LEARNING TO FEEL

Emotional AI technology can help businesses capture peoples' emotional reactions in real time—by decoding facial expressions, analyzing voice patterns, scanning e-mails for the tone of language, monitoring eye movements, and measuring neurological immersion levels, for example.

For technology and platform companies, the ultimate outcome is a much better understanding of customers—and the ability to forge deeper, more personal connections.

But Emotional AI also brings risks. The data collected using Emotional AI technology will test companies with a whole new set of ethical challenges that require responsible actions.

Gartner predicts that by 2022, 10% of personal devices will have emotion AI capabilities, either on-device or via cloud services, up from less than 1% in 2018.[1]

Emotional AI will be a powerful tool indeed, and it will force businesses to reconsider their relationships with consumers. Emotional AI will not only offer new metrics to understand people; it will redefine products and services as we know them.

But as technology and platform companies foray into the world of emotional intelligence, the need to mitigate the risks of using AI to interpret sensitive human emotions—and then turning those emotions into data—will be essential. Reading people's emotions is a sensitive business. Emotions are highly personal, and customers will have justifiable concerns about privacy invasion, emotional manipulation, and bias. They'll also want to understand what data is being collected and how that data will be used after the fact.

Technology, communications, and platform companies play a critical role in managing Emotional AI responsibly since they are at the forefront of this technological revolution: They make the devices and facilitate the critical interactions and data captures. They also serve as tech enablers for collecting and leveraging emotional data for other industries.

But just how important is responsibility to using emotional data? We set about to find out.

We explored the notion of responsibility[2] and the frequency with which companies are talking about emotional data. One thing we found was that companies that lead in responsibility or data usage alone do not have a significantly higher profit compared with the average company in their industry. Yet when a company leads in both responsibility *and intensity*[3] of data usage, the gain in profit is approximately double that of the average company in that industry.

Clearly, responsibility is critical—not just to engender trust with customers but to drive profitable growth in this new Emotional AI era.

Figure 1. Emotional data and responsibility: By the numbers[4]

Gains in total revenue and EBITDA from responsible use of emotional data

Revenue: +63%
EBITDA: +103%

● Average Company   ● Responsible Data Leader
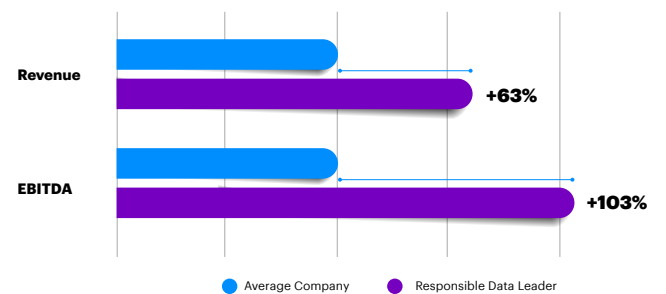
Responsibility must be designed into the way companies build and deploy Emotional AI technologies—from the start. Recent experience with the unintended consequences of technology, like data breaches and algorithmic biases with AI, shows that this cannot be taken for granted. By asking themselves a set of critical questions, as well as setting clear guidelines on critical areas, business leaders can unleash economic possibilities with Emotional AI that have so far remained in our collective imagination. The work needs to begin now.

COMING TO OUR SENSES

Emotional AI is coming of age, creating a tipping point of opportunity for Communications, Technology and Platform companies.

What is Emotional AI? To better understand this phenomenon and its implications for media, telecommunications, high-tech and platform businesses, first consider this hypothetical but all-too-familiar scenario:

You've been researching ice-cream makers online. After several weeks of reading reviews and price-comparison shopping, you think better of the idea. An ice-cream maker is an expensive and unnecessary purchase, you decide. Toward the end of a particularly rough work week, however, you see a pop-up ad for a $150 ice-cream maker. In desperate need of an emotional pick-me up, you click "ADD TO CART."

Thanks to neuroscientist Antonio R. Damasio, we now know with scientific certainty what drives Friday afternoon purchases of ice-cream makers. Emotion. Plain and simple. In the 1990s, Damasio confirmed through research what advertising executives had known for decades: That people base their decisions on emotions rather than rational factors.[5]

This is precisely why companies always want to know what people feel and what drives their decisions. In our digital era of instant gratification, understanding customers' emotions and knowing how to respond to them is critical to brand relevancy and financial success.

To be sure, pinpointing how people feel has never been an easy task, even with surveys, focus groups, rigorous data analytics, and social media channels at their fingertips. For one thing, human emotions are inherently difficult to read and even more difficult to predict. For another, there's often a disconnect between what people say they feel and what people actually feel.

Enter Emotional AI.

Artificial Intelligence technology is helping businesses recognize and detect peoples' emotions in real time—by decoding facial expressions, analyzing voice patterns, monitoring eye movements, scanning e-mails for tone of language, and measuring neurological immersion levels.[6] These activities have come to be classified under a broad term called "Emotional AI" (or "Emotion AI").

Emotional AI is generating a whole new form of customer data: "emotional data." Emotional data is a broad term that combines biometric and physiological data points collected via text analysis, facial and voice recognition, eye movement, heart rate, gait analysis and general emotion detection.[7]

The Opportunity

How far is Emotional AI from entering the mainstream? While tech giants and smaller start-ups have been investing in Emotional AI for over a decade, commercial deployments are now emerging in digital voice assistants, cars, call centers, robotics, and smart devices like TVs, smartphones, and health-trackers.[8] Couple that with sentiment-analysis software from companies like Affectiva, BeyondVerbal, and Sensay,[9] and companies now have the ability the recognize, interpret, and process a range of human emotions they couldn't before.

Imagine the power of a camera-enabled TV that can detect the emotions of viewers by watching their facial expressions. Or smart speakers in the home that can recognize the mood of the person based on the tone of their voice or the words they use. Or a car's dashboard that can monitor the driver's emotional state and trigger an alert to pull over or even take control of the car completely. These new Emotional AI applications have at least three mutual benefits for companies and their customers:

BETTER EXPERIENCES

Everyone's emotions fluctuate depending on time and context. With emotion-detection and emotion-recognition technology, companies can better understand what annoys and excites customers on their path to purchase and adjust accordingly. They can also market products and services to consumers with greater precision and relevancy. For consumers, that means just the right experience at just the right time.

BETTER DESIGN

Being able to sense human emotions can help companies design new products that will connect with human users at the deepest level imaginable. This adds a new suite of tools to the UX designer's toolbox. Emotional AI will tell companies exactly how consumers feel about the product. For consumers, that means a product they truly love.

BETTER CUSTOMER SERVICE

Companies like Boston-based startup Cogito are giving businesses the tools to help their employees interact better with customers.[10] Its algorithms not only can identify "compassion fatigue" in customer-service agents, but can also guide agents on how to respond to callers via an app. An upset customer might, for example, call to complain about a product. Recording and analyzing the conversation, Cogito's platform would then suggest that the agent slow down or prompt them on when to display empathy.

To be sure, these are just a few of the benefits that have been realized in the early days of Emotional AI. Adoption of the technology is still on the rise and varies based on industry and geography, but the trend is clear for technology and platform companies: The intensity at which technology and platform companies are discussing emotional data, based on their earnings-call transcripts, is consistently increasing over time, indicating a growing adoption of emotional data and Emotional AI.

And this is happening across industries. Beyond platform and high-tech companies, some early-adopter sectors include automotive, insurance, financial services, and retail. Cross-industry functions such as customer support, Human Resources, and market research also are taking advantage of Emotional AI.[11]

For some digital natives, Emotional AI and emotional data is a natural evolution of their businesses. After all, data is a central component of service development for platform companies. But for more traditional corporations like telecom carriers, Emotional AI holds the potential to open up a completely new world of opportunities.
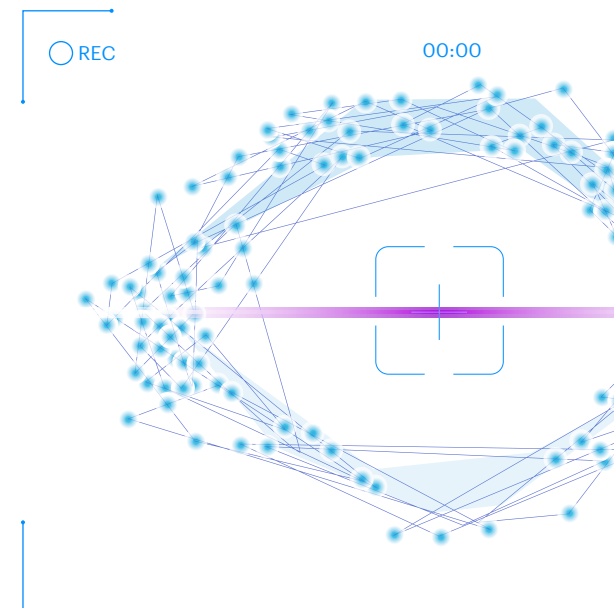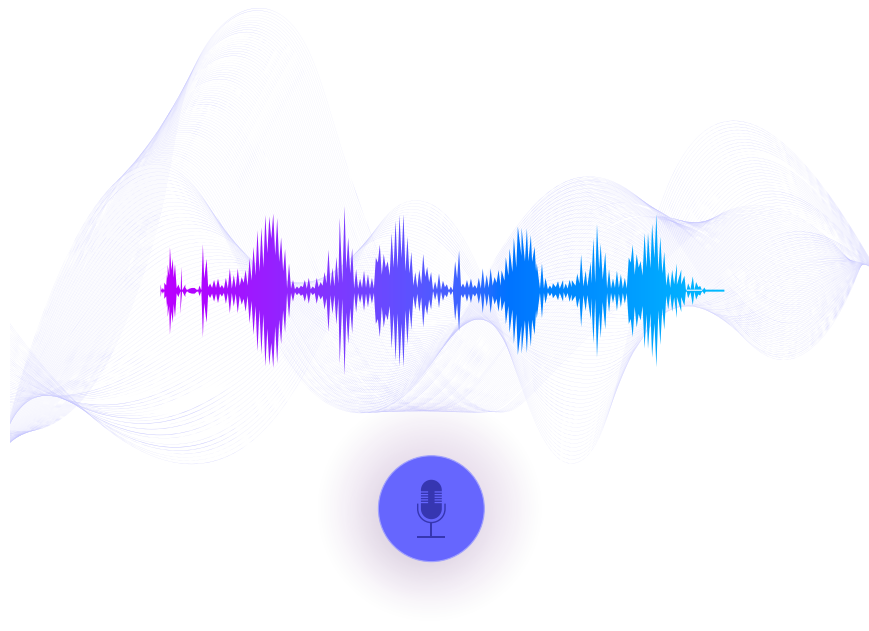
OPPORTUNITY #1

VIDEO

One of the best ways to sell products is to engage the customer on an emotional level. That's happening now at brick-and-mortar stores across the world. Cameras and sensors are being deployed to detect the facial expressions of shoppers—and the computer vision, AI, and analytics component recognize, classify, and interpret the emotions they appear to be expressing at a given moment. Seeing this, the systems can automatically call up a digital ad display to show a targeted image. A retail employee can also make buying suggestions or offer discounts to the shopper in real time.[12]

Critically, the emotional data collected can be used to help make future decisions. For example, if emotional responses skew negative, the company can lower prices, change packaging or branding, modify inventory strategy, reconfigure product displays, or move items to different aisles.[13]

Take Fujitsu, the Japanese information and communication technology (ICT) company, which has deployed "line-of-sight" detection sensors in mannequin sections of retail stores. Fujitsu's AI technology tracks people's line of sight—what products catch their eye—and tries to surmise their interests based on those movements. Suddenly, customized information flashes on a screen, offering a new kind of customer experience. Then sales staff receive the information in a push notification to their phone so they can offer that customer a personalized service.[14]

REC   00:00

AUDIO

Amazon is working on emotional-recognition training for its voice assistant Alexa. The technology has applications for health monitoring and consumer sentiment analysis. Reports indicate that the company has filed patents that would allow Alexa to recognize emotions such as "happiness, joy, anger, sorrow, sadness, fear, disgust, boredom, [or] stress.[15]"

Digital voice assistants offered by competitors, such as Apple and Baidu, are said to be involved in developing similar technologies. Huawei, which launched a voice assistant for the Chinese market in 2013, is also working on emotional voice AI.[16]
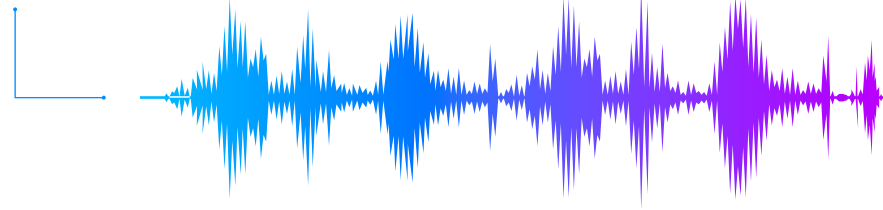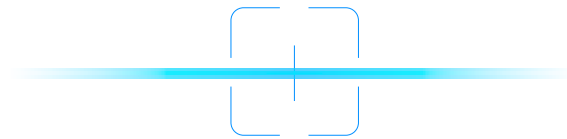
OPPORTUNITY #3

VIDEO + AUDIO

With emotion tracking, product developers can learn which features elicit the most excitement and engagement in users. Take, for example, Affectiva's Auto AI platform,[17] which can recognize emotions like joy and anger and adapt a vehicle's in-cabin environment accordingly.[18] Cameras and microphones can pick up on passenger drowsiness—and may lower the temperature or jolt the seatbelt as a result. A smart assistant might change its tone in response to a frustrated passenger. With Emotional AI, any product or service—whether in the car or elsewhere—can become an adaptive experience.

Though distracted-driver alert systems started showing up in luxury cars about a decade ago, they're now making their way into mainstream vehicles.[19]

One automaker that has embraced driver-monitoring devices is Subaru. Subaru's Forester, Outback, and Legacy models all offer a feature called DriverFocus, which uses an infrared camera mounted in the center of the dashboard to monitor the driver's eyes and head position. If the driver's eyes are closed or don't face forward for a few seconds, the system beeps and displays the message, "Keep Eyes on Road" on the dashboard. The system watches for heads nodding or someone talking on the phone or texting, even turning around to look in the backseat.[20] If the driver doesn't respond, the number of beeps increase and become constant. The infrared camera even works in the dark and through sunglasses.[21]
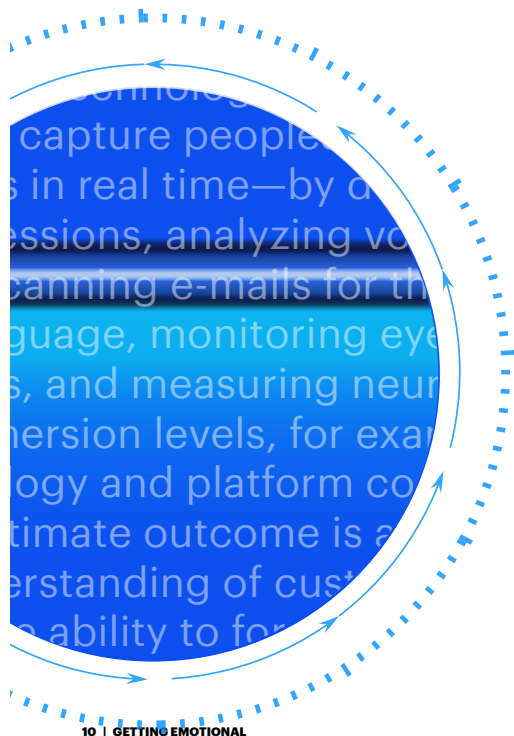
TEXT

Myriad applications have been created to detect emotion in text. There are two reasons for this: First, speed. An AI system can read an entire book and spit back a summary in five seconds. Second, emotion capture of text seems less invasive. There are no sensors or facial-recognition technology needed.[22]

The potential of emotion detection in e-mail or instant messaging is already a big deal. You may not be aware of an aggressively toned e-mail that you're about to send to your boss or a client. AI can identify anger or frustration. Co-workers complain you are too verbose and jargon-heavy? AI can track reading level and even compose original, realistic text today across a variety of genres. Procrastinate or dither too much on replies to important people? AI can track your response time to specific individuals.[23]

Nationwide, which banks 15 million customers in the UK, is one company that has put emotion tracking of text to the test. Nationwide uses AI technology from analytics firm SAS to analyze e-mails from customers. The company found, for example, that customers become progressively unhappier as the number of email exchanges rises.[24]

The risks of capturing and using emotional data need to be better understood, particularly for early-adopter companies in the communications, technology, and platforms industries. Though many of these firms have built their entire existence on facilitating the transport of data through devices, networks, and services—and have created procedures and checkpoints for leveraging and managing customers' personal data—emotional data brings a new set of risks and challenges that leaders must tackle head on.

FEELING THE RISKS

Emotional AI and emotional data will test communications, technology, platforms companies with a deep set of challenges

Collecting and monetizing peoples' personal data has a dark side. When done without care for the individual or anticipation of the unintended consequences, companies risk losing their customers' trust and business, and may even see an impact to the bottom line.

While many companies by now understand the risks surrounding personal data in general, emotional data is a different matter entirely. Reading people's emotions is a sensitive science. And a far from perfect one. This isn't like Web cookies or credit-card information. Cars that can sense fatigue and distractedness and smart TVs that can watch people while they watch movies from their sofa bring a new level of risk to consider and manage. It also raises important ethical questions.

Already, some organizations are calling for an outright ban on emotion recognition. The AI Now Institute, a research institute studying the social implications of artificial intelligence, said affect-recognition technology should not be allowed to play a role in important decisions about human lives, such as who is interviewed or hired for a job, the price of insurance, patient pain assessments, or student performance in school.[25]

Based on our own research, we see four factors that make emotional data different than other forms of customer or personal data:

INTIMACY

We are dealing with data that is profoundly connected to personal feelings, intimate and sometimes private behaviors, and thoughts. In some instances, the Emotional AI system may even be able to predict your own emotion several seconds before a person displays a particular behavior based on correlated micro expressions.

INTANGIBILITY

Emotional data that companies can collect may not be known, recognized, or understood by the average consumer. Sharing data on your state of mind is quite different in complexity than sharing your street address, date of birth, or even browsing history.

AMBIGUITY

Ambiguity: Artificial Intelligence "thought processes" are neither clearly explained nor visible to the consumer. Individuals have no way of confirming whether the emotional data captured from them is correctly interpreted, and have no recourse to address errors or misreadings. If humans have trouble interpreting emotions, it's not going to be that much easier for AI systems. To say the least, the accuracy of Emotional AI is far from perfect.

ESCALATION

The power, speed, and decentralized nature of today's data-collection methods mean that when mistakes proliferate, they can be incredibly hard to reverse.

Leaders from the technology and platforms industries have a responsibility to act now to prepare for the Emotional AI era, whether that's designing how data-collection technologies will ultimately work, the rules for using them, or the business models that can support them.

So, how can companies find a trade-off in acting responsibly while seizing the opportunities to create new customer experiences and offer better products and services? Based on expert interviews and comprehensive literature reviews, we see four aspects of data collection and usage that merit close attention: (1) Systems Design; (2) Data Usage; (3) Transparency; and (4) Privacy—with Security an integral component throughout.

Given the still-emerging nature of Emotional AI, the failure to act responsibly in these four areas can have far-reach negative consequences.

Key Emotional AI Considerations

Systems Design
How to design and train systems to avoid bias

Data Usage
How to use data without being coercive or manipulative

Transparency
How to be open with consumers about what data is captured and how it is used

Privacy
How to respect the individual's privacy and offer ways to opt out

Security

SYSTEMS DESIGN

As more and more companies incorporate Emotional AI in their operations and products, it's going to be imperative that they're aware of and actively work to prevent bias in their systems.

Establishing ethical governance is critical to helping executives mitigate downside risks, because addressing AI bias can be extremely complex. Data scientists and software engineers have biases just like everyone else, and when they allow these biases to creep into algorithms or the data sets used to train them—however unintentionally—it can leave those subjected to the AI feeling like they have been treated unfairly. But eliminating bias to make fair decisions is not a straightforward equation.[26]

Some technologies are better than others at tracking certain emotions, so combining these technologies could help to mitigate bias. A Nielsen study testing the accuracy of neuroscience technologies such as facial coding, biometrics, and electroencephalography (EEG) found that when used alone, accuracy levels were at 9%, 27%, and 62% respectively.[27] When combined, accuracy levels shot up to 77%. Testing the results with a survey brought this up to 84%. Such combinations therefore serve as a check on the accuracy of results—a referencing system of sorts, but still fall short of the targeted degree of accuracy that systems should strive for to ensure reliability.

DATA USAGE

The goal of any digital marketing and advertising campaign is to leverage data to connect with a target demographic and influence their opinions in a way that's beneficial to the advertiser. But when does marketing or advertising tilt from persuasion to coercion or manipulation? This is an ethical grey area that has persisted throughout the history of advertising. Now imagine how much more complicated the quandary will get with Emotional AI.

There are instances when the manipulation and coercion—or, in the parlance of app providers, nudging—may be welcome. Take Noom, the weight-loss app and personalized meal-planning service with more than 45 million users that was one of the most Googled diets in 2018.[28] Noom was designed by behavioral psychologists with prodding, cajoling, and coercing in mind.

The whole point of the app is to nudge the user to make smart choices and do the right thing for them. When a user gets started with Noom, they answer a series of online questions (weight, health concerns, and lifestyle). Then they get assigned a coach and eating recommendations, and they're given digital tools to help them track their fitness, food, blood pressure, and blood sugar. In some ways, the user is asking to be coerced and manipulated, in a sense saying, use my personal data to help me lose weight and become healthier.[29]

But the line between persuasion and manipulation is thin. The same techniques that encourage consumers to do good or benefit themselves may also be used to exploit their cognitive biases—to manipulate them.

The key is share in the value of the data collection. Our research has found that the more value a consumer derives from sharing their data, the more they trust their service providers.[30] Consumers may cry foul if they are being manipulated and if their emotional data is being used for the company's gain and not their own. Which is why the customer must receive some tangible benefit in the equation. At the very least, that would help engender trust. The customer trusts that they would get something out of the deal, and that the organization collecting emotional data on them will not try to manipulate them into taking actions counter to the customer's best interests.

TRANSPARENCY

In our digital era, businesses have built sophisticated technology stacks to collect and organize data on customers. But driven by the promise of greater financial returns, some companies began using consumers' personal data without their knowledge or consent, and even sold the data to third-party brokers. This has angered consumers for several reasons. Chief among them is the lack of transparency.[31] Unfortunately, that lack of transparency is persisting in the Emotional AI era. The lack of regulation and the inability for government regulations to get ahead of these technologies virtually ensures that emotional data will go unchecked for many years for come.

According to one expert, most AI systems that capture emotional data neither provide adequate context nor acquire consent from the person whose data is being collected and used. Quite often, businesses fail to explain the benefits to the user of such collections.[32]

So, whatever emotion-tracking application is being used—whether it's a gaze-tracking mannequin or an emotion-sensing dashboard in a car—companies should be transparent with the user about what is being collected, how, and why.

PRIVACY

Even with the emergence of data-management functions and chief data officers (CDOs) and chief privacy officers (CPOs), most companies remain badly behind the curve. Now introduce the idea that customers' personal, intimate thoughts and feelings about what they are seeing can be tracked and turned into data: Are firms' privacy policies and strategies ready?

This is a new terrain for both consumers and companies. The expectation for privacy is far from clear. As Andrew McStay, professor of Digital Life at Bangor University in Wales, points out in his paper, "The Right to Privacy in the Age of Emotional AI,[33]" intimate data about human emotions in most instances can be legally collected in public spaces as long as the person is not "singled-out."
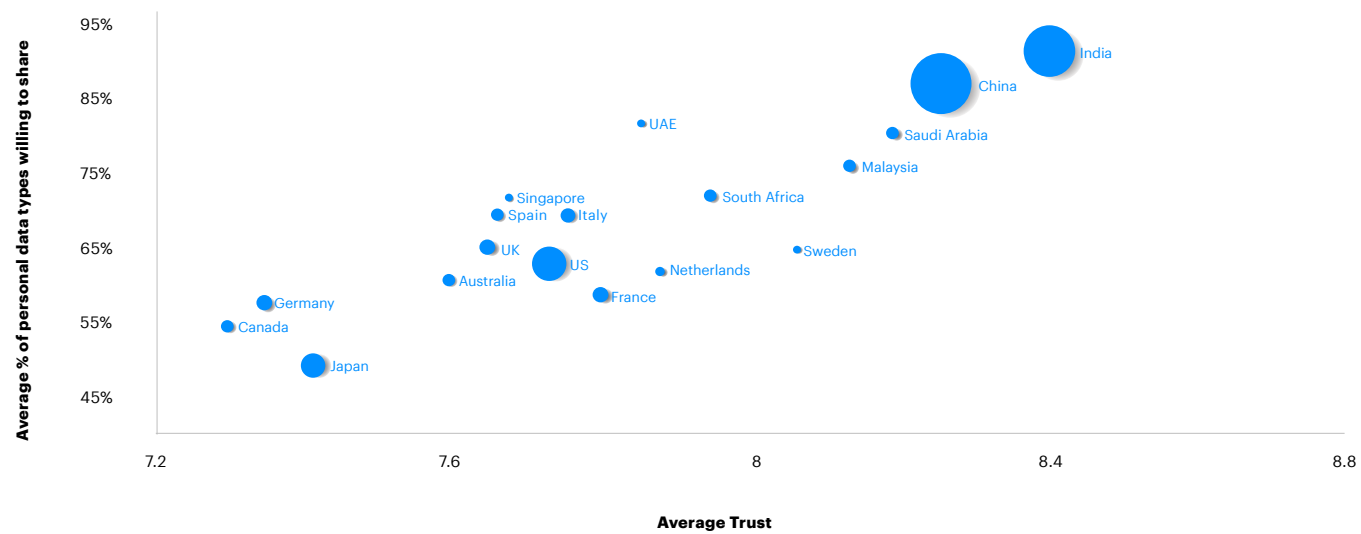
No doubt privacy battles will erupt as our inner lives become a currency. As emotional data collections become more sophisticated, privacy and data protection will become more complex, and clarity around data ownership, usage and meaningful consent will become more urgent. For example, on the subject of consent, what are the right protocols? Should stores put up a visible notice by the entrances, alerting shoppers that they are being watched? Should tracking mannequins have disclaimers?

Rana el Kaliouby, the founder of facial-cue recognition company Affectiva, has predicted that in a few years most of our devices will be emotion-aware.[34] And just as location tracking became standard after a few years, so will emotion.

Which is why building trust is so critical. In Accenture's Keep-Me Index, we see the strong correlation between consumers' trust in a company, and the quantity of personal data they are willing to share with that same company. Not surprisingly, it also shows the different levels of both trust and willingness to share personal data between consumers in different regions of the world (figure 2).

Figure 2. Average quantity of personal data customers are willing to share by level of trust and country[35]

Size of the bubble indicates the number of people with access to internet within each country | Source: Accenture Keep Me Index, 2019

Average % of personal data types willing to share (y-axis: 45%, 55%, 65%, 75%, 85%, 95%)

Average Trust (x-axis: 7.2, 7.6, 8, 8.4, 8.8)

Countries plotted: India, China, UAE, Saudi Arabia, Malaysia, Singapore, Spain, Italy, South Africa, UK, US, Australia, Netherlands, Sweden, France, Germany, Canada, Japan
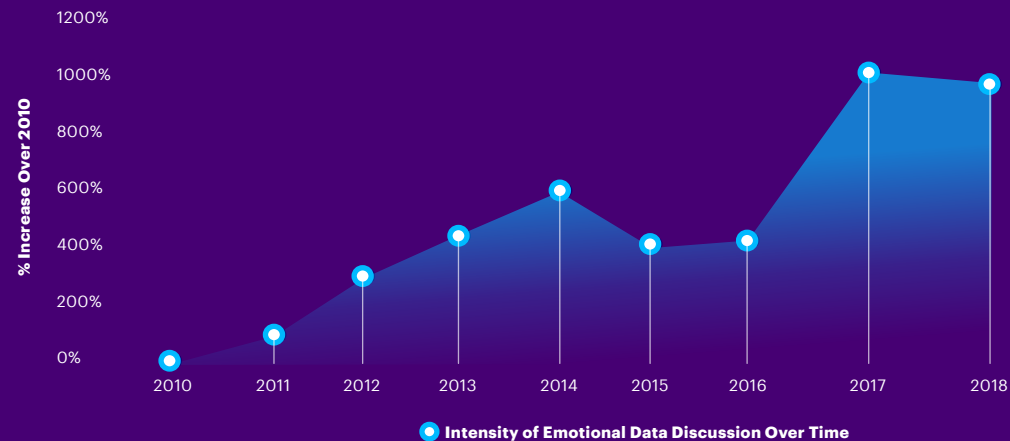
A NEW SENSE OF RESPONSIBILITY

Responsible actions today may prevent unintended consequences tomorrow

Without responsibility measures, companies risk losing customers' trust and squandering the opportunity to harness emotional data to innovate and drive profitable growth.

An analysis of earnings-call transcripts for communications, technology, and platform companies over the last 10 years shows that the intensity with which these firms are adopting and discussing emotional data and Emotional AI has been consistently increasing over time.

Figure 3. Company discussion intensity on Emotional AI technologies in Earning Release Calls[36]

Increase in Intensity of Emotional AI Discussion in Earnings Calls for Communications, Technology and Platform Companies with base year 2010

% Increase Over 2010

1200%
1000%
800%
600%
400%
200%
0%

2010 2011 2012 2013 2014 2015 2016 2017 2018

Intensity of Emotional Data Discussion Over Time

Given the role of the communications, technology and platform industries in the design of emotional data collection and usage across all industries, their approach towards responsibility in the use of emotional data becomes central to how responsibility is woven into Emotional AI as its use expands across all industries. This role needs to be taken seriously. Therefore, to become a responsible steward of Emotional AI, companies should be guided by a set of principles for how data is captured and leveraged. At minimum, the following principles can help organizations navigate the ethical terrain of Emotional AI.

GUIDING PRINCIPLES

The data collected should be relevant to an objective—not with a carte blanche, capture-everything mindset.

There should be informed consensual use of data.

Companies should prioritize human consequence and agency rather than rely entirely on AI to shape outcomes.

Data modelling should be retrained and dynamic—not static.

Model an aggregate population rather than individuals.

Minimize harm rather than maximize value.

Create greater value for the data provider than for the data collector and user.

To identify the internal processes and activities that will require the most attention, companies will also need to ask themselves a series of critical questions, such as those listed in the table below. To be clear, this is not intended to be a complete list. Rather, it is a means of zooming in on key areas of concern to address based on the needs of each individual company.

Identify your most important areas to address by asking yourself questions like...

Systems Design

Are the goals of the system defined and clear to both the company and the user?

Who designed the system? What kinds of people weren't at the design table?

What steps are taken to ensure the system is handling biases and maximizing for fairness?

Do we understand the emotions that are being captured and how AI systems are capturing those emotions? What is the accuracy/error rates? How do these change for different demographics?

Does the system or human agent have more influence over the final decision-making?

Data Usage

What are the modes of interaction between the consumer and the system?

How reliable and predictable is the system?

Is the confidence level of the system communicated to the user?

What are all the potential consequences to the consumer/user/business/partner if the system does not perform as expected?

Can decisions from this system materially alter the trajectory of someone's life?

Transparency

Are customers aware that they are interacting with an Emotional AI system?

What type of consent process would sufficiently inform the customer in this situation?

How frequently does the customers need to provide consent when interacting with the system?

How do we explain to customers what the purpose of Emotional AI applications are in a way that's meaningful to them?

Can consumers opt out easily?

Privacy

Will the collection of emotional data be intimidating for the customer?

How will emotional data be collected, stored, shared, sold, and erased?

What are all the potential consequences to the consumer if the data is misused?

No organization is the same or will have the same vulnerabilities or advantages when it comes to Emotional AI. Accenture's perspectives on the development of AI Ethics Committees should be an important consideration as businesses explore the adoption of Emotional AI.[37] In addition to create such committees, there is a set of actions firms can take to drive stronger responsibility across three layers—individual, company, industry ecosystem layer—of operations.

Importantly, the following recommendations were crafted to help leaders address the entire portfolio of risks that Emotional AI present. Some recommendations, however, have a higher degree of relevancy to specific risks.

At the Individual Level

Listen to your employees—and empower them to be ethical business owners. As shown in employee protests, there is a strong sense of ethics and doing the right thing within the workforce. Several companies are testing their Emotional AI solutions on employees, which provides an opportunity to elicit feedback on designing responsible safeguards around privacy, security, usage, transparency, and design. If employees are empowered to drive an ethical mindset across their day-to-day activities regardless of what those are, going through the checklist exercise as discussed above will become a much easier task.

At the Company Level

Lean on diversity. Diversity in the workplace can help avoid the unintended harms associated with Emotional AI. A diversity of worker skills can help leaders understand the potential as well as the downside risks of capturing and using emotional data; with different perspectives and viewpoints, most worst-case scenarios can be imagined and planned for. A diversity of backgrounds can help executives ensure that AI systems are designed and trained with the least possible biases, and to guarantee that checklists are relevant for the consumer groups targeted across geographies, age groups, and lifestyles.

Draw on outside experts for responsible design. Asking the right questions is critical. But we won't always know the answers ourselves. The impact of collecting emotional data aren't areas of expertise for a typical business leader, nor for most employees. When an engineer designs an Emotional AI system, that individual might not be best placed to evaluate the possible biases or backlash from consumers, let alone to assess the ramifications of mass usage. That engineer must be empowered to connect with the experts who can help make these judgments. That's why a broader ecosystem of experts and collaborators needs to be embedded into business processes, including the design of technology tools, business models and all aspects of Emotional AI.

Bring responsibility to startup culture . Silicon Valley and similar places are home to many successful platform, media, telecom, and tech companies, and their mindset has influenced even more companies. A start-up mentality is good and can take your business a long way. But firms need to find a way to build a responsibility mindset into the "minimal viable product" culture. Quick and dirty risks also being quick and irresponsible.

Extend the reach of risk assessment. Unintended consequences are, by definition, unplanned for. But companies can reduce the frequency of bad outcomes by being more conscious about the design of their risk assessment questions. The risk assessment lens needs to allow for a broader view of impact, incorporating individual and societal wellbeing. And the lens must reach further into the future, including systemic second- and third-order risks. For example, anonymous data collected about our brain waves today may be transformed into identifiable insights about our thoughts by someone else, somewhere else, years later. We must be honest and explicit about such future risks, and continuously revisit questions to build foresight and detect shifting trends early. Appropriate governance mechanisms will be critical. Tools and frameworks can be designed to ensure correct questions are asked, and iterative governance processes can address potential issues as they arise, reducing the chances of being caught off-guard.

At the Industry Ecosystem Level

Build responsibility into partnership agreements early on. Partnerships across the media, telecommunications, and technology and platforms landscape are evolving to provide meaningful value for users. Part of this development means data is shared and co-used more extensively between partners. Ensuring ethical principles can be fulfilled requires the entire partner ecosystem to operate on the same principles. Unless those are made clear —probably with checklists and all—and agreed on, there is a strong risk that words will remain just words and not actions.

ABOUT THE RESEARCH

Intensity of data usage is an index metric between 0 and 100 that indicates the relative frequency with which companies discuss topics/sub-topics around emotional data in their earning call transcripts.

Responsibility is a composite index between 0 and 100 that measures a company's efforts in sustainability and trust by aggregating many different performance factors some of which are: employee diversity, labor rights, employee training, trust of supply chain partners on the company, good environmental management, consumer trust in the company, transparency in forensic accounting methods and company governance among others.

ON DATA INTENSITY:

Earning call transcript data was aggregated by company/company-year to generate a frequency of "hits" based on the key topics around emotional data/data privacy and security. Examples of topics include: Fingerprint data, Voice data, Eye data, Facial data as well as general Emotion AI data.

The frequency was then divided by the total number of words available for each company across all earnings calls and other conference transcripts to arrive at the proportion of transcripts devoted to talking about emotional data over time. This measure was then log-transformed to smooth out extreme values.

Once the data was smoothed out, we applied a normalization process to the data to generate an index of values between 0 and 100 for each company where 100 indicates the highest intensity of discussion around emotional data topics and 0 indicates no discussion. The normalized measures are relative in nature and allow us to compare intensity of discussions across topics around emotional data as well as over time.

The chart in figure 3 shows the percentage increase in relative frequency of occurrence of mentions of emotional data and Emotional AI for 329 companies for 8 years each compared to the base year of 2010. For instance, in 2017, the intensity of discussions was around 1000% more than in 2010.

ON RESPONSIBILITY:

The responsibility index is a composite average of the following components:

From Arabesque: diversity representation of women and minorities in a company, employment quality and employment satisfaction, product access to disadvantaged communities, training and development opportunities, transparency and truthfulness in accounting practices

From Competitive Agility Index: Trust subcomponent for supply chain partners, trust subcomponent for customers, trust subcomponent for employees.

Figure 1: The econometric model on EBITDA and Revenue uses a panel data for Communications, Technology and Platform companies between 2015 and 2018. The model controls for company characteristics as well as time-series and industry fixed-effects. Outliers in EBITDA margins (top and bottom 5%) were excluded from the sample. The final dataset includes 153 companies.

REFERENCES

[1] https://www.gartner.com/en/newsroom/press-releases/2018-03-20-gartner-highlights-10-uses-for-ai-powered-smartphones

[2] Responsibility here is defined as a composite average of indices on trust metrics for business partners, customers, and employees, as well as indices on employee well-being such as diversity and company transparency in external reporting.

[3] Intensity of emotional data is measured as an index of the relative frequency with which companies discuss topics around emotional data in their earning call transcripts.

[4] Accenture Research and Analysis, see "About the Research"

[5] https://www.scientificamerican.com/article/feeling-our-emotions/

[6] https://hbr.org/2019/11/the-risks-of-using-ai-to-interpret-human-emotions

[7] Emotional AI Expert interview – November 2019

[8] https://www.gartner.com/smarterwithgartner/13-surprising-uses-for-emotion-ai-technology/

[9] https://hbr.org/2018/07/3-ways-ai-is-getting-more-emotional?autocomplete=true

[10] https://www.economist.com/special-report/2018/03/28/customer-service-could-start-living-up-to-its-name

[11] Emotional AI Expert interview – November 2019

[12] https://www.retaildive.com/news/how-retailers-can-tell-stories-by-reading-emotions/542298/

[13] https://www.retaildive.com/news/how-retailers-can-tell-stories-by-reading-emotions/542298/#:~:targetText=Emotion%20AI%20systems%20use%20small,interested%20in%20gauging%20shopper%20sentiment.

[14] https://blog.global.fujitsu.com/fgb/2018-04-13/revolutionizing-retail-with-shops-featuring-the-latest-technology/

[15] https://developer.amazon.com/blogs/alexa/post/2d8c2128-eec9-44cc-9274-444940eb0a4d/using-adversarial-training-to-recognize-speakers-emotions

[16] https://www.cnbc.com/2018/04/20/emotion-artificial-intelligence-huawei-working-on-an-emotional-ai.html

[17] http://go.affectiva.com/auto

[18] https://www.theatlantic.com/technology/archive/2018/10/alexa-emotion-detection-ai-surveillance/572884/

[19] https://apnews.com/6ff93241fbcf4c6eac3d85b8115ef71d

[20] https://apnews.com/6ff93241fbcf4c6eac3d85b8115ef71d

[21] https://www.freep.com/story/money/cars/mark-phelan/2019/08/03/subaru-driverfocus-outback-forester-legacy/1903279001/

[22] Expert interviews (page 24 of Challenges, Opportunities, and Risks of Emotional Data)

[23] https://www.businessinsider.com/nationwide-sas-ai-customer-experience-2019-3

[24] https://www.businessinsider.com/nationwide-sas-ai-customer-experience-2019-3

[25] https://ainowinstitute.org/AI_Now_2019_Report.pdf

[26] https://hbr.org/2019/11/create-an-ethics-committee-to-keep-your-ai-initiative-in-check

[27] https://www.nielsen.com/uk/en/solutions/capabilities/consumer-neuroscience/

[28] https://www.mensjournal.com/health-fitness/noom-is-the-lifestyle-app-you-need-to-get-fit-and-trim-down/

[29] https://www.noom.com/programs/health-weight/exsf01d/?upv=3&sp=google&utm_source=g&utm_medium=paidsearch&utm_campaign=1355772182&utm_content=330788143608&utm_term=aud-492010801913:kwd-299095591416|noom&gid=52400241257|&type=branded|intent|e&cid=CjwKCAi A8ejuBRAaEiwAn-iJ3o1LB2kX6SPpfpVl2WSd6XhU_XvYKOPqU82jD9DhiTggUytTZGND2BoCfu0QAvD_BwE&pos=1t1&step=pros&lang=en&device=c#/

[30] Emotional AI Expert interview – November 2019

[31] Emotional AI Expert interview – November 2019

[32] Emotional AI Expert interview – November 2019

[33] https://www.ohchr.org/Documents/Issues/DigitalAge/ReportPrivacyinDigitalAge/AndrewMcStayProfessor%20of%20Digital%20Life,%20BangorUniversityWalesUK.pdf

[34] https://www.inc.com/magazine/201607/tom-foster/lightwave-monitor-customer-emotions.html

[35] Accenture Keep Me Index 2019

[36] Accenture Research and Analysis, see "About the Research"

[37] https://www.accenture.com/us-en/insights/software-platforms/building-data-ai-ethics-committees

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