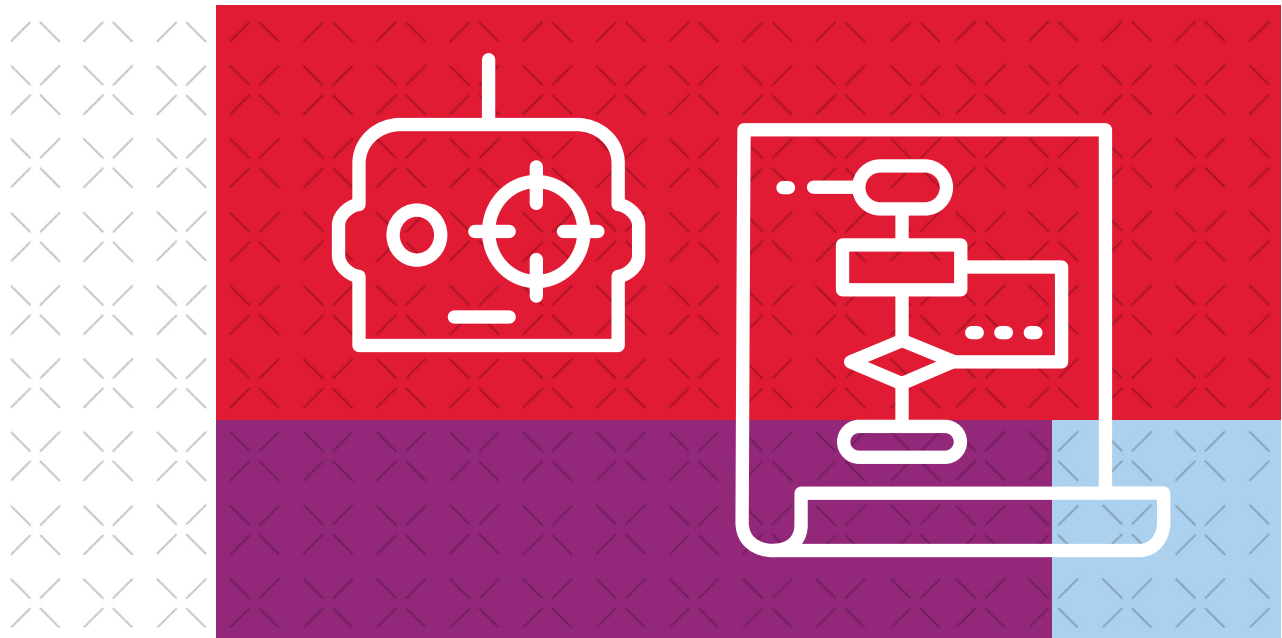
George E. Warren Professor of
Business, Columbia University,
New York, NY, USA
dlr12@columbia.edu





There are several ways to reduce algorithm skepticism and to smooth the transition of algorithms into our future lives.





As beliefs about a technology's effectiveness are fundamental determinants for its adoption, consumers tend to prefer humans in such cases. Whether or not consumers trust algorithms depends on the nature of the task to be performed, and also on the way the algorithm itself is presented. Framing both task and algorithm in appropriate ways can foster adoption of and trust in algorithms, according to our research.

Trust in algorithms depends on the characteristics of the task ✕ Familiarity, the scope of consequences, and the perceived objectiveness of a task are important determinants of algorithm adoption by consumers. In general, consumers tend to rely more on algorithms they are already familiar with. For instance, algorithm-based movie recommendations on Netflix are quite convenient. Consumers also rely on algorithms for getting directions via smartphone. In general, past experience with algorithms increases trust and use.

Some tasks are much more consequential than others, like diagnosing or treating a disease. Performing such tasks poorly has more serious consequences than others with less potentially far-reaching outcomes, and consumers seem to be less willing to trust and rely on algorithms when the stakes are higher.

The main focus of this research was related to a third characteristic: the influence of the perceived objectiveness of a task, a quality that can be managed actively. The series of studies shows that consumers trust algorithms more for objective tasks that involve quantifiable and measurable facts than for subjective tasks, which are open to interpretation and based more on personal opinion or intuition. Objective tasks typically associated with more "cognitive" abilities are thus entrusted significantly more to algorithms than tasks perceived as being subjective and typically associated with more "emotional" abilities. For instance, consumers perceive data analysis or giving directions as very objective – and consider algorithms superior to expert humans for performing such tasks – while the opposite is true for tasks like hiring employees or recommending romantic partners.

Importantly, this research also shows that perceived task objectiveness is malleable. Re-framing a task like recommending romantic partners as actually benefiting from quantification makes the task seem more objective. This in turn increases consumers' willingness to use algorithms for that task.

BOX 1

An investigation of trust in algorithms

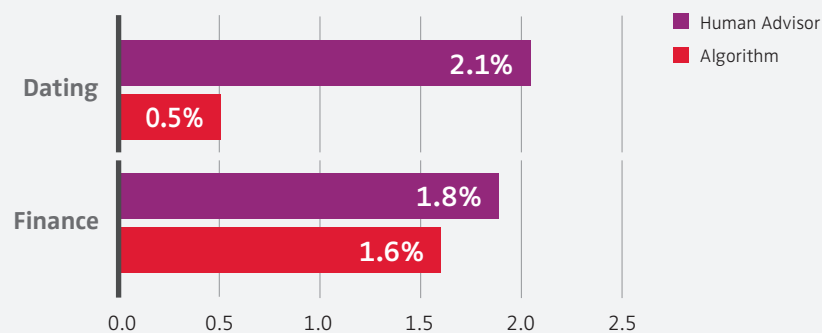
In a series of six experiments with over 56,000 participants we investigated what makes consumers rely on algorithms. We found that consumers tended to rely on algorithms for objective, less consequential tasks and for tasks they already had experience with. Further, we found ways to encourage reliance on algorithms.

Subjective tasks are entrusted to humans more than to machines

In one experiment we found that consumers are equally likely to click on ads for algorithm-based and human-based financial advice. For the more subjectively-perceived dating advice, in contrast, click rates for the algorithm-based option were significantly lower than for human-based advice (see Figure 1).

FIGURE 1 > A human adviser is strongly preferred for dating advice, but only slightly for financial advice

Clickthrough Rate

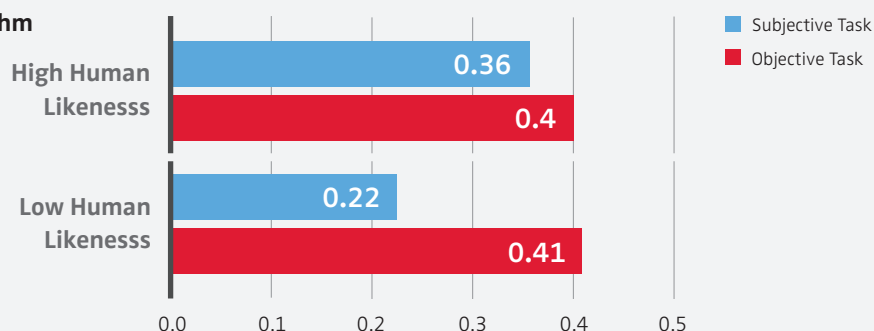


Human-likeness of algorithms can reduce skepticisms

In another experiment, we tested the extent to which participants trusted in algorithms to predict a stock index's future value, manipulating perceived task objectivity as well as the human-likeness of the algorithm. In one setting, this task was framed as being objective (stock prices depend on objective numerical indicators) or subjective (stock prices are driven by feelings and intuition). In the human-like condition, participants read about the ability of algorithms to perform fundamentally human "intuitive" tasks like creating art and music and understanding emotions. Task objectiveness affected reliance on algorithms when human-likeness was low, but this effect was eliminated when human-likeness was high (see Figure 2).

FIGURE 2 > Increasing an algorithm's human-likeness has a strong impact on reliance for subjective tasks

Reliance on Algorithm





Perceived task objectiveness can be increased and impacts the perceived effectiveness of algorithms as well as trust in the algorithm.



Trust also depends on how the algorithm is perceived

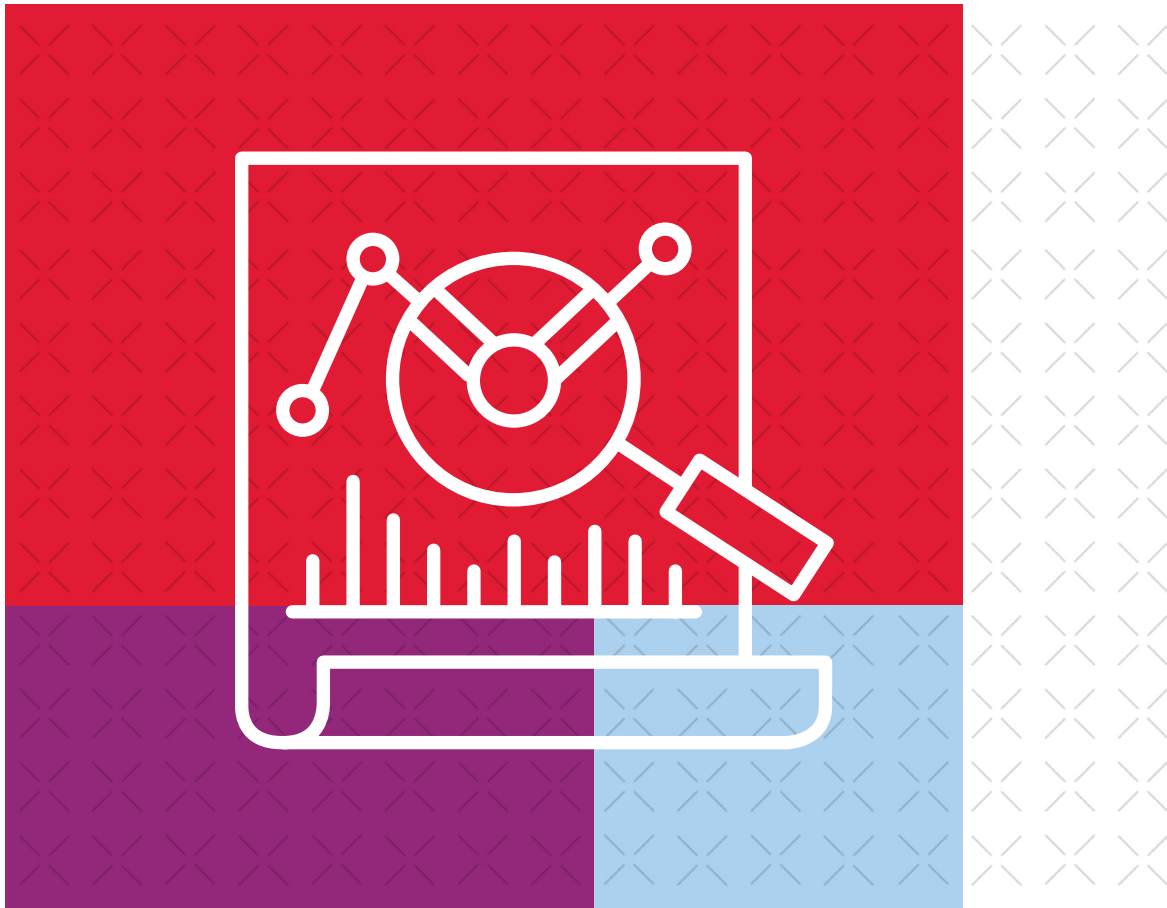
✗ As mentioned earlier, consumers believe in the cognitive capabilities of algorithms, though not in the “soft skills” that humans possess, even if this belief is becoming increasingly inaccurate. With the progress in AI, algorithms are increasingly capable of performing tasks typically associated with subjectivity and emotion. Machines can, for instance, already create highly valued paintings, write compelling poetry and music, predict which songs will be hits, and even accurately identify human emotion from facial expressions and tone of voice. Even though algorithms may accomplish these tasks using very different means than humans do, the fact that they have such capabilities makes them seem less distinct from humans. Making algorithms seem more human-like when it comes to these soft skills could therefore be a means to reduce algorithm aversion and encourage use, especially for tasks that are perceived as less objective.

How to encourage trust in and use of algorithms ✗ Given that algorithms offer enormous potential for improving outcomes for both consumers and companies, encouraging their adoption can be in the entities’ own best interest. Our results demonstrate that the following interventions can nudge consumers and managers into increased reliance on algorithms and better decisions.

> **Provide evidence that algorithms work** ✗ One of the most intuitive approaches for increasing consumers’ willingness to use algorithms is to provide them with empirical evidence of the algorithm’s superior performance relative

to humans. However, when the task is perceived as being subjective, this might not be convincing enough. Experiments indicate that consumers are less likely to believe in algorithm superiority compared to human judgement, even when provided with evidence to support this. In this case, additional interventions are necessary.

- > **Make the task seem more objective** ✗ Given that consumers trust in the cognitive capabilities of algorithms, another way to increase trust is to demonstrate that these capabilities are relevant for the task in question. This might be particularly useful for subjective tasks. In our studies, we found that algorithmic movie recommendations and recommendations for romantic partners were perceived as being much more reliable when the task framing emphasized how helpful quantitative analysis could be relative to intuition for those tasks. The results demonstrated that the perceived objectiveness of a given task is indeed malleable. Perceived objectiveness can be increased and impacts the perceived effectiveness of algorithms as well as trust in the algorithm for that task. A practical marketing intervention can therefore be used to increase trust in and use of algorithms for tasks that are typically seen as subjective.
- > **Present algorithms as more human-like** ✗ The third intervention we found to be useful was making algorithms seem more human-like, specifically along the affective or emotional dimensions of humanness. Figure 2 shows that increasing awareness of algorithms’ affective human-



likeness by explaining that algorithms can detect and understand human emotions encourages adoption of and trust in algorithms for subjective tasks. Although actual reliance on algorithms is typically lower when the task is seen as subjective, this effect can be eliminated by providing real examples of algorithms with human-like abilities.

While the general trend is clearly toward an increased use of algorithms in many domains of our private and corporate lives, the pace at which they are adopted – as well as the areas where they will be adopted first – depends on several factors. Managers face a balancing challenge: while increasing the capabilities of algorithmic products and services in subjective domains, they must simultaneously address consumers' and decision-makers' beliefs that algorithms might be less effective than humans at those tasks. Our results suggest several ways to reduce skepticism, increase trust, and smooth the transition of algorithms into our future lives. ✕



FURTHER READING

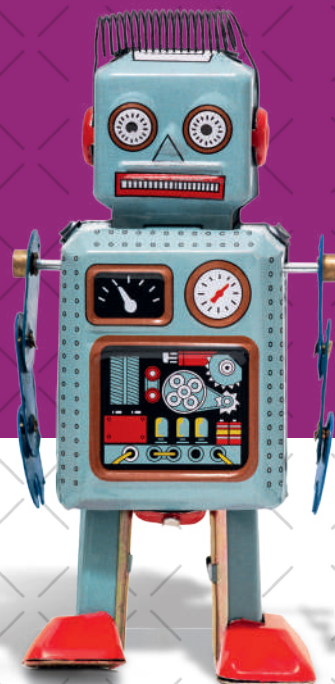
Castelo, N.; Bos, M. W. and Lehmann, D. (2019): "Task dependent algorithm aversion", *Journal of Marketing Research*, Vol. 56(5), 809–825.

Logg, J.; Minson J. and Moore, D. (2019): "Algorithm Appreciation: People Prefer Algorithmic To Human Judgment", *Organizational Behavior and Human Decision Processes*, 151, 90–103.

Longoni, C.; Bonezzi, A. and Morewedge, C. (2019): "Resistance to Medical Artificial Intelligence", *Journal of Consumer Research*, forthcoming.

Hello,
I am
Sam!

The humanization of chatbots can elicit negative emotional reactions from customers, especially if the service does not deliver as expected.



When Humanizing Customer Service Chatbots Might Backfire

Rhonda Hadi

KEYWORDS

Chatbots, Customer Service, Angry Customers, Avatars, AI

THE AUTHOR

Rhonda Hadi

Professor of Marketing,
Said Business School,
University of Oxford,
United Kingdom
Rhonda.Hadi@sbs.ox.ac.uk

The rise of the customer service chatbot ✕ Technological advancements in AI are continuously transforming the way companies operate, including how they interact with their customers. One clear illustration of this is the proliferation of customer service chatbots in the marketplace. In typical applications, these automated conversational agents exist on a company's website or social media page, and either provide customers with information or help handle customer complaints. Remarkably, chatbots are expected to power 85% of all customer service interactions by 2020, with some analysts predicting the global chatbot market will exceed \$1.34 billion by 2024. The cost-saving benefits are intuitive, but do chatbots improve customer service outcomes? While some industry voices believe that chatbots will improve customer service due to their speed and data synthesizing abilities, other experts caution that chatbots will worsen customer service and lead customers to revolt. Through a series of studies, we shed light on how customers react to chatbots. Our research finds support for both optimists and skeptics, contingent on the situation and specific characteristics of the chatbot.

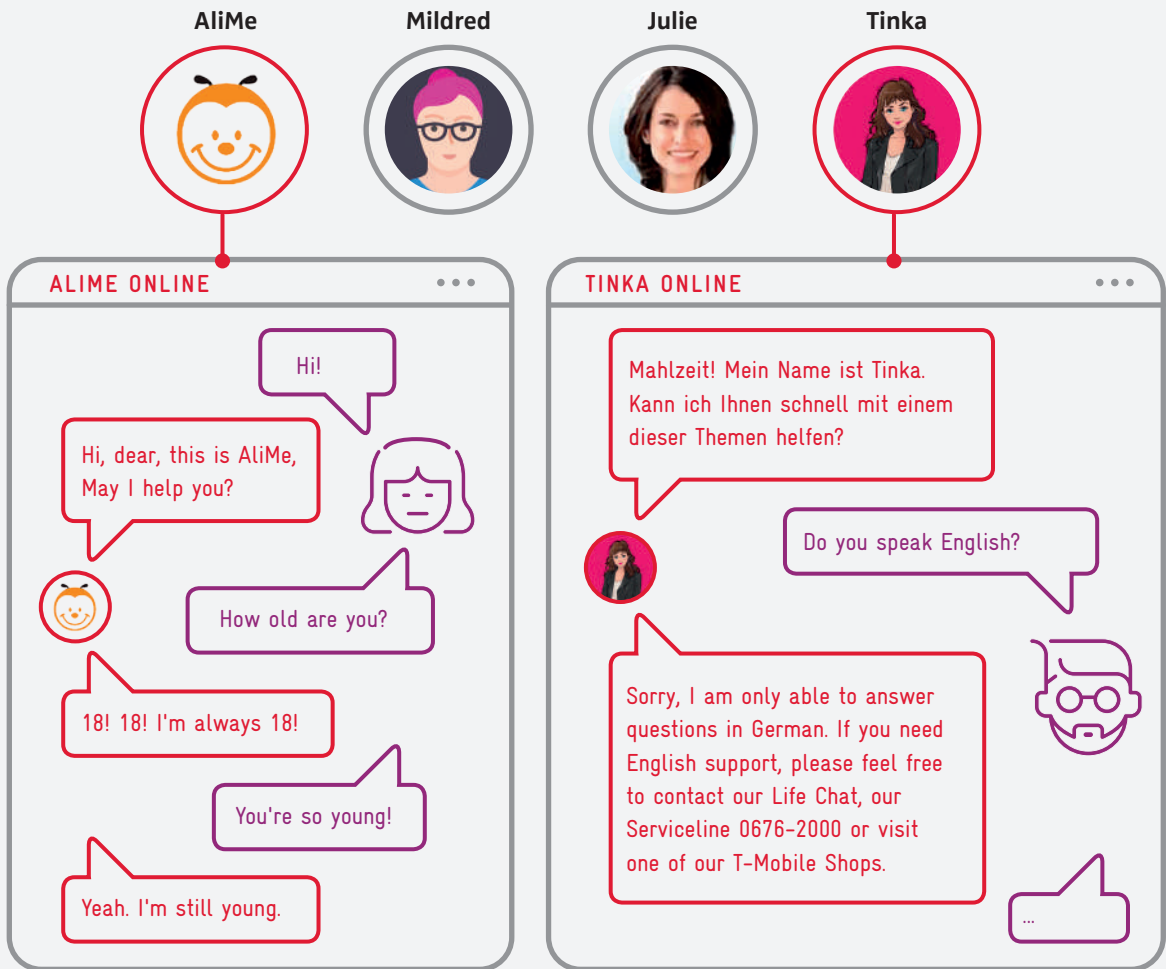
From humanized brands to humanized bots ✕ Technology designers often make deliberate attempts to humanize AI, for example, by imbuing voice-activated devices with conversational human voices. Industry practice shows these efforts also apply to customer service chatbots, many of which are given human-like avatars and names (see Box 1). Humanization, of course, is not a new marketing strategy.

BOX 1

A Host of Chatbot Personalities in the Marketplace

A variety of chatbot personalities can be found across the global marketplace. Lufthansa used a customer service bot named 'Mildred' for providing flight information, while 'Julie' helps Amtrack customers booking their trains or get timetables. The financial services provider ING's bot is named 'Inga', and the Australian government currently uses five separate bots – 'Sandi', 'Mandi', 'Sam', 'Oliver', and 'Alex' – to handle millions of citizen inquiries. In the Alibaba Universe in China, customers get assistance from a cute little mascot, called 'AliMe', who can also provide humorous banter (see below). Finally, 'Tinka' is a servicebot used by the telecommunications provider T-Mobile in Germany and Austria (see Figure 1). Tinka's profile describes her as an alien with an amazingly high IQ score, and she can ask riddles if prompted by customers.

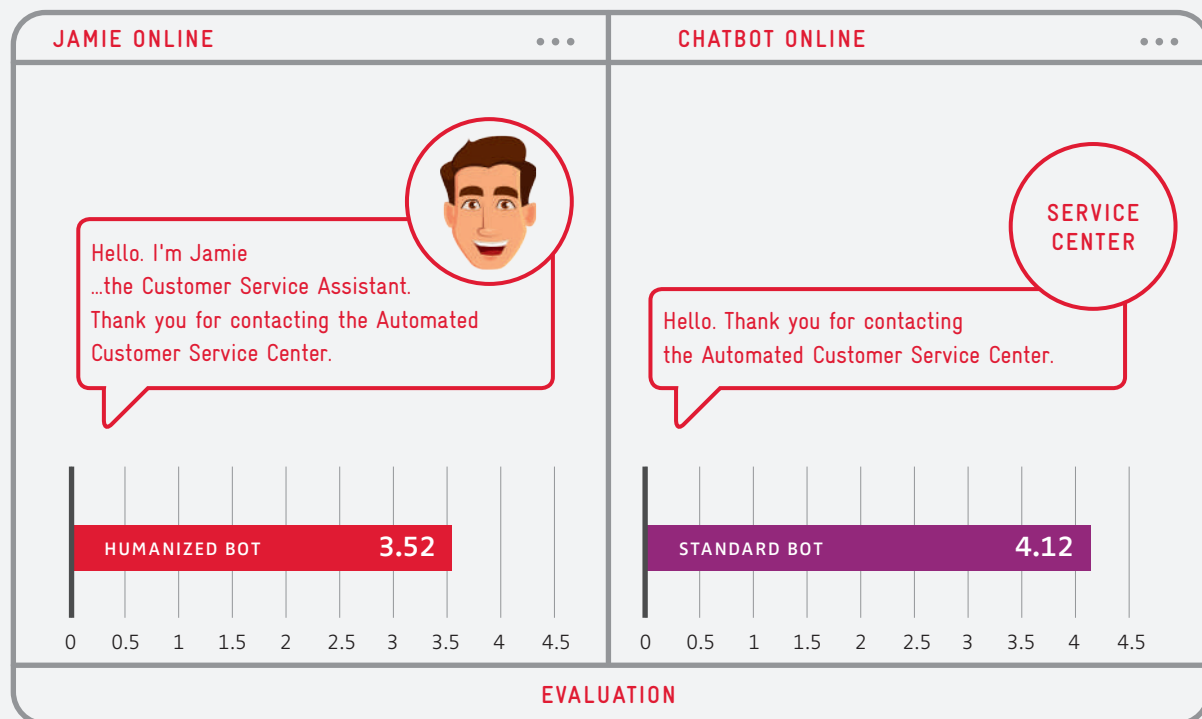
FIGURE 1 > Natural conversations with chatbot personas



Product designers and brand managers have long encouraged consumers to view their products and brands as human-like, either through a product's visual features or through brand mascots, like Mr. Clean or the Michelin Man. This strategy has generally been linked to improved commercial success: brands with human characteristics support more personal consumer-brand relationships and have been shown to boost overall product evaluations in several categories, including automobiles, cell phones, and beverages. Further, in the realm of technology, human-like interfaces have been shown to increase consumer trust. However, there is also evidence that in particular settings, these humanization attempts can elicit negative emotional reactions from customers, especially if the product does not deliver as expected.

A brain behind the bot? ✗ When a chatbot is presented in a human-like way, customers tend to assume it encompasses a certain level of agency. That is, they expect the chatbot is capable of planning, acting and reacting in similar manner to a human being. These heightened expectations not only increase customers' hopes that the chatbot is capable of doing something for them, but they also increase customers' beliefs that the chatbot should be held accountable for its actions and deserves punishment in case of wrongdoing. Of course, chatbots – no matter how human they may seem – do not always meet the high levels of performance a customer might expect. While expectancy violations are never a good thing, they are particularly harmful for angry customers, who tend to respond punitively to obstacles hindering their ability to achieve a desired outcome. To explore how angry customers react to chatbots, we conducted a series of studies to test whether and in which situations humanizing chatbots might be a good strategy.

FIGURE 2 > Angry customers evaluate a company more harshly when its customer service chatbot is imbued with human-like characteristics



Overall evaluation of the company on a 7-point scale

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Chatbot humanization may act as a double-edged sword: it enhances customer satisfaction for non-angry consumers but exacerbates negative responses from angry consumers.

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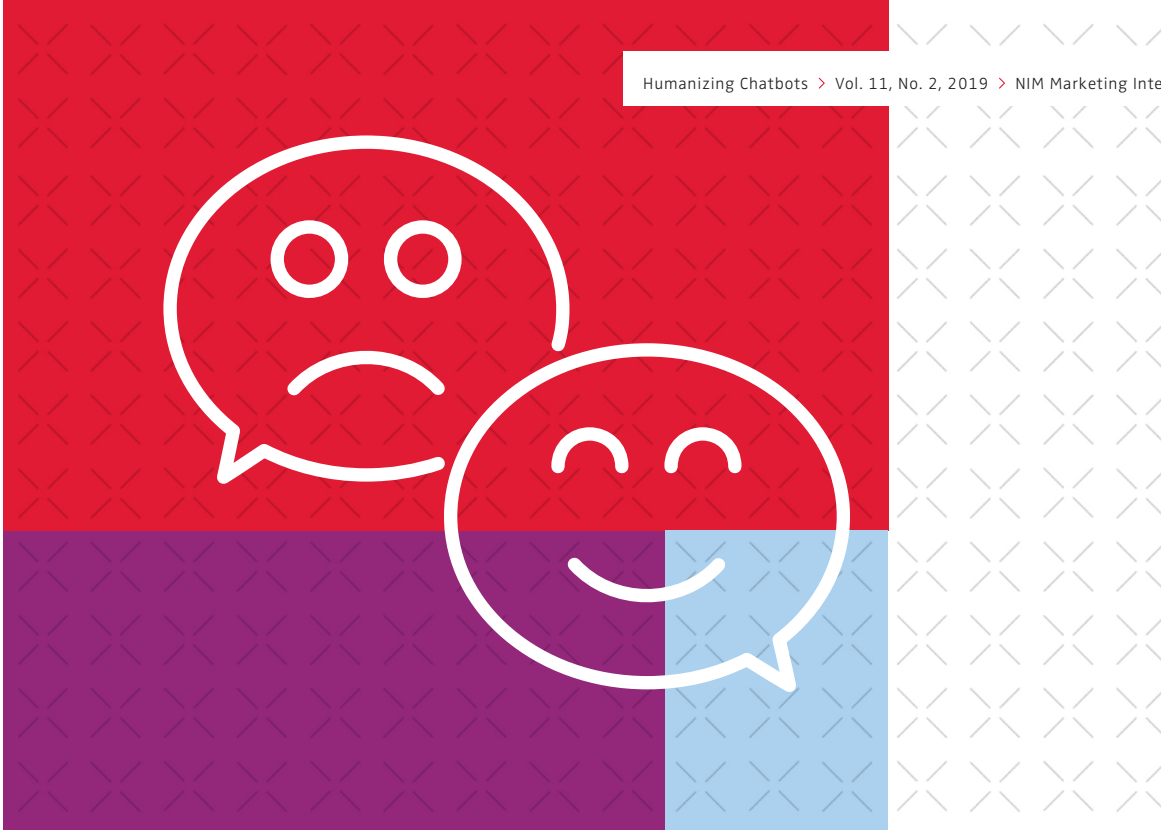
Blaming the bot: When humanized chatbots exacerbate anger ✕ My collaborators in this research were three colleagues from the University of Oxford: Felipe Thomaz, Cammy Cronic, and Andrew Stephen. In our first study, we analyzed over 1.5 million text entries of customers interacting with a customer service chatbot from a global telecom company. Through natural language processing analysis, we found that humanization of the chatbot improved consumer satisfaction, except if customers were angry. For customers who entered the chat in an angry emotional state, humanization had a drastic negative effect on ultimate satisfaction. In a series of follow-up experiments, we used simulated chatbot interactions and manipulated both chatbot characteristics and customer anger. These experiments confirmed our initial analysis, as angry customers reported lower overall satisfaction when the chatbot was humanized than when it was not. Furthermore, results showed that the negative influence of humanized chatbots under angry conditions extends to harm customers' repurchase intentions and evaluations of the company itself (see Figure 2).

Optimal chatbot characteristics depend on the situation

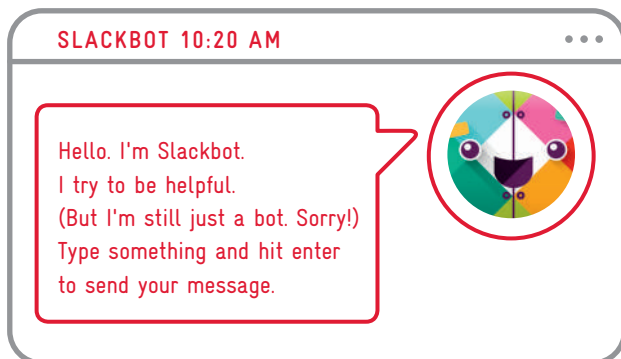
✕ At first glance, it may seem like it is always a good idea to humanize customer service chatbots. However, our research suggests that the consequences of humanizing chatbots are more nuanced and that the outcomes depend on both customer characteristics and the specific service context. We believe chatbot humanization may act as a double-edged sword: it enhances customer satisfaction for non-angry consumers but exacerbates negative responses from angry

consumers. Therefore, companies should carefully consider whether or when to humanize their customer service chatbots. Based on our findings we suggest the following guidance which might be helpful in designing a company's (automated) customer service in an efficient, yet customer-friendly way:

- > **Gauge whether a consumer is angry before they enter the chat** ✕ In our studies, anger played a pivotal role in determining customer reactions to humanized chatbots. Therefore, it is advisable to predetermine whether customers are angry as a first step. This could be done using keywords or real-time natural language processing. Angry customers could then be transferred to a non-humanized chatbot while others could be introduced to a humanized version. Another option might be to promptly divert angry customers to a human agent who can possibly be more empathetic and has more agency and flexibility to actually solve a problem to the customer's satisfaction.
- > **Stick to non-humanized bots for customer complaint centers** ✕ When a customer contacts a company specifically to complain, one can assume at least a moderate level of anger. Therefore, a non-humanized chatbot should be implemented in these settings to avoid potential negative effects on company reputation or purchase intentions when the bot is unable to offer adequate solutions. The use of humanized bots could be restricted to more neutral or promotion-oriented services like searches for product information or other assistance.



> **Manage expectations** ✕ Finally, companies can try to limit excessively high expectations of chatbot performance. This might be done by incorporating explicit disclosure that the customer is interacting with a bot and not a human being, like in the Slack example below.



Get your bot right in a growing bot-scape ✕ More and more brands will rely on chatbots to extend their customer service offerings, and these chatbots will grow increasingly sophisticated over time. Accordingly, customers will get more used to this type of service encounter but also get more demanding. Given the vast amount of industry investment into AI and machine learning technology, there may come a point in the future where chatbots are so functionally advanced that expectancy violations are no longer a feasible concern. In this future, chatbots will likely have greater freedom of action, and be able to perform even intuitive and empathetic tasks better than humans. When this becomes a

reality, the differences between the reactions of angry and non-angry consumers may diminish, in that chatbot humanization may always be a good thing. Accordingly, companies are well-advised to be on the forefront of technical progress, to learn quickly and integrate the most advanced AI into their chatbots. However, in the near future, it is important to consider the variety of consumer contexts and conditions where the interaction is likely to occur. Customer service chatbots represent yet another contact point demanding thoughtful consideration in customers' increasingly automated lives. ✕



FURTHER READING

Hadi, R.; Thomaz, F.; Crolic, C. and Stephen, A. (2019): "Blame the Bot: Anthropomorphism and Anger in Customer-Chatbot Interactions", working paper.

Valenzuela, A and Hadi, R. (2017): "Implications of Product Anthropomorphism Through Design", in Michael R. Solomon and Tina M. Lowrey (Eds.), *The Routledge Companion to Consumer Behavior*, Routledge, London.

AI-Driven Sales Automation: Using Chatbots to Boost Sales

Christian Hildebrand and Anouk Bergner

Chatbots – the new sales agents? ✕ Advances in artificial intelligence and natural language processing are giving rise to a new kind of service encounter: chatbots. These humanized interfaces allow brands to provide 24/7 support while automating major areas of customer service operations. Recent industry reports indicate that more than 80% of all businesses are considering integrating chatbots within the next five years. Many service providers are already using chatbots, but most applications have focused on cost saving and automation to partially replace human service encounters. However, rather than a mere cost-saving opportunity, chatbots might bring a myriad of advantages in automating customer-company interactions. One critical question for business is: Can chatbots augment the corporate sales force? More directly, are chatbots able to sell?

Through a series of field and laboratory studies, we found evidence that chatbots can indeed alter consumer preferences and purchase decisions. What consumers enjoy in particular is the ability to engage in natural dialogue and even to connect to the chatbot's "personality." We gained insights on the "optimal mechanics" of such interfaces and found evidence that incorporating chatbots into consumers' shopping processes promotes more intimate consumer-brand relationships, greater trust, and can be used as a powerful opportunity to upsell.

KEYWORDS

**Chatbots, Sales Automation,
Turn-Taking, Personalization,
Trust**

THE AUTHORS

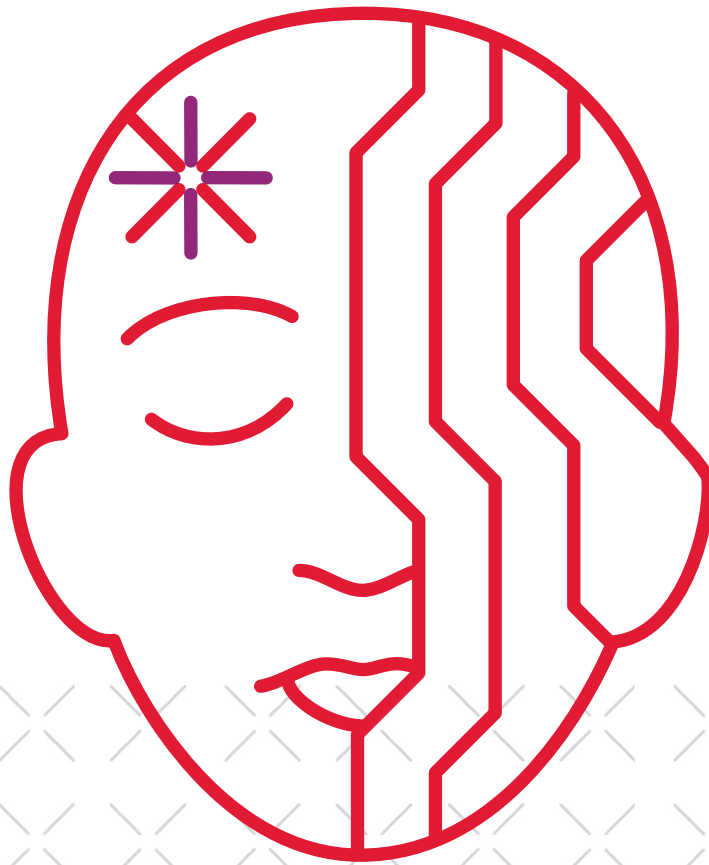
Christian Hildebrand

Director and Professor of
Marketing Analytics,
Institute of Marketing (IfM-HSG),
University of St. Gallen,
Switzerland
christian.hildebrand@unisg.ch

Anouk Bergner

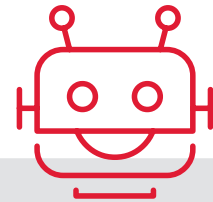
University of St. Gallen,
Switzerland
Anouk.Bergner@unisg.ch





Companies should consider very carefully how the specifics of the chatbot interface might affect the user experience.





BOX 1

Key ingredients to design better chatbot touchpoints

To assess the dynamics of the psychological mechanisms of turn-taking and personalization, we built different types of chatbot interfaces that varied in their ability to emulate natural dialogue and their level of personalization. Our participants interacted with these interfaces in different industries, like car rental services, financial advisory and online fashion retail.



- > We found that the turn-taking mechanism and the ability to react naturally to a user's input are the foundational building blocks for more intimate and trusting brand relationships and more positive brand attributions.



- > Our studies revealed a significant impact of the formality of the language employed by the interface. More informal communication styles, using emojis and trivial acknowledgements like "Great, thanks!" following a consumer input, significantly enhanced close consumer-brand relationships.



- > We also found that chatbots mirroring even generic consumer characteristics significantly increased its persuasion potential. Merely matching a consumer's gender or using a similar sounding name led to increased upselling compared to traditional interfaces (i.e., websites).

Sales automation with chatbots: The critical role of turn-taking and personalization

✗ First, a chatbot's ability to engage in more natural dialogue compared to traditional media is a critical ingredient for fostering a more enjoyable, trusted user experience. Research in human-to-human interaction has shown that turn-taking during conversations makes the conversational partners feel closer and that they like each other more. Thus, turn-taking is key to fostering trust between interaction partners.

The second important driver for building closer consumer-brand relationships is personalization. Both in terms of the chatbot being viewed as more human-like compared to a traditional interface as well as in its ability to adapt to specific consumer characteristics. People see and treat machines like other humans when these machines possess more human-like features. Brands and products with more human characteristics also lead to more positive brand association and more intimate brand relationships, according to prior research.

However, apart from the obvious visual characteristics of a chatbot, it is not very clear what makes an interaction with a machine "feel human" and personal, and how this ultimately affects consumer purchase decisions. A condensed summary of our key insights is presented in Box 1.

The powerful impact of chatbots upsell potential

✗ In the context of our car rental bot, we found that consumers were almost twice as willing to trade-up to more costly options and add-on services when they were offered by a humanized chatbot (see Figure 1). This effect increased even further for more personalized interfaces matching fundamental consumer characteristics, according to additional experiments.

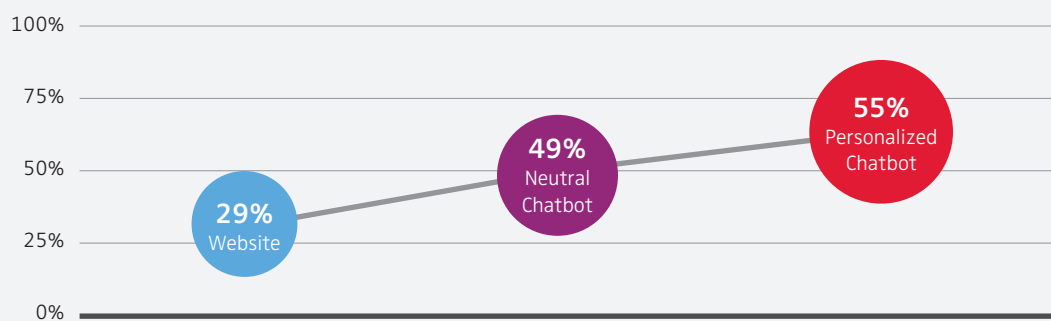
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Incorporating chatbots into consumers' shopping processes promotes more intimate consumer-brand relationships, greater trust, and can be used as a powerful opportunity to upsell.

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FIGURE 1 > Willingness to trade up to a more costly car rental option depending on bot-type

Choice Upsell Option



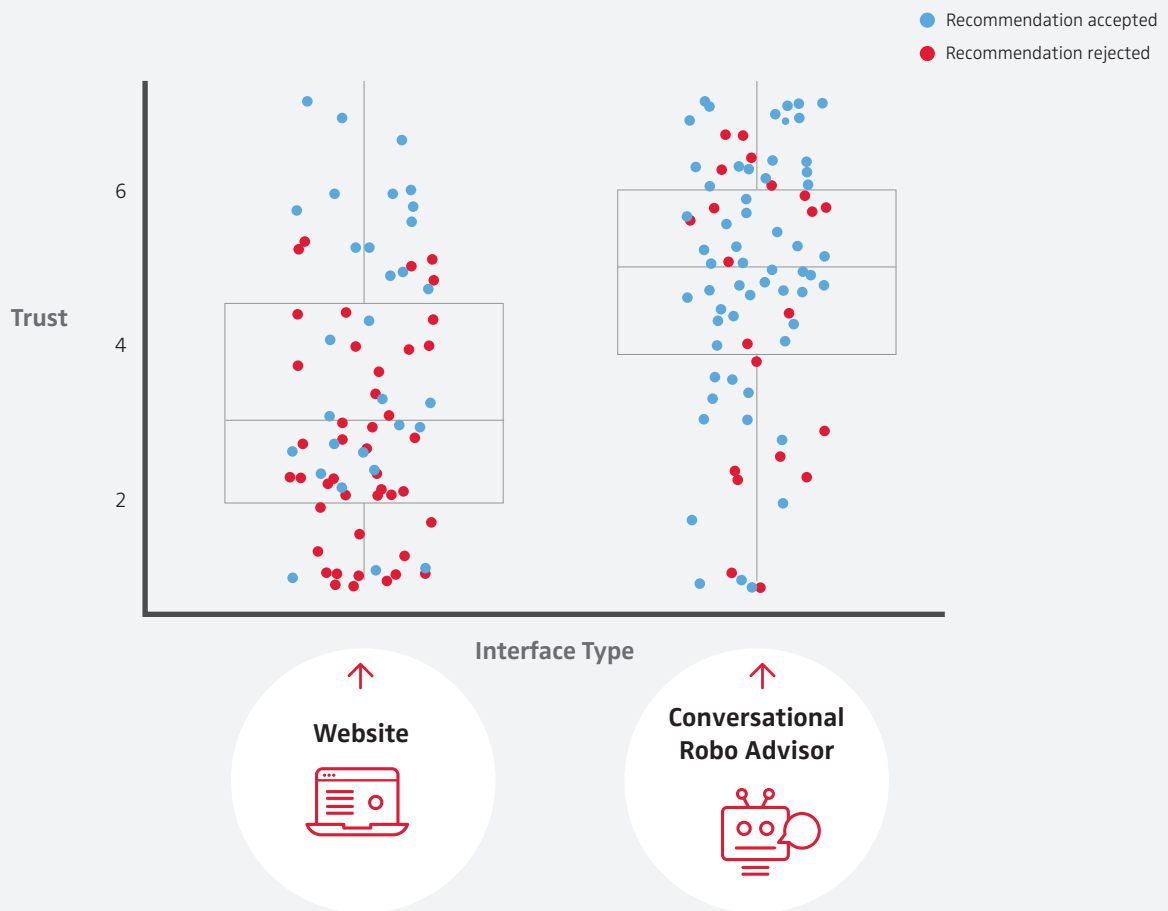
The powerful impact of chatbots on trust ✕ In our work with a financial advisory chatbot, known as a “robo advisor,” we found astonishing results with people putting too much trust in recommendations provided by robo advisors. We went as far as proposing objectively wrong portfolio recommendations to knowledgeable investors. Despite the objectively wrong advice and additional warnings to investors, they were three times more likely to accept an incorrect recommendation from a humanized robo advisor than from a traditional web interface. Figure 2 clearly depicts the greater trust in the robo-advisors and substantially fewer rejections of the recommended portfolio. Red dots indicate rejection of the recommended portfolio.

In another study, allowing consumers to customize a dress shirt via a humanized chatbot rather than a traditional e-commerce website also led to a significant increase in consumers' willingness to pay for the custom-made dress shirt.

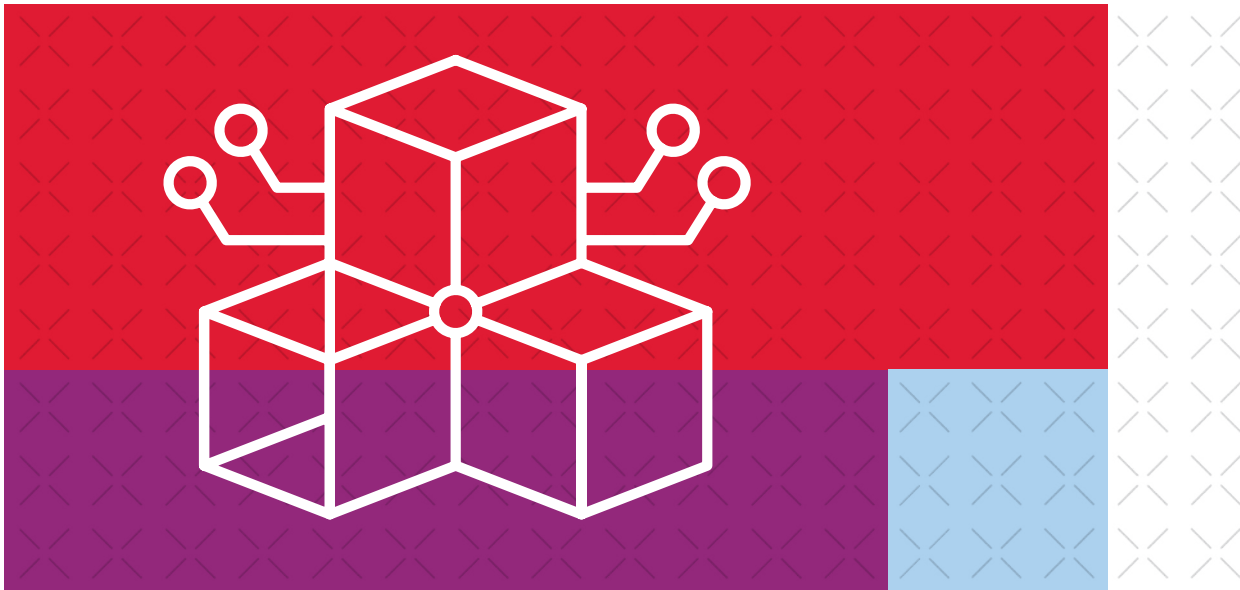
Designing better chatbot touchpoints ✕ The implementation of bot interfaces varies tremendously in current industry practice. They range from human-like bot interfaces to merely presenting a brand logo or a digital avatar. Some applications provide a maximum amount of information with limited turn-taking between the user and the interface, others offer only short pieces of information and require more turn-taking. Often, the implementation is a function of the default settings provided by chatbot providers and platforms. Instead of simply implementing the default option, companies should consider very carefully how the specifics of the chatbot interface might affect the user experience.

Our work provides clear guidelines for developing better customer-bot touchpoints – for both customers and companies. Four effective design “mechanics” may serve as a guideline.

FIGURE 2 > Trust perceptions and rejection of an objectively incorrect portfolio recommendation



- > **Make the interaction feel natural** ✗ Our studies reveal that greater turn-taking between the user and the interface is an important lever for generating trust. This critical trust-building mechanism has positive downstream consequences on brand perception and upselling potential. Managers should move beyond “out-of-the-box” chatbot services. Simple mechanics such as increasing the frequency of interactions leads to greater trust and a more enjoyable user experience. Yet, managers should carefully monitor and detect the flow of the conversation and provide witty answers to random and unrelated questions. Should the conversation with the chatbot get stuck nevertheless, companies should have hybrid systems at the ready that quickly connect users to a human representative.
- > **Adapt chatbots to consumer characteristics** ✗ While we have only investigated a few ways of personalizing chatbots – based on consumers’ gender, using similar-sounding first names, mimicking the type of language used – we see great potential for brands in providing a personalized chatbot experience. Our findings suggest that personalizing chatbots to basic consumer characteristics increases trust perception and improves the perception of intimacy between the customer, the chatbot and, ultimately, the brand.
- > **Adapt chatbots to your brand** ✗ A chatbot should not only adapt to consumer characteristics, but it should also reflect the key characteristics of the brand. While we did



not investigate this aspect in this research, we expect that chatbot “personalities” can be specifically tailored to the desired brand personality. Not only structural aspects of a chatbot interaction like the extent of turn-taking, but also more contextual factors such as the personality expressed through the type of language will affect both brand perception and consumer choice. Thus, designing the personality of machines more generally will be an exciting avenue for future research and brand strategists alike.

- > **Beware of the potential downsides** ✕ Finally, consider the potential downsides and pain points for users. As illustrated in the article by Hadi and colleagues in this issue, there can be severe downsides to the humanization of chatbots in certain applications. They show that providing automated service interactions to already dissatisfied customers can create a downward spiral that hurts both the entire service value chain and the brand.

Chatbots as persuasion agents: Augmenting the corporate salesforce ✕ Will machine intelligence improve enough that consumers will no longer be able to distinguish a machine from a human? As developments in artificial intelligence advance at an ever-increasing rate, it is not inconceivable that chatbots and other humanized interfaces will reach this benchmark in the near future. Brand managers should therefore consider chatbots not merely as another digital marketing fad or a way to save costs through service automation. Chatbots can be a powerful tool in fundamentally changing the orchestration of a brand’s digital touchpoints and ultimately step-change a company’s sales potential. Possible applications go beyond mere service interactions and can have direct effects on a company’s top-line growth.

Chatbot personas have the potential to persuade customers, to offer extended features, to sell upgrades and build closer customer-brand relationships. Companies seeking to leverage the full potential of AI in the context of conversational interfaces and digital assistants should not overlook the critical process of optimizing the design aspects of their chatbots rather than simply using “off-the-shelf” chatbot templates. ✕



FURTHER READING

Bergner, A.; Hildebrand, C. and Häubl, G. (2018): “Machine Talk: How Conversational Interfaces Promote Brand Intimacy and Influence Consumer Choice”, Association for Consumer Research, Conference Proceedings.

Dale, R. (2016): “The Return of the Chatbots”, *Natural Language Engineering*, 22(5), 811–17.

Hildebrand, C. and Bergner, A. (2019): “Detrimental Trust in Automation: How Conversational Robo Advisors Leverage Trust and Miscalibrated Risk Taking”, *Society for Consumer Psychology, Conference Proceedings*.

Levinson, S. C. (2016): “Turn-taking in Human Communication – Origins and Implications for Language Processing”, *Trends in Cognitive Sciences*, 20 (1), 6–14.

The Thorny Challenge of Making Moral Machines: Ethical Dilemmas with Self-Driving Cars

Edmond Awad, Jean-François Bonnefon, Azim Shariff and Iyad Rahwan

Self-driving vehicles: Safe, but not 100% ✕ Autonomous, self-driving cars are being tested and trained extensively and have already covered thousands of miles of real road driving. Incidents are remarkably rare. However, any accidents – especially if they involve fatalities – are covered broadly in media all over the world, and consumers wonder whether autonomous vehicles (AVs) are actually safe, and whether they should ever trust them. Experts agree that AVs do have the potential to benefit the world by increasing traffic efficiency, reducing pollution and eliminating up to 90 % of traffic accidents – those that are caused by driver error, tiredness, drunkenness or other human factors. Though safety is constantly improving and injuries and deaths might be significantly reduced, crashes will never be completely avoidable. And any imminent crashes will require AVs to make difficult decisions.

How to react when a crash is imminent? ✕ Imagine, as an example, situations as depicted in Figure 1. The AV may avoid harming several pedestrians by swerving and sacrificing a passerby (A), or the AV may be faced with the choice of sacrificing its own passenger to save one (B) or more (C) pedestrians.

Although these scenarios appear unlikely, even low-probability events are bound to occur with millions of AVs on the road. Furthermore, the tradeoffs involved in these scenarios will occur in much more frequent, but less extreme scenarios: instead of choosing between certain death, the car will need to choose between slightly increasing the risk toward one group rather than toward another. AV programming must include decision rules about what to do when these situations occur. While a human driver has to spontaneously react in a

KEYWORDS

Ethics, Decision Making, AI, Autonomous Vehicles, Moral Machines

THE AUTHORS

Edmond Awad

The Media Lab, Institute for Data, Systems and Society, Massachusetts Institute of Technology, Cambridge, MA, USA
awad@mit.edu

Jean-François Bonnefon

Toulouse School of Economics (TSM-R, CNRS), Université Toulouse-1 Capitole, Toulouse, France
jean-francois.bonnefon@tse-fr.eu

Azim Shariff

Department of Psychology, University of British Columbia, Vancouver, Canada
Canadashariff@psych.ubc.ca

Iyad Rahwan

The Media Lab, Massachusetts Institute of Technology, Cambridge, MA, USA, Center for Humans and Machines, Max-Planck Institute for Human Development, Berlin, Germany
irahwan@mit.edu

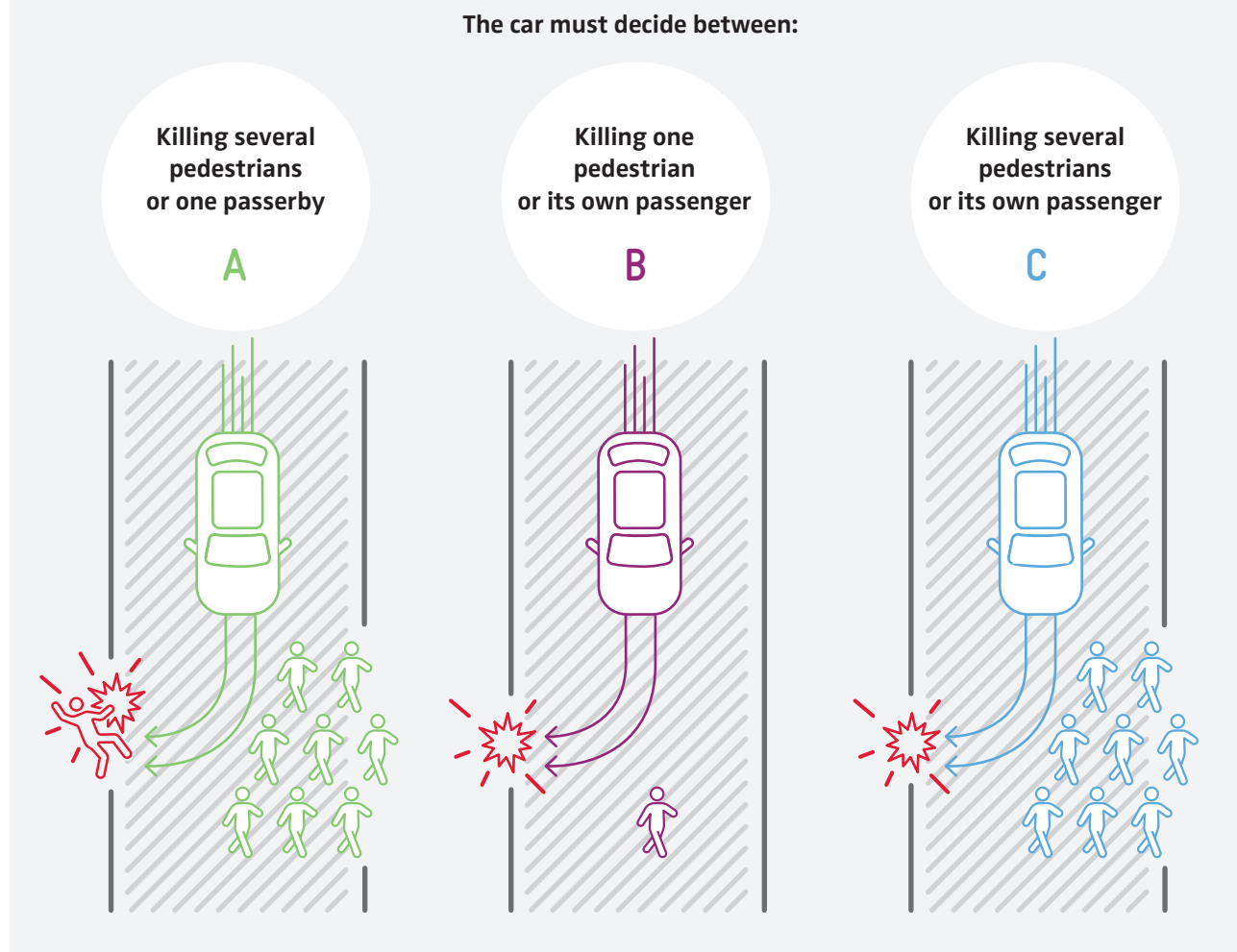


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Figuring out how to build ethical autonomous machines is one of the thorniest challenges in artificial intelligence today. ←

FIGURE 1 > Three traffic situations involving imminent unavoidable harm



split second, an autonomous vehicle needs to be programmed deliberately; someone needs to define the rules, well before AVs become a global commodity. The algorithms that control AVs will need to embed moral principles guiding their decisions in situations of unavoidable harm. But what is the right moral decision in such a case? How should AI be programmed to react in such an instant? Manufacturers and regulators will need to accomplish three potentially incompatible objectives: consistency, avoiding public outrage, and not discouraging buyers. One step toward solving this problem is trying to learn how people feel about alternative decisions that self-driving vehicles' AI might have to make. This was the purpose of our Moral Machine study (see Box 1).

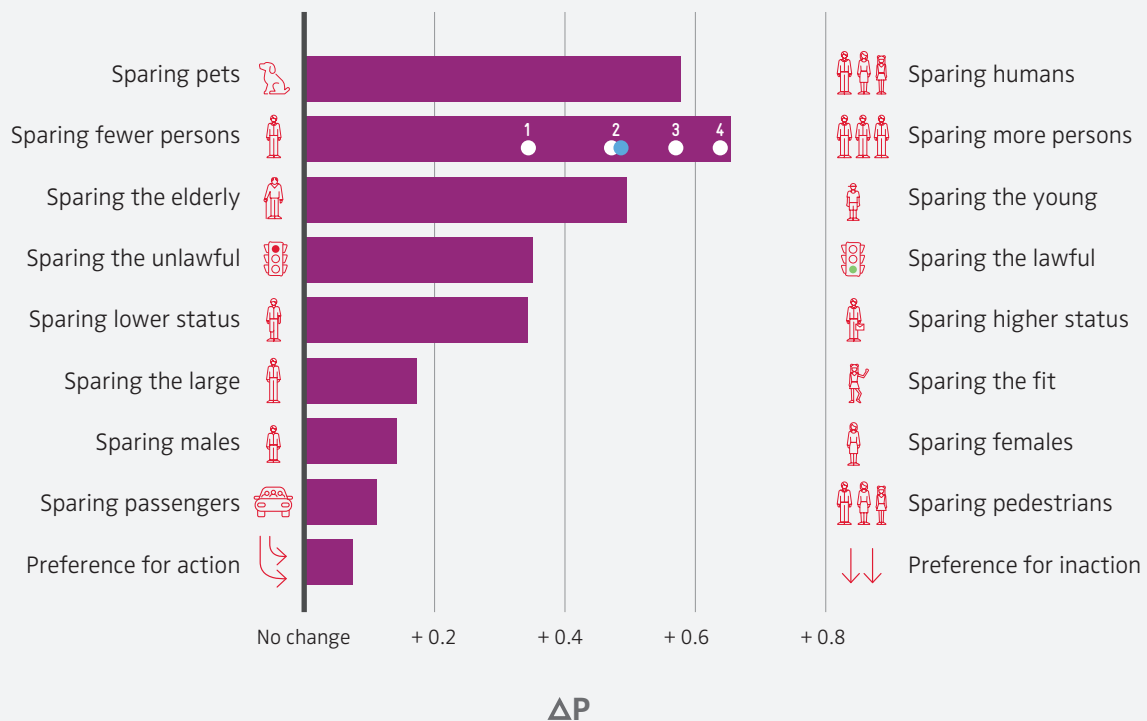
Saving passengers or pedestrians? ✕ Another online study among U.S. residents sheds more light on the complexity of the topic of AI-driven decision-making in dangerous situations. This study explored the trade-off between saving driver and passengers versus saving pedestrians and other road users – the dilemma illustrated in Figure 1. In principle, participants approved of utilitarian AVs minimizing the number of casualties. Their moral approval increased with the number of lives that could be saved. Participants' approval of passenger sacrifice was even slightly positive when they had to imagine themselves and another person, particularly a family member, in the AV.

BOX 1

Exploring moral preferences – the moral machine experiment

With a group of MIT researchers we set out to gauge societal expectations about the ethical principles that should guide machine behavior. To address this challenge, we deployed the Moral Machine, a viral online experimental platform designed to explore the moral dilemmas faced by autonomous vehicles. This platform gathered 40 million decisions in the context of unavoidable accidents. More than two million people from 233 countries and territories participated online in our multilingual 'serious game' and revealed which harm seemed more tolerable to most people. Indeed, the most emphatic global preferences in the survey are for sparing the lives of humans over the lives of other animals; sparing the lives of many people rather than a few; and preserving the lives of the young, rather than older people (see the first three preferences in Figure 2).

FIGURE 2 > Global preferences in favour of the choice on the right side



ΔP is the difference between the probability of sparing persons possessing the attribute on the right, and the probability of sparing persons possessing the attribute on the left, aggregated over all other attributes. For the number of persons effect sizes are shown for each number of additional characters (1 to 4); the effect size for two additional persons overlaps with the mean effect of the attribute (= blue circle).

BOX 2

Cultural differences in the preference for ethical standards

While there was not much variation along the lines of demographic characteristics like age, gender, income, education, or political and religious views, the cultural background did play a role in the assessment. Some of the differences are listed below:



> Countries within close proximity to one another showed closer moral preferences, with three dominant clusters in the West, East, and South.



> Participants from collectivist, eastern cultures like China and Japan were less likely to spare the young over the old compared to countries in the southern cluster in which central and southern American countries dominate.



> Participants from individualistic cultures, like the UK and US, placed a stronger emphasis on sparing more lives given all the other choices – possibly, because of the greater emphasis on the value of each individual.



> Similarly, participants from poorer countries with weaker institutions turned out to be more tolerant of jaywalkers versus pedestrians who cross legally.



> Participants from countries with a high level of economic inequality showed greater gaps between the treatment of individuals with high and low social status.

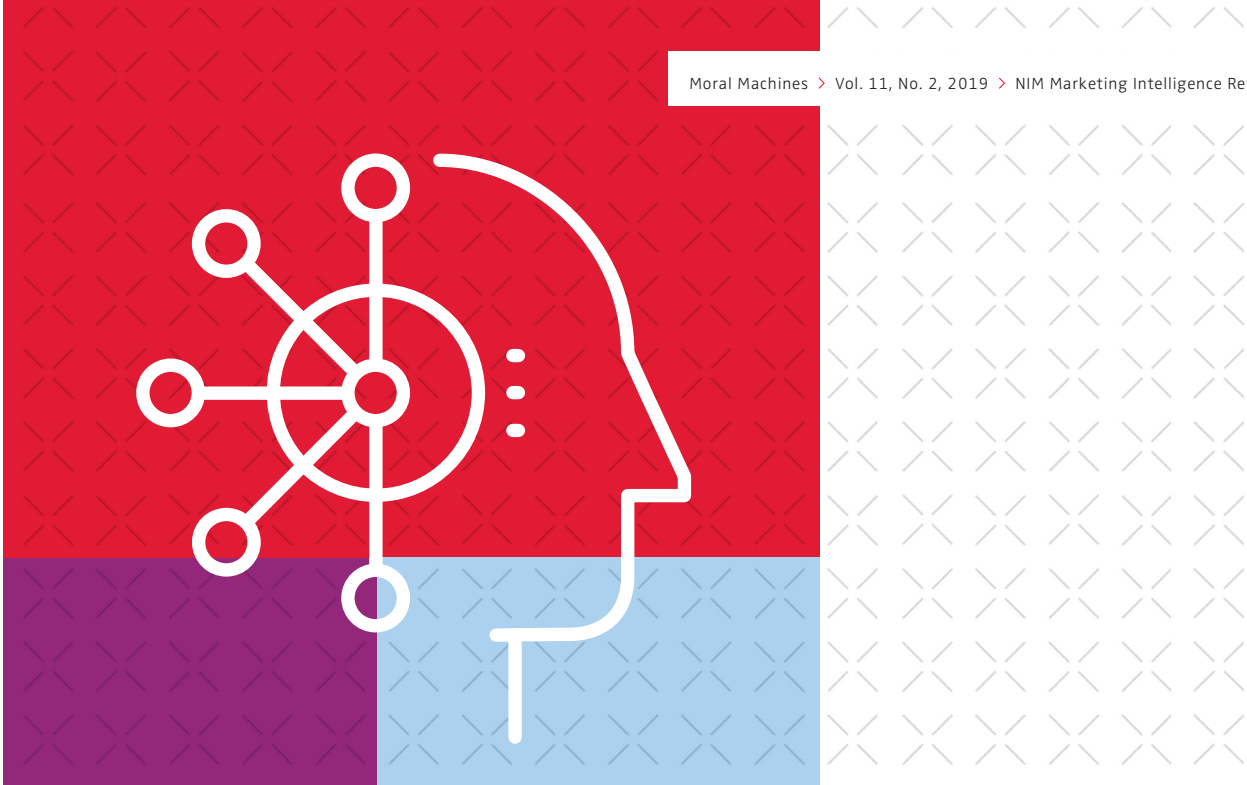


> Finally, we observed some striking peculiarities, such as the strong preference for sparing women and the strong preference for sparing fit characters in the Southern cluster.

Consumers would like other people to buy AVs relying on such a utilitarian algorithm, but they would themselves prefer to ride in AVs that protect their passengers at all costs. Further, study participants disapproved of enforcing utilitarian regulations for AVs, and would be less willing to buy such AVs. Thus, the moral dilemma triggers a social dilemma that needs to be solved.

Steps towards solving the ethical dilemma of self-driving vehicles ✕ We find ourselves in a situation that is new to the world: Vehicles are able to make decisions as far-reaching as who should live or die – without real-time human supervision. This problem is not limited to a niche market but will affect everyday transportation and all road users, no matter whether they drive, walk, or ride a bike. To be prepared to actually let AVs take over our roads, producers need to master several challenges on top of the technical ones.

- > **Discuss ethics of AI on a general level** ✕ All stakeholders should embrace the challenges of machine ethics as a unique opportunity to decide, as a community, what we believe to be right or wrong, and to make sure that machines, unlike humans, unerringly follow the agreed-upon moral preferences. We might not reach universal agreement, as indicated by the Moral Machine survey, but the fact that broad regions of the world displayed relative agreement is encouraging.
- > **Work on a new social contract** ✕ Over a century ago, cars started to become a commodity on the roads. A system of laws regulating the behavior of drivers and pedestrians (and the designs and practices of manufacturers) was introduced and has been continuously refined. Overall, this traffic system is trusted by society. In days to come, the integration of autonomous cars will



require a new social contract that provides clear guidelines on who bears responsibility for different kinds of accidents; how monitoring and enforcement will be performed; and how trust can be engendered among all stakeholders. This contract will be similarly transformational, but will probably occur over a much shorter period of time.

- > **Prepare the public to build trust** ✕ The ethical quandary of who to save in life-threatening incidents produces a social dilemma. People recognize the utilitarian approach to be the more ethical one, and as citizens, they want the cars to save a greater number of lives. But as consumers, they want self-protective cars. As a result, the adoption of either strategy brings its own risks for manufacturers: A self-protective strategy risks public outrage, whereas a utilitarian strategy may scare consumers away. To make people feel safe and trust AVs, we must encourage public discourse about the absolute reduction in risk to passengers through overall accident reduction. Otherwise, outsized media coverage of rare accidents will trigger the biased perception of risk for passengers, which might irrationally overshadow the greater safety effects.

Interesting times ahead ✕ Figuring out how to build ethical autonomous machines is one of the thorniest challenges in artificial intelligence today. As we are about to endow millions of vehicles with decision autonomy, serious consideration of algorithmic morality has never been more urgent. Our data-driven approach highlights how

the field of experimental ethics can provide key insights into the moral, cultural, and legal standards that people expect from algorithms of self-driving cars. And even if these issues are being tackled and will eventually be solved, other AV challenges such as hacking, liability, and labor displacement will remain. We face interesting times! ✕



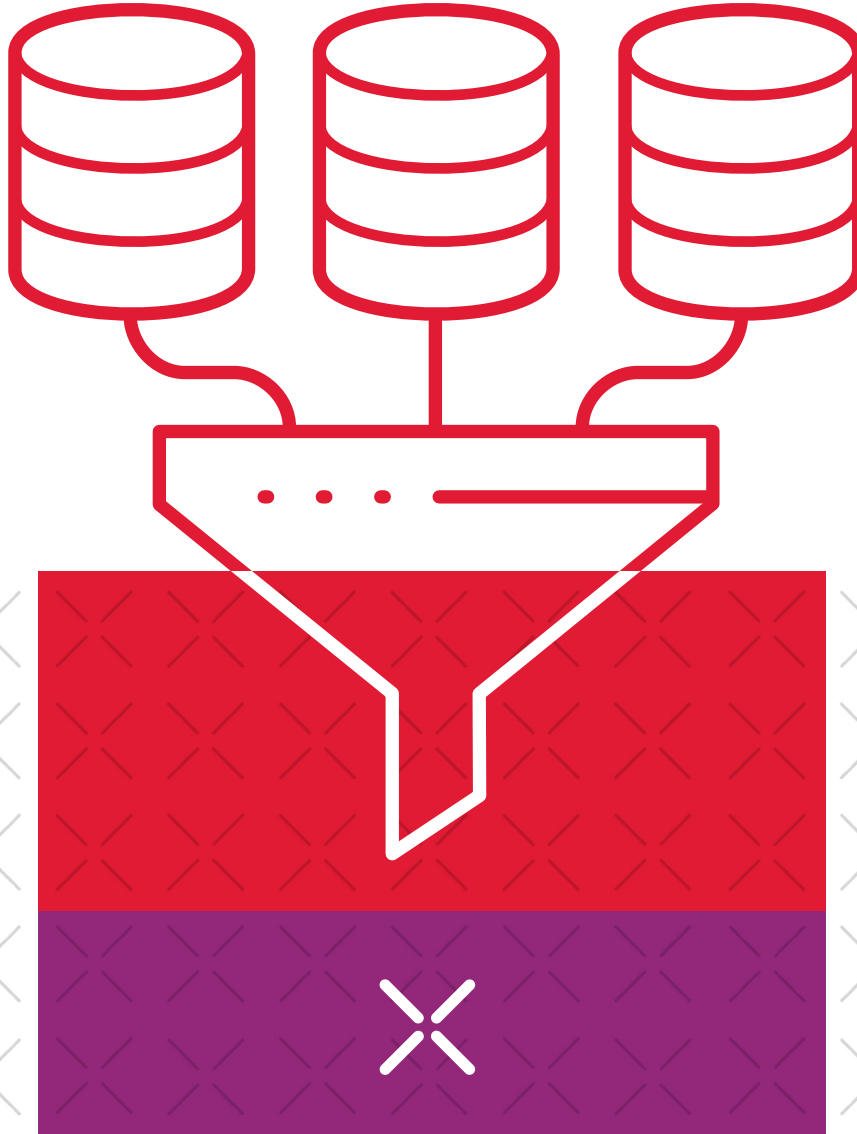
FURTHER READING

Awad, E.; Dsouza, S.; Kim, R.; Schulz, J.; Henrich, J.; Shariff, A.; Bonnefon, J.K. and Rahwan, I. (2018): "The Moral Machine Experiment", *Nature*. 563. doi: 10.1038/s41586-018-0637-6.

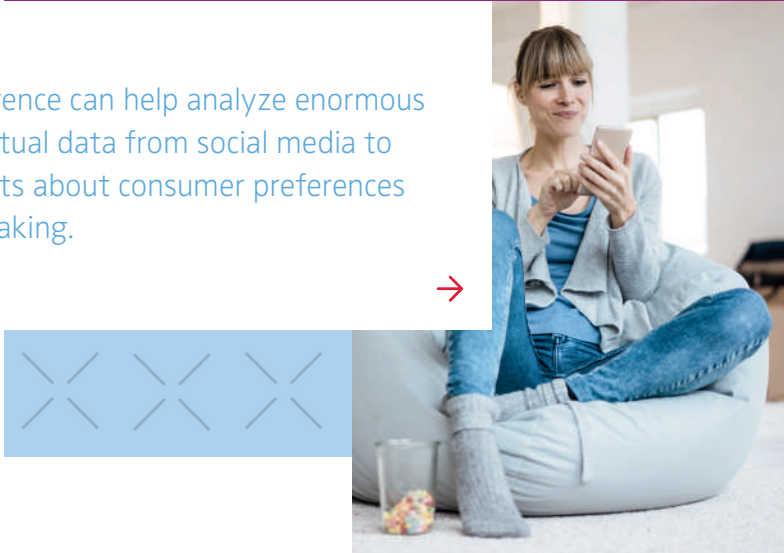
Bonnefon, J.-F.; Shariff, A. and Rahwan, I. (2016): "The Social Dilemma of Autonomous Vehicles", *Science*. 352. doi: 10.1126/science.aaf2654.

Bonnefon J.-F.; Shariff A. and Rahwan, I. (2019): "The trolley, the bull bar, and why engineers should care about the ethics of autonomous cars", *Proceedings of the IEEE*, Vol. 107, 502-504.

Shariff, A.; Bonnefon, J.-F. and Rahwan, I. (2017): "Psychological roadblocks to the adoption of self-driving vehicles", *Nature Human Behaviour* <https://doi.org/10.1038/s41562-017-0202-6>



Artificial intelligence can help analyze enormous amounts of textual data from social media to generate insights about consumer preferences and decision-making.



Understanding Consumer Preferences from Social Media Data

Bradley Taylor

KEYWORDS

Text Analysis, AI, Preference Measurement

THE AUTHOR

Bradley Taylor

Black Swan Data,
Executive Data Science Director
(formerly GfK SE)

Reading “between the lines” of product reviews on a large scale

✗ When people consume in the digital space, they not only click and buy, but often comment on products, brands and services on social media, on platforms or the sites of online stores. The enormous amount of textual data consumers produce online is in fact a treasure box that hasn't yet been fully opened. But as data volumes grow, so do new algorithms to process and analyze unstructured data. Artificial Intelligence (AI) is one of the domains that can help open this treasure box further to better understand consumer decision-making.

In a GfK research project, we tested how we can learn consumer preferences and predict choices from publicly available social media and review data which are related to sales data. The common AI tool “Word Embeddings” has shown to be a powerful way to analyze the words that people use. It enabled us to reveal consumers' preferred brands, favorite features and main benefits. Language biases uncovered by the analysis can indicate preferences, and they fit reasonably

well to actual brand sales within various categories. Especially when data volumes were large, the method produced very accurate results and it is completely passive (see Box 1). We have been using free, widespread online data without affecting respondents or leading them into ranking or answering questions they would otherwise not have even thought of. The analysis is fast to run, and no fancy processing power is needed.

Predicting the most preferred brands in one category

✗ To test if brand preferences could be derived from online reviews, we first ran the AI-based text analysis for one category (TVs) and different amounts of data and compared the outcome of the analysis to actual sales data. Specifically, we ran 3 experiments: using data from one online retailer only, encompassing a total of 3,000 reviews; using data from multiple retailers totalling 4,500 reviews (a random subsample of the whole data); and using the entire data set of 53,000 reviews.

The results are displayed in Figure 1. The first column shows the sales ranks of 5 brands in the category. It is important to note that the sales difference between brands C, D and E was quite small, and therefore we had expected some confusion. The 2nd column shows the results of 3,000 reviews scraped from a single online retailer. With this limited amount of data, the rank is clearly wrong, ranking the most-sold brands A and B on ranks 3 and 4 instead of 1 and 2. The 3rd column introduces multiple retailers with a random subsample of 4,500 reviews. In this experiment, Brand A is now in the correct position (1), but we see confusion on Brand B and the others. The 4th column, using the complete dataset of 53,000 reviews, shows the correct ranking for Brand A and B – the major volume drivers in the category – and confusion of Brands C, D, E.

BOX 1

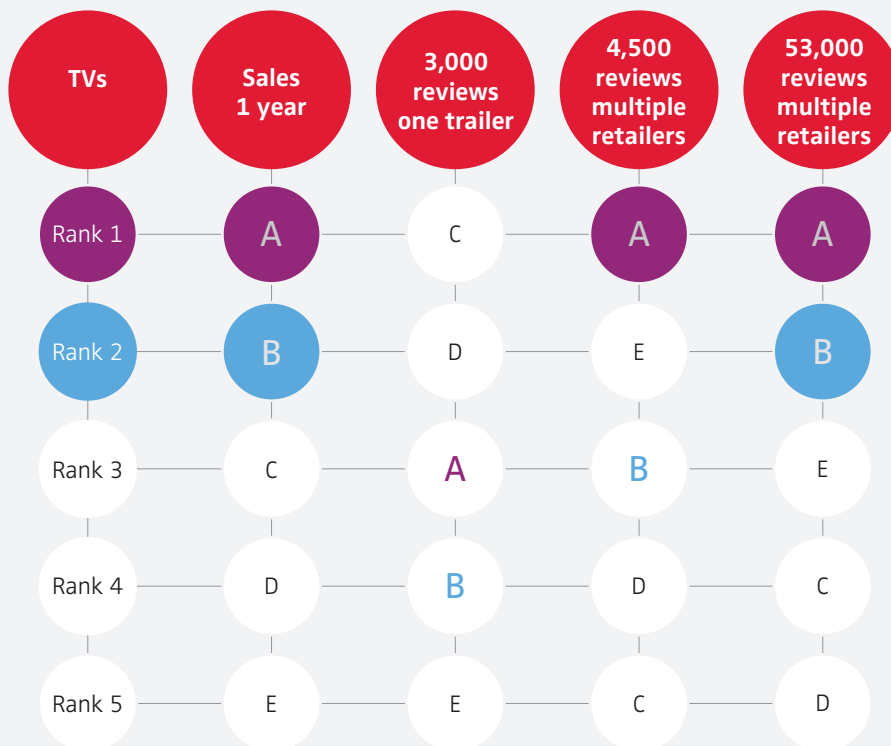
AI based natural language processing

We processed product review data via an AI method in the sub-domains of Natural Language Processing called Word Embeddings. The review data was scraped from online stores which have customer reviews of products sold. Additionally, we used a Twitter data set from tweets and comments which contained keywords around the category.

Word Embeddings enabled us to analyse the relationships of words to each other. This is accomplished by transforming words of a specific context into numerical vectors. The library used is called WordVectors. In our case the name of the category served as the context and we searched for words which were semantically most similar. For example, "TV" or "fridge" were used as the context (transformed into a vector) to look for similarities. We then used a closest-to function which generated a list of words with scores indicating how similar words were to this context. In the analysis, all special characters, numbers and white spaces were removed. All words were transformed to lower case and all stop words were removed. Sentence order of words is not important for this exercise.

In the next step, we used the degree of similarity of words to the context to get a rank order of brands and compare this order to actual unit sales rankings of the last 12 months. The point-of-sale data came from our GfK retail panels, which consists of multiple retailers' data aggregated to a total category picture by brand. All data reviews and point-of-sale data were from the U.K. market.

FIGURE 1 > Prediction accuracy of brand preferences in the TV category for different amounts of available data



Predicting brand preferences in multiple categories

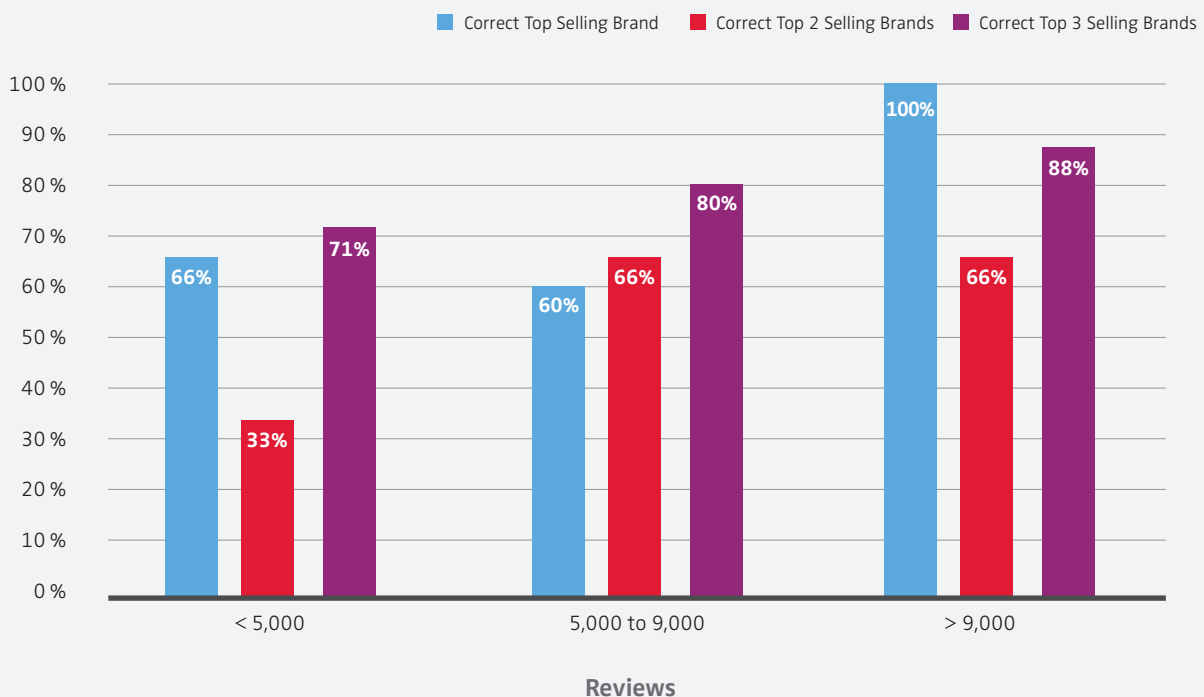
✗ Next, we ran experiments across 10 categories, again using point-of-sale data as the reference for the ranking. As in the first experiment, more data lead to more accurate results. The categories we tested were Tablets, Hand-held Vacuums, Full-size Vacuums, Smartphones, Hair Dryers, Fridges, Laptops, TVs, Shavers, Dishwashers and Washing Machines. We see that, to get correct brands in the top positions in at least 80% of all cases, a sample of 5,000+ is required, and that accuracy can be enhanced significantly with larger amounts of data (Figure 2). In the Smartphone category (using Twitter data), we made the interesting observation that the correct order prevails bar Alcatel. This brand was characterized by a disproportionate amount of spam, which could be the reason for the incorrect ordering of Alcatel.

Understanding preferences of product features

✗ As an extension to the method described before, we further tested if semantic networks from Word Embeddings can help us understand the bias toward not just brands but product feature preferences. Such an attempt to understand what people desire goes beyond buzz or sentiment analysis and toward mapping consumers' minds. The outcome of such a brand-plus-feature analysis could be similar to classic surveys on attribute preferences.

Our sample consisted of data from 36,000 reviews of TV sets. Picture quality emerged as the number one feature and sound quality came second. Sound quality's being so high up should not be surprising since the TV experience actually combines vision and sound, despite its categorization as a

FIGURE 2 > Ability to correctly identify top-selling brands from 10 different categories for different sample sizes



visual device. The next most-desired feature was ease of use, and then came the ability to connect with services such as YouTube or Netflix. We learned that unless the process for connecting the TV to the Wi-Fi router and internet is easy, people will not use the TV services for streaming. Not only does getting connected need to be self-explanatory, but the way in which third-party app providers link to the TV platform must be very user-friendly. There seems to be a double-barrelled problem here for adoption!

Last among the top five features was the look and style of the TV. Given the current focus on other elements of advertising, we can see how using AI to understand the consumer can help inform the marketing and even the innovation strategy of many manufacturers.

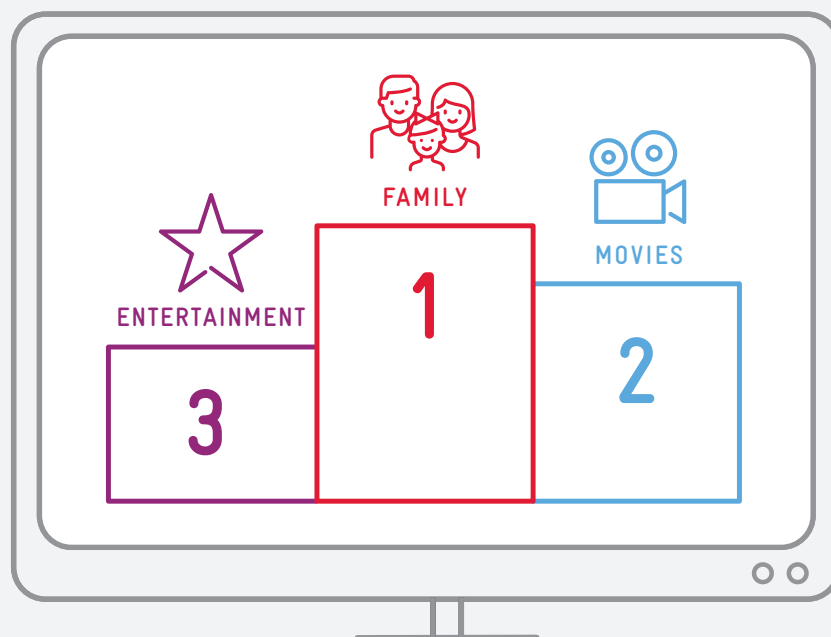
Understanding product benefits ✕ Our extended analysis helped us understand not only top features but also purchase motivations and the benefits that consumers seek. Figure 3 lists the main topics that emerged and the roles they play. Family was ranked first, giving us the insight that TVs are

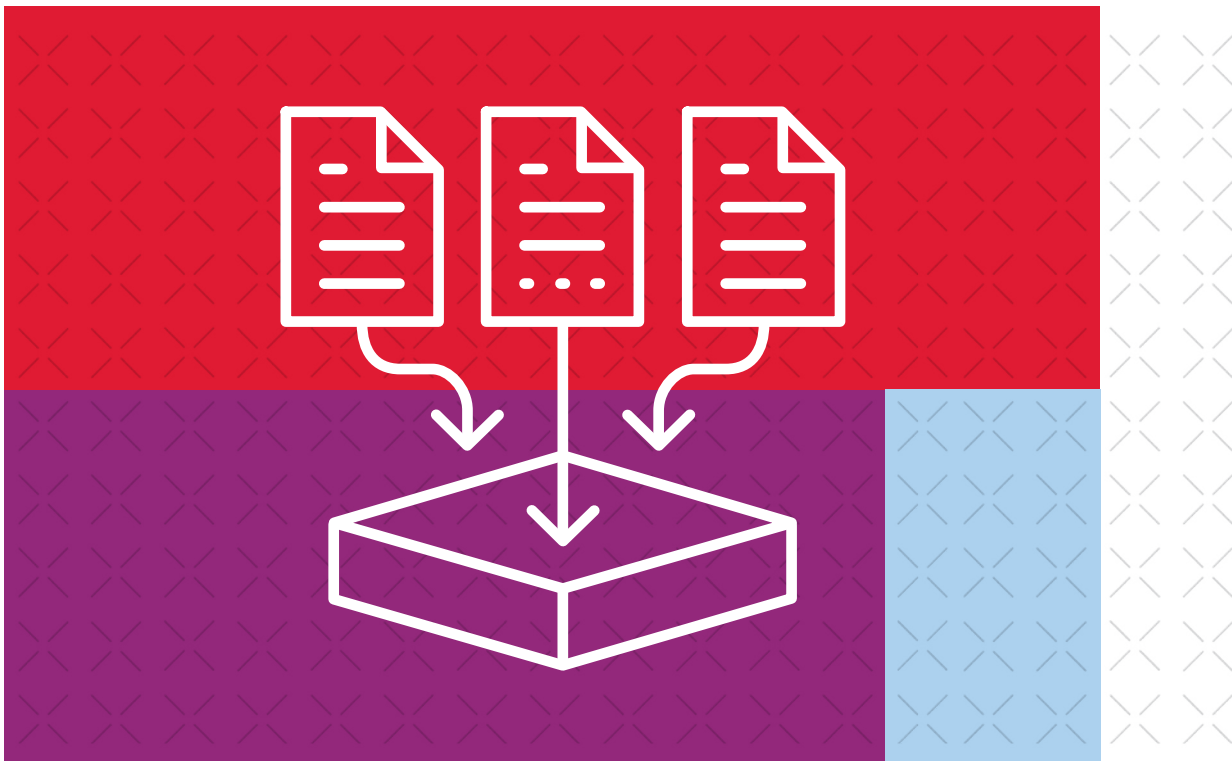
not all about entertainment, or simply watching movies, but rather are devices which can be used and enjoyed by the entire family. Although the top features are picture and sound quality, the purchase motivation for TV sets goes beyond features and into their beneficial effects on home life. The communication implication is that TVs have a connection to social constructs such as families, and should be spoken about in a far more socially-connected manner. Simply stating their ability to provide the best picture and the most engaging movies and gaming experiences does not sufficiently address purchase motives.

Critical issues for future applications of AI-based text analysis ✕ We have demonstrated that this type of analysis can help generate very useful insights. However, there is still a lot to learn, and several critical issues need to be considered.

> **The amount of available data is key for prediction quality** ✕ Our results show that sample size is important in achieving reliable results. According to the results we presented in Figure 1 and Figure 2, we currently recom-

FIGURE 3 > Most-preferred benefits of TVs





mend a sample size of over 10,000 reviews or other text. In the range of +/- 10,000 samples, researchers should only look at the words closest to the context. When moving further away, the orders become less certain, and one can be less sure of the population's preferences.

- > **Include reviews from different sources** ✕ In addition to the sheer amount of data, diversity of sources has shown to improve results. Figure 1 shows that using only one retailer introduced biases and, together with a small sample of reviews, led to the poor performance of the method. Due to some retailers and brands having exclusive offers, other more representative answers can be worked out by including as many retailers as possible. This is particularly important for brand rankings, and less so for feature or benefit rankings, so long as the brands in the dataset represent the features and benefits of the whole category.
- > **Consider ambiguous meanings of words** ✕ Results must be interpreted with care when words become confused in their meaning. One example we encountered was "Hoover," which is both the trademark of a vacuum cleaner brand and is used generically as a verb meaning "vacuum." The word is also being used to describe the entire category. Unless the data is cleaned by removing the category and activity uses of the word, the results will inevitably show the brand in an overinflated position.

We have clearly begun to be able to represent the human in the machine. AI is helping us to understand consumers, to create mathematical models, and to represent complex preferences and consumer choices. It can accelerate our understanding of what is important to people, and hence their decision-making processes. AI augments the intelligence and skill of our experts and workforce, filling in knowledge gaps and reducing the cognitive load that the volumes of available diverse and continuous data sources represent. Eventually, AI and big data might enable us to learn insights from existing data that have previously been delivered by costly surveys and active questioning. ✕



FURTHER READING

<http://arxiv.org/pdf/1301.3781.pdf>
<https://implicit.harvard.edu/implicit/>



← JAN NEUMANN

ABOUT JAN NEUMANN

Jan Neumann leads the Comcast Applied Artificial Intelligence Research group with team members in Washington, DC, Philadelphia, Chicago, Denver and Silicon Valley. His team combines large-scale machine learning, deep learning, NLP and computer vision to develop novel algorithms and product concepts that improve the experience of Comcast's customers such as the X1 voice remote and personalization features, virtual assistants and predictive intelligence for customer service, as well as smart video and sensor analytics.

Before he joined Comcast in 2009, he worked for Siemens Corporate Research on various computer vision-related projects such as driver assistance systems and video surveillance. He has published over 20 papers in scientific conferences and journals and is a frequent speaker on machine learning and data science. He holds a Ph.D. in Computer Science from the University of Maryland, College Park.

ABOUT COMCAST

Comcast Corporation (Nasdaq: CMCSA) is a global media and technology company with three primary businesses: Comcast Cable, NBCUniversal, and Sky. Comcast Cable is one of the United States' largest video, high-speed internet, and phone providers to residential customers under the Xfinity brand, and also provides these services to businesses. It also provides wireless and security and automation services to residential customers under the Xfinity brand. NBCUniversal is global and operates news, entertainment and sports cable networks, the NBC and Telemundo broadcast networks, television production operations, television station groups, Universal Pictures, and Universal Parks and Resorts. Sky is one of Europe's leading media and entertainment companies, connecting customers to a broad range of video content through its pay television services. It also provides communications services, including residential high-speed internet, phone, and wireless services. Sky operates the Sky News broadcast network and sports and entertainment networks, produces original content, and has exclusive content rights.

→ www.comcastcorporation.com

**THE INTERVIEWER**

Professor Christian Hildebrand conducted the interview in June 2019.

Talking Versus Typing: The Power of Voice-Based Remote Controls

Interview with Jan Neumann, Senior Director, Applied AI,
Comcast Cable, Philadelphia, USA

While many customers are still reluctant to entrust themselves to Alexa, Cortona or Siri in their homes, they seem to be less worried about controlling their TV sets via voice control. Comcast started offering a voice-based remote control in 2015 and has extended this service continuously. In the vast world of home entertainment, it seems that voice has come just in time to help consumers navigate and control their ever-increasing home entertainment options. Jan Neumann, Head of AI at Comcast, explains how Comcast enables its customers to comfortably boil down a huge entertainment portfolio to personally relevant content on the TV screen, and how the company remains successful in the highly competitive home entertainment market.



Christian Hildebrand ✕ *The rise of voice control is a very hot topic these days. Everyone is talking about Alexa, Google Home, and Siri. Comcast recently introduced a voice-based remote control. How does voice reinvent the TV experience?*

Jan Neumann ✕ One of the major issues that TV customers were facing was that more and more content was available but that the interfaces for finding that content had not changed. You still had the traditional remote controls with numbers. In a world where all you had to do was switch between, let's say, 20 TV channels when you could remember the corresponding numbers, this might have worked fine. But now you have hundreds of thousands of different items

that you can watch at any time. In this situation, enabling a more complex interface to indicate what you are looking for is super powerful.

Is voice just providing a different or ultimately a better customer experience?

Voice control actually inverts the interface. Traditionally, the interface dictated to the customer how to interact with the interface. Now we allow the customers to express themselves, and then it is up to us to interpret that. This process favors the customer instead of the platform. We say that voice flattens the interface. It is the perfect shortcut device: You simply tell us what you are interested in, and it is up to us to under-



The voice-based remote control is actually one of the main reasons to stay with our platform.



stand and deliver that to you on the screen. We can limit the amount of information presented so that you can again use the traditional remote control to navigate. Painful typing into the TV becomes unnecessary.

From other voice-based devices, we know that there is quite a difference between adoption and usage rates. Usage does not match the sales figures. Do you know if people are actually using your voice-based remote control?

Yes, it is one of the most popular products that we have put out, and it has been extremely successful. Based on user feedback, it is a very large driver of customer satisfaction and retention. Once customers get used to it, they use it heavily on a daily basis. The voice-based remote control is actually one of the main reasons to stay with our platform. We process more than half a billion voice commands a month, and this number is climbing.

Is voice just a new channel to connect to your customers or does it also change behavior more fundamentally? Do people search differently using voice?

Users start out with straightforward use cases, for example, searching for “CNN” or “NBC,” or certain channel numbers. Once you give them examples of more complex use cases, their searches become more sophisticated. We are constantly improving the functionality. For instance, users can ask for “results of the current NBA playoffs,” like between the Raptors and the Warriors, and we are able to come up with the statistics as well as when the game is playing. So basically, the users now just have to describe what they want to watch.

Could you give us another example of how a user might search and what he or she will get?

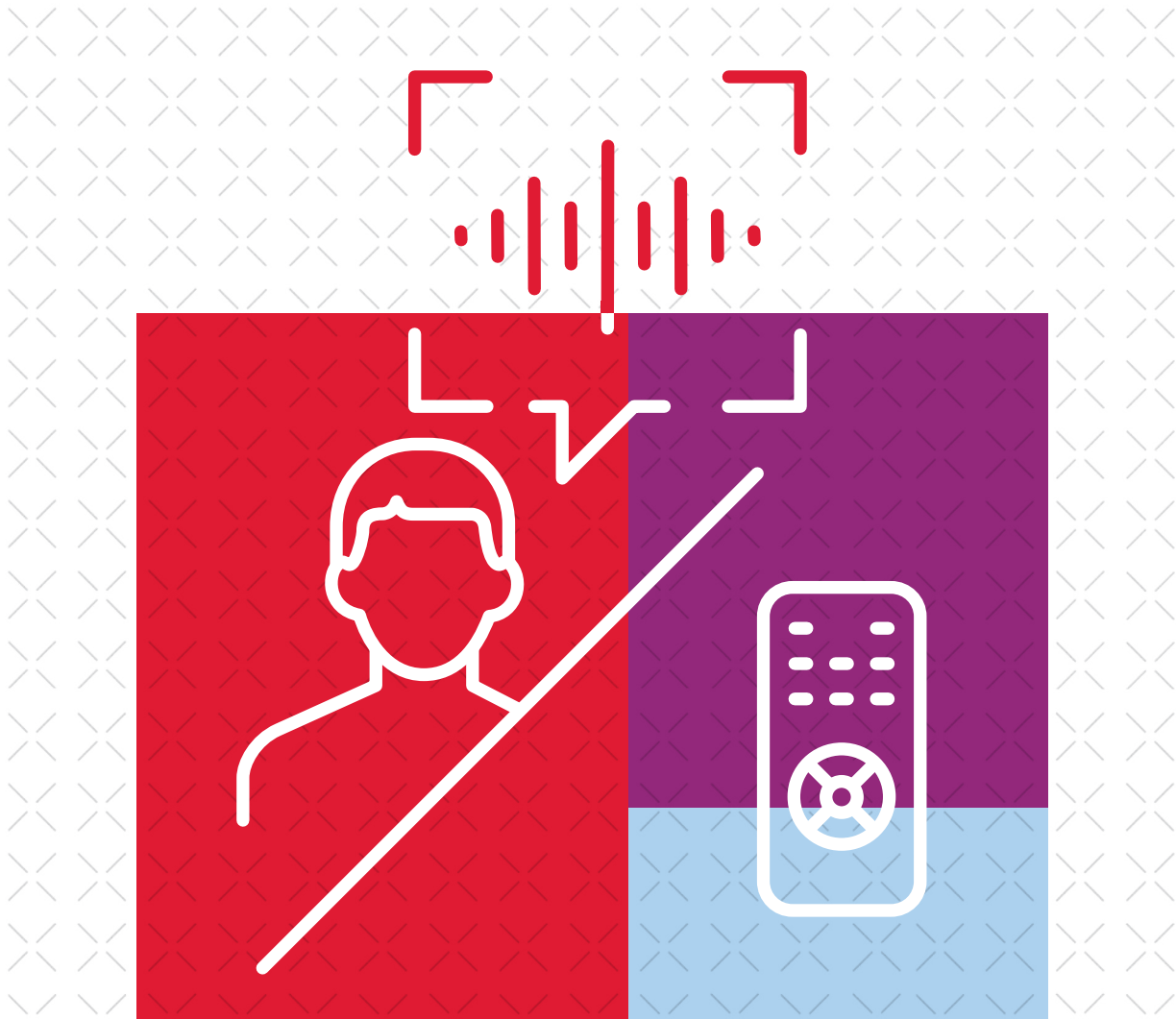
Very recently, we introduced a new feature. Users can describe what happens in an episode they want to watch, and they no longer need to remember its title or number. They simply need to say, “Show me the Friends episode with Brad Pitt,” and that’s what they will be shown on screen.

How are people talking to the voice-based remote control? Very naturally, like to another person, or do they just throw in single key words?

People often start with simpler, command-like input. But they can say virtually anything. It’s trial and error for them and for us as well. We do not tell them which commands they should use or what to say. We give users the power and freedom to express exactly what they want. This way we can learn what is popular or interesting. Through listening, we learn what customers want, and what next feature we might deliver.

How can you create a better customer experience when people don’t know all the cool features of the voice interface? Do you have to actively encourage and educate customers on how to use the interface?

To educate our customers, we use the screensaver regularly, for instance. Also, we have lots of advertising that describes potential use cases. Just recently, we started rolling out the voice suggestions feature, which actively recommends what consumers might want to search for. In this way, we teach customers some good expressions to use as well as new search possibilities. Our suggestions are contextually rel-



evant; users are more likely to remember and use them next time because they fit and seem like a good idea. This feature is so new that we have not seen measurable results yet, but we are very excited about it.

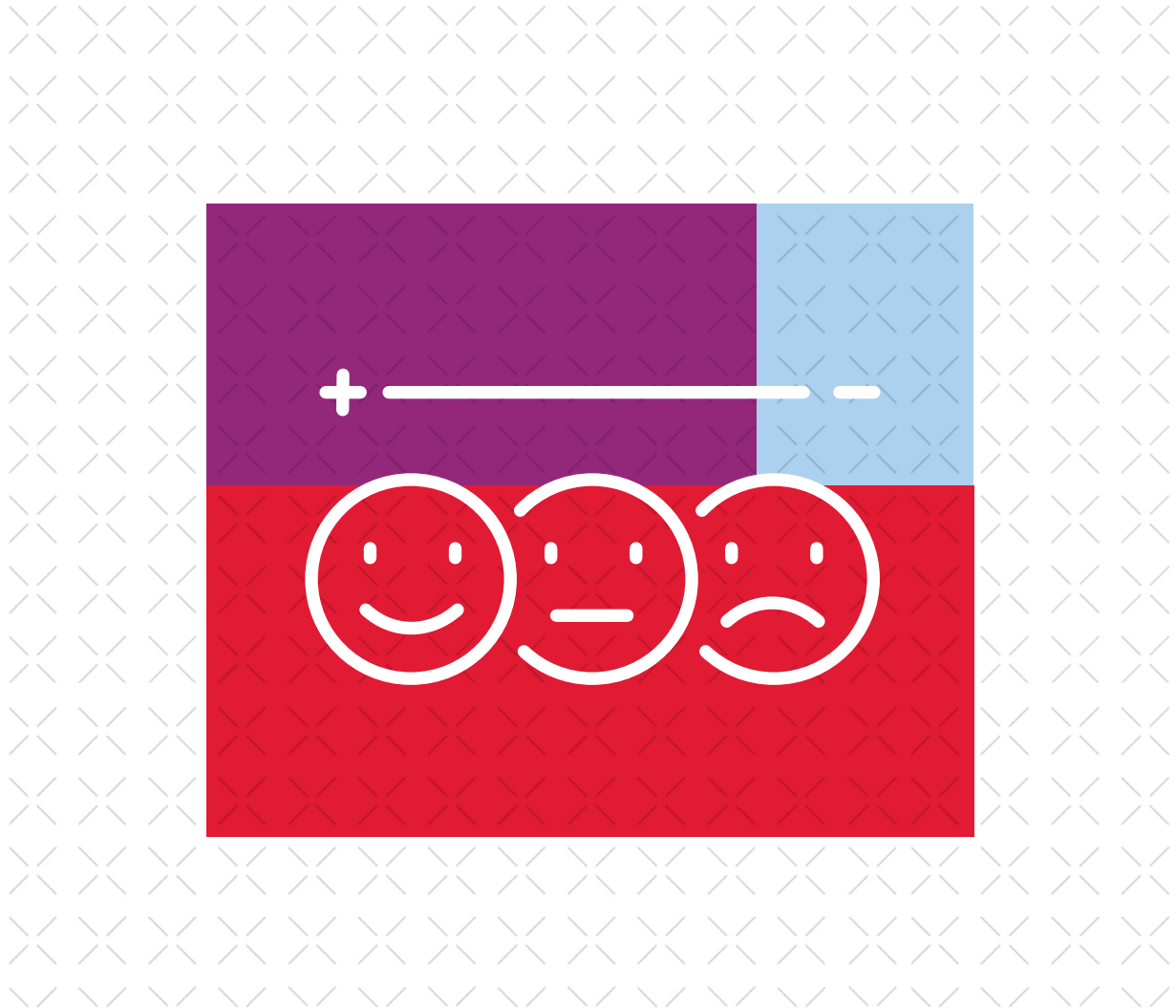
Identifying intent is often difficult and messy. How do you leverage natural language processing to increase understanding and prevent having to say the phrase Alexa users know too well – “Sorry, I don’t know that?”

One advantage we have is that we do not offer a general assistant for everything. Our voice service is focused on entertainment, on home control, and on customer service. In each of these domains, we have a pretty good understanding of the entities involved and of possible actions. Customer service is a little bit more complex. It involves longer sentences and chats in contrast to the rather short voice commands in



One challenge is how to use the screen on top of voice.





entertainment, which are mostly quite to the point. Our service is far less complex because the more services you involve, the harder it gets to identify the intent.

Another challenge must be managing your rich portfolio of constantly changing content, with new shows coming up all the time. How do you manage and handle this portfolio? How are you able to produce well-tailored, timely recommendations for customers?

It is important to have strong metadata generation and management. This means that you must be able to automatically detect who is in a program, what they are talking about in a new show or video, which viewer segments might be interested, etc. It is about identifying content on a deeper level and having rich descriptions of what can be expected, like which emotions are involved or which music is playing. We fill in the blanks of what hasn't been provided, to enable a richer interaction pattern.

Which lessons have you learned from taking the voice remote to the market? Do you see anything that applies to other industries interested in getting into voice-controlled interfaces?

With entertainment in particular, you have a screen and you want to use it. So the experience is not only about voice – it needs to be unified and combined, with text and talk together. One challenge is how to use the screen on top of voice. You can use voice to get a list of funny comedies, but instead of having to command “next page, next page” or “second on the right side,” it makes sense to allow navigation on screen. You need to combine the strengths of both native interfaces.

Now let's talk more generally about how AI and your analytics focus have changed the inner workings of Comcast. How has the transition from a “system administration culture” to one that is focused on continuous delivery of a better customer experience changed the organization?



It comes down to the question of who can learn the fastest from the customers and be the most agile in meeting their needs.



The biggest change was putting the customer first. Building everything around customers and their satisfaction changes the focus, the type of projects, and the entire approach to business. It is extremely motivating to see the impact we are making with that switch to technology. Instead of having to make assumptions about what the customers might like, we get this information directly from our technologies. We can learn so much faster, and this is really exciting.

Ironically, a few years ago, Comcast was criticized for a lack of customer orientation. Now you seem to be changing the game by leveraging AI to provide a better customer experience. This is quite impressive.

Thank you. It's been a companywide effort that includes a lot more than technology and software, and it's super exciting to see how customers have responded. We know we still have a lot more to do, but as a technologist and an AI scientist, I've been particularly excited to apply this technology to make our customers' experiences easy and frictionless.

Yet you are competing with Netflix and other global tech companies that are trying to eat your market share. Isn't this extremely challenging, or even frightening?

As an engineer, I would say it's much more motivating. Having so many companies doing so many exciting things really inspires me and my team to try new things and constantly stay ahead of the curve. Engineers are pretty competitive people as a group, so when we see someone else doing something cool, it provides both inspiration and motivation.

In the end, do you have a competitive advantage if you have the best algorithms?

Well, algorithms are the tool for achieving something. It comes down to the question of who can learn the fastest from the customers and be the most agile in meeting their needs. Fundamentally it is the same business for everybody, but there are certain ways to accelerate the feedback cycle and be more efficient via technology.

Finally, let's have a look into the interface of the future. What's the next big thing that will better connect and serve your customers? Brain interfaces, or more sensors in people's homes?

Whatever the interface is, it all comes down to being able to actively understand and anticipate the needs of the customers, and then being able to serve them, fulfill their needs, and address their intentions. Voice is a natural way of communicating, and for now it is a very good medium. We also use nonverbal cues, and maybe they can play a role in the future. But in the end, the medium is irrelevant. Whatever allows us to capture needs effectively and with as little friction as possible is what we will end up with.

Wow, what closing words! Thank you for your time, Jan, and for taking us with you into the new tech universe at Comcast! ✕

Editors

ABOUT CHRISTIAN HILDEBRAND

Christian Hildebrand is Professor of Marketing Analytics at the University of St. Gallen. He had doctoral and post-doctoral visits at Stanford University, Duke University, and the University of Michigan. His work explores how new technologies change hard-wired cognitive processes of how people think and make decisions. His research focuses on understanding and optimizing consumer-firm interfaces with an emphasis on digital voice assistants, chatbots, and mobile devices. His research has been published in leading academic and practitioner-oriented journals, and he frequently works with corporations across a large number of industries, from online retail and consumer electronics to the automotive and financial sectors.



EDITOR

Christian Hildebrand

Director and Professor of Marketing Analytics
Institute of Marketing (IfM-HSG),
University of St. Gallen, Switzerland
www.ifmhsg.ch
christian.hildebrand@unisg.ch



MANAGING EDITOR

Christine Kittinger-Rosanelli

NIM Marketing Intelligence Review,
Nuremberg Institute for Market Decisions
christine.kittinger@nim.org

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PUBLISHER

Nürnberg Institut für Marktentscheidungen e.V.
(Nuremberg Institute for Market Decisions)
Founder and anchor shareholder of GfK SE
Nordwestring 101
90419 Nuremberg
Germany
Tel +49 911 95151983
Fax +49 911 376 77872
Email: hello@nim.org
www.nim.org

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