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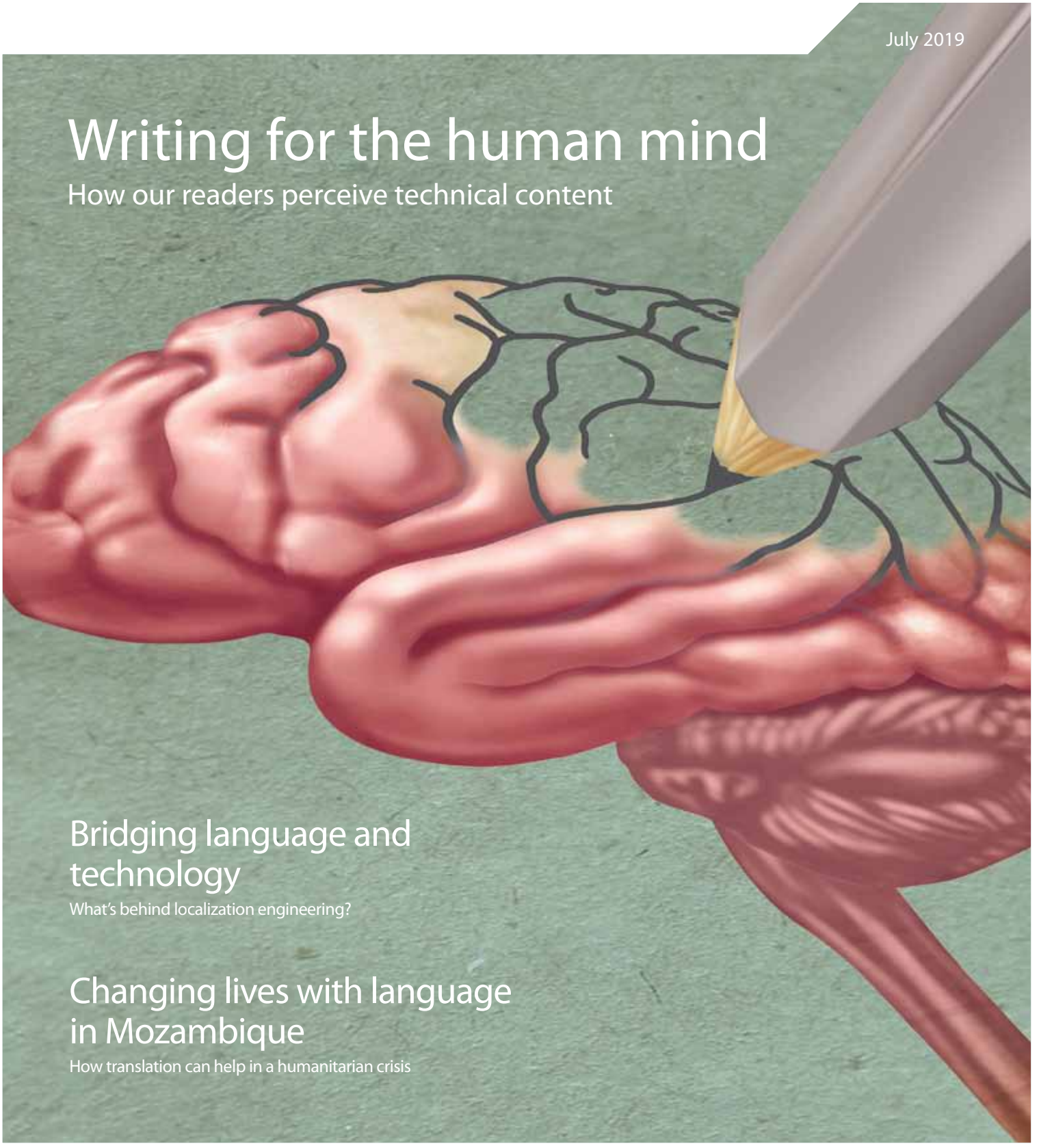

Writing for the human mind

How our readers perceive technical content

Bridging language and technology

What's behind localization engineering?

Changing lives with language in Mozambique

How translation can help in a humanitarian crisis

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tcworld

magazine for international information management

From the editor

The unique human brain

There is nothing more complex than the human brain. All day long, it perceives information and tests it against our previous experiences, our cultural beliefs, and the memories we have stored. This is how we find meaning in our everyday encounters and put them into context.

But the brain wasn't always this sophisticated. Scientists suggest that it developed over a period of four billion years starting with single-celled organisms that could sense the world and react accordingly in order to survive. Much later – around 500 million years ago – the first vertebrates with complex brains appeared, which then developed the ability to process information. This allowed them to breathe air and colonize land. With the arrival of homo sapiens, the brain went into high-speed mode and developed rapidly. We know now that the modern human brain is three times the size of the earliest human brain.

From an evolutionary perspective, it wasn't until very recently that we discovered what the brain is all about. Aristotle believed the brain to be a radiator with the simple function of keeping the heart from overheating. He believed the heart to be the center of our cognition and processing. Today we understand that the brain is the seat of complex thought, the tool we use to think, move, love, remember, and socialize. But then along came technology, which – just like the human brain – became smarter and smarter. These days, Artificial Intelligence exceeds our brain's ability to store information, analyze data, solve logical problems, or translate information – all this without needing sleep or being impaired by emotional or social triggers.

Yet, as an invention designed to meet our human needs and assist us in our private and professional lives, robots and Artificial Intelligence lack common sense and empathy, as well as the ability to understand humor or sarcasm or to express creativity as we do through music or art. It is these essential qualities, however, that connect us to other humans, that allow us to be heard and understood.

When writing an instruction manual, developing software or an app, or even when training Artificial Intelligence, we need to keep in mind that it is ultimately the human brain we are speaking to – with all its biases, memories, experiences, needs, and desires.

C. Melville

Corinna Melville

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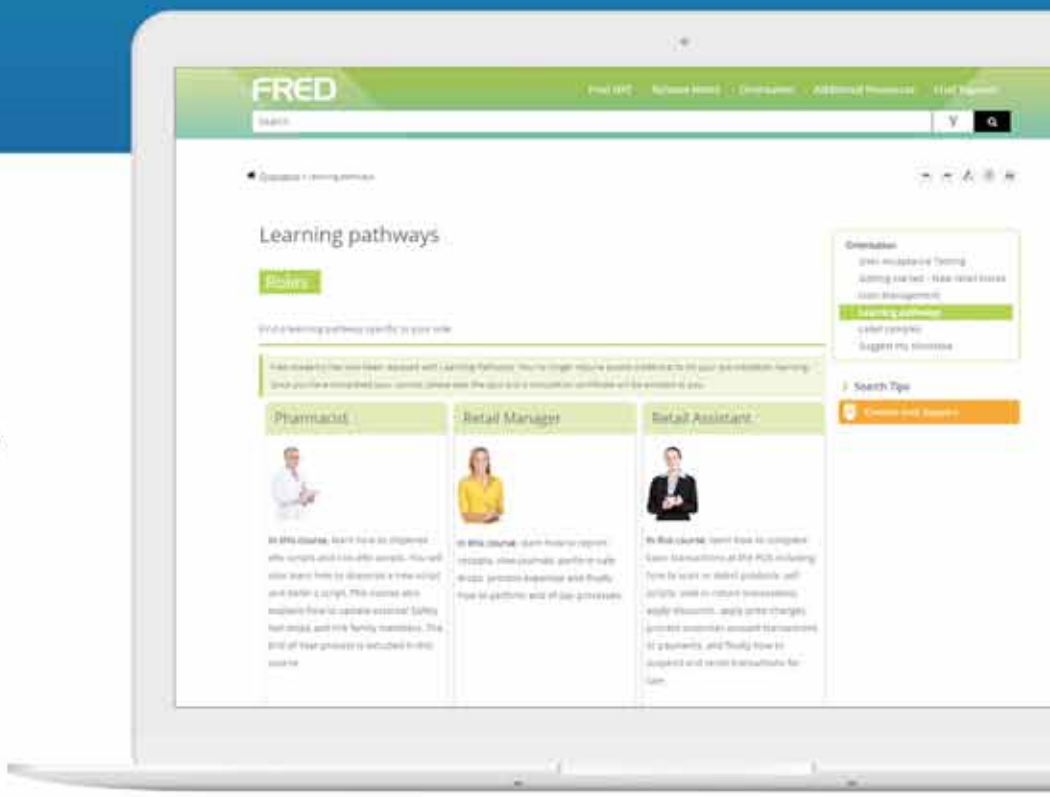

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Writing for the human mind

Emotions and perception play a crucial role in the way our readers consume our content. As writers, we need to learn to speak to the human brain.

page 12

Changing lives with language in Mozambique

For most organizations, translation is about entering new markets and increasing profits. For the non-profit organization Translators without Borders it is about saving lives.

page 32

Cognitive biases in technical communication

Think you're the rational type? Think again! How we speak to our colleagues, write our documentation – yes, even the way we train Artificial Intelligence – is strongly influenced by our culture, knowledge and experience.

page 38

GDPR still a mystery to SMEs


Image: © matejmo/istockphoto.com

The General Data Protection Regulation (GDPR) came into force in May 2018. But despite enormous publicity surrounding the new amendment to the European data protection law, many business owners still lack knowledge about the consequences of not meeting its provisions and requirements.

A recent investigation into SME owners' engagement with the digital landscape showed that 39 percent don't know who GDPR affects, while 1 in 10 respondents don't think GDPR gives consumers any new rights. This lack of awareness is concerning as SMEs are putting themselves at serious risk by ignoring the new regulation.

Perhaps indicative of why SMEs have failed to engage with the information distributed about the new regulation was the answer to the question: "What have you found most annoying online in 2018?" Alongside nuisance PPI phone calls and website pop-ups, constant communication about GDPR topped the list.

This suggests that the efforts made to spread understanding of the regulation and ensure business compliance have been ineffective – irritating, rather than enlightening their intended audience. The problem is, this is one area that businesses can't simply put off until a later date – understanding the new regulation is not an optional extra.

How GDPR benefits consumers

GDPR is intended to give consumers two main benefits. The first is that their data will be more secure overall. All companies that handle personal data must ensure they have adequate security measures in place to protect the customer data they hold. It doesn't only apply to the way this data is stored; every aspect of the way customer data is handled is covered.

There is also a new 72-hour timeframe in which companies are required to notify customers of a data breach. This is to give customers adequate time to take action to secure their information, such as changing passwords.

The regulation will give consumers greater control over their data. It includes the right to have any personal data stored on them by a company "returned" in a format that can be easily passed on, even to a competitor of that company. In theory, this means consumers will be able to get better deals from suppliers with greater ease.

How businesses should process their customers' data

When you gather information from your customers (whether you are collecting, storing or deleting it) you are – in GDPR terms – processing it. So, if you're accessing data, for whatever length of time, you need to be mindful of the rules surrounding this.

There are six lawful bases for processing personal data under the regulation. These are

- **Consent** – you have clear consent to use the data in a specific way; think, gathering browsing data to personalize online adverts.
- **Contract** – the data is necessary as determined by your contract. For example, processing credit card details when the consumer signs up for a trial period.
- **Legal obligation** – you need to process the data to comply with the law – this could be to deliver to a regulatory body or as part of a criminal investigation.
- **Vital interests** – processing needs to be done to protect someone's life.
- **Public task** – data processing needs to be done for you to complete a task in the public interest, and this has a clear basis in law.
- **Legitimate interests** – processing is necessary for legitimate interests, such as fraud protection, unless there is good reason to protect the data.

Much of the focus so far has been on affirmative consent from data subjects in order to reduce unsolicited marketing – one of the most noticeable effects being the "cookie consent" pop-up on every new web page visited.

Many SMEs still not compliant

Despite the publicity surrounding GDPR, especially in the months before it came into force, our survey showed many SMEs were unprepared for – or misunderstood – the changes. Hiscox Lead Cyber Underwriter Stephen Ridley believes there are some businesses who seemed to have done the absolute minimum, such as update their website's privacy notice, and are still a long way from fully complying. The main confusion appears to be around understanding the nature and volume of the data they process.

www.hiscox.co.uk

Organizations are increasing investments in customer experience technology

Three-quarters of organizations surveyed by research firm Gartner, Inc. have increased customer experience (CX) technology investments in 2018. Customer analytics continues to be one of the biggest investments, with 52% intending to increase funding in 2019, focusing on customer journey analysis, customer needs analysis, voice of the customer (VoC) and digital marketing.

Gartner's 2019 Customer Experience Innovation Survey gathered data from 244 respondents in seven countries in North America, Western Europe and Asia/Pacific, across a wide range of industries. The objective of the study was to understand the priorities, technology investments and high-stakes situations faced by organizations in their CX initiatives.

The survey reveals that when organizations grow in CX maturity, a greater focus of technology investment is placed on increasing customer understanding and delivering accurate actions by analyzing data. At the same time, CX programs expand from a core team to a wider group of employees. The requirement for change management makes employee training tools an important technology investment.

According to the survey, the top five CX project priorities in 2019 are metrics (64%); VoC (50%); increasing speed of product and service launches (45%); product proliferation and personalization (45%); prioritization of CX investments (44%); and customer journey automation (44%).

According to the survey, the top three emerging technologies expected to have the biggest impact on CX projects in the next three years include Artificial Intelligence (53%), virtual customer assistants and chatbots (39%) and omnichannel engagement solutions (37%).

High-stakes situations have negative impact

The survey reveals that many organizations have faced crisis situations in their CX program within the last three years. Economic or financial pressure has impacted the highest proportion of respondents (53%). For those with lower maturity levels, 60% had CX initiative launches stalled due to lack of executive support, and 59% found it difficult to demonstrate value or ROI, which leads the CFO to question all future investments.

"High-stakes situations impacting CX programs can result in the removal of funding for a CX initiative or its cancellation, or even employees losing their jobs," said Olive Huang, research vice president at Gartner. "This may lead to a decline in the quality of the customer experience, weakened financial performance of the organization and erosion of its competitive position."

According to Ms. Huang, there are many actions you can take to avoid these situations or reduce their impact, from securing management buy-in to improving technologies that support change management programs, such as employee training tools.

"Pay special attention to building recruitment, retention and succession plans for key technology leadership roles related to CX," Ms. Huang said. "Candidates for these roles are often hard to find and highly valued in the job market."

www.gartner.com

Image: © niroworld/123rf.com

ADAPTABLE NEURAL LANGUAGE PAIRS

SDL, provider of content creation, translation and delivery solutions, has announced its latest machine translation innovation with the addition of new Adaptable Language Pairs to SDL Machine Translation, enabling brands to tune their own language pairs to any project, department or industry. This innovation is powered by Hai, the SDL Linguistic AI™ technology, and gives customers the control, privacy and freedom to create their own proprietary language pairs by adapting existing ones.

www.sdl.com

OUTSOURCED LANGUAGE MARKET CONTINUES TO GROW

The global market for outsourced language services and technology will reach US$49.6 billion in 2019, according to a primary quantitative study by independent market research firm CSA Research. The firm surveyed 589 providers from around the world. The global market leaders in the 15th annual global study are detailed in CSA Research's "Who's Who in Language Services and Technology: 2019 Rankings".

www.csa-research.com

ACTITO ACQUIRES SMARTFOCUS

ACTITO S.A., a provider of marketing automation, has acquired SmartFocus. SmartFocus is an SaaS ("Software as a Service") digital marketing platform created in 1999. The company is headquartered in London and operates worldwide. The acquisition of SmartFocus supports ACTITO's plans for geographic expansion and growth following the sale of its subsidiary MediQuality to the US company WebMD Health Corp.

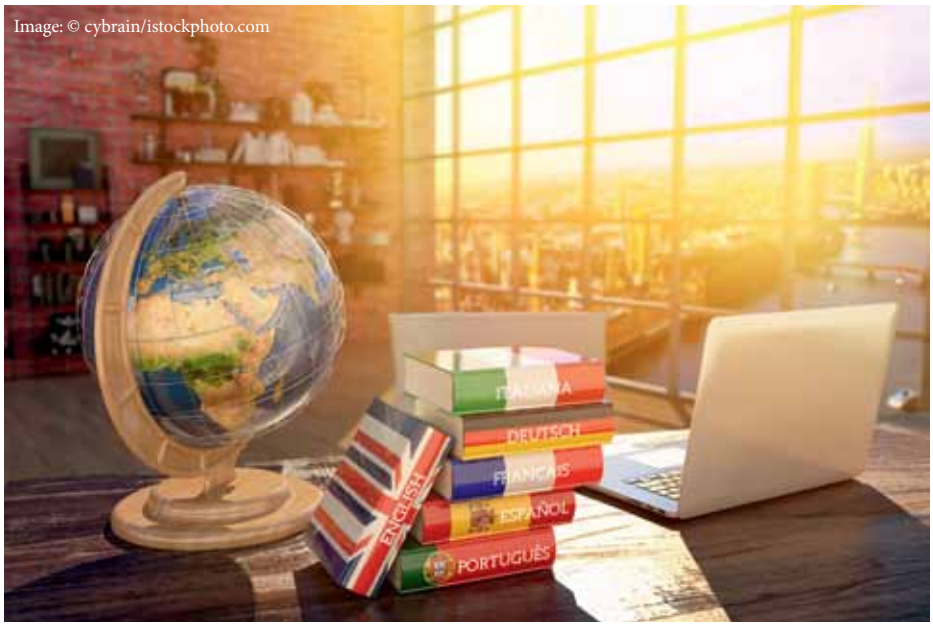
www.actito.com

THE NEW IEC/IEEE 82079-1 ED. 2

The revised standard IEC/IEEE 82079-1, with the new title *Preparation of information for use (instructions for use) of products - Part 1: Principles and general requirements,* is now available in English and French in the webstore of the IEC. It replaces the previous standard from 2012.

https://webstore.iec.ch

TAUS releases Transcreation Best Practices and Guidelines



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TAUS recently published the *Transcreation Best Practices and Guidelines* for the translation industry. The publication aims to form a useful basis for further, industry-wide discussion around the definitions and processes of transcreation. The processes and guidelines defined in this document will also provide the training material for an online course to be made available on the TAUS eLearning Platform with exclusive examples and practical exercises.

In mid-2018, participants of the TAUS QE Summit in Dublin assigned TAUS the task of presenting a structured set of best practices, guidelines and training materials, for linguists interested in developing their skills around transcreation and international copywriting. This publication would serve as a step towards formalizing an understanding of both the terms and the processes.

"It was time to take on this task," says Solen Aslan, Digital Marketing Manager (TAUS), "as the discussion around transcreation had been going on for some time, but without the guidelines that could help define, scope and potentially measure the output of these processes. It was also necessary, because the need for giving practical support to transcreators has never been so great, and is increasing daily."

The Chair of the Editorial Board, Paul Mangell (Alpha), adds that "Some seasoned translation experts believe that transcreation is really just another name for good, culturally adept translation. In other words, they believe that transcreation has 'hijacked' what well-educated, skillful translators have always done – provide a culturally relevant, linguistically accurate text, rather than a 'word-for-word' translation. All good translation is in some way creative – and must take into account the writer and their purpose, plus the reader and their culture."

In the TAUS Transcreation Best Practices, the Board firmly concluded that transcreation is a distinct process, and can be separated through different forms of preparation, source material, and intent. This document investigates, elaborates on and exemplifies these indicators that separate transcreation from other industry terms.

TAUS Transcreation Best Practices are freely available for everyone to download.

https://info.taus.net/taus-transcreation-best-practices-and-guidelines

2019 International Year of Indigenous Languages

Languages play a crucial role in our daily lives. They are not only our first medium for communication, education and social integration, but also at the heart of each person's unique identity, cultural history and memory. The ongoing loss of indigenous languages is particularly devastating, as the complex knowledges and cultures they foster are increasingly being recognized as strategic resources for good governance, peacebuilding, reconciliation, and sustainable development. More importantly, such losses have huge negative impacts on indigenous peoples' most basic human rights.

In 2016, the United Nations General Assembly adopted a resolution proclaiming 2019 as the International Year of Indigenous Languages, based on a recommendation by the Permanent Forum on Indigenous Issues. At the time, the Permanent Forum expressed concern that 40 per cent of the world's estimated 6,700 languages were in danger of disappearing.

Hosted by UNESCO in collaboration with the Permanent Forum, the IYIL 2019 will strive to preserve, support and promote indigenous languages and mobilize stakeholders to act in five key areas:

1. Increasing understanding, reconciliation an international cooperation.
2. Creating favorable conditions for knowledge-sharing and dissemination of good practices.
3. Integrating indigenous languages into a standard setting.
4. Empowering through capacity building.
5. Elaborating new knowledge to foster growth and development.

www.un.org

tcunplugged

The Power of "No"

Text by Leah Guren

Image: © convisum/123rf.com

In the first half of 2019, one of the popular self-help/self-improvement challenges was "Say yes to everything." You may have seen some of your friends and colleagues accept this challenge on social media. "Say yes to everything" is based on the idea that we become closed off to new experiences, new opportunities, and new friendships, and sometimes need a reminder to get out of our stodgy, small comfort zones.

I applaud the original motivation behind this trend. However, I disagree with it for three reasons:

First, it is true that aging causes many people to become more fearful and to contract their lives to a tiny, manageable realm of home and neighborhood. But it is equally common for people to find the aging process liberating; they no longer care what other people think and are willing to try things to please themselves, rather than others. And it seems that many older women, particularly those who still lead active careers, fall into this latter category. Every day, I interact with competent, bold, older women who fearlessly take on new challenges.

Second, "say yes to everything" fails to address the real problem that plagues business professions: namely, we are already over-committed, over-scheduled, and too busy. We don't need to say "Yes" to more things; rather, we need to learn to say "No".

Finally, it places people in an uncomfortable situation of committing to invitations that they cannot financially afford, or agreeing to activities that conflict with their beliefs or undermine another goal (such as getting fit or losing weight, or even getting more sleep every night).

Burnout, stress, and overload

Think about your department. Do you have one editor or content developer who always seems to be involved in more projects than anyone else? Chances are, this person is:

- female
- experienced (over 20 years in the profession)
- extremely competent
- perceived as helpful, supportive, or generous

This person – let's call her Carol – is already way too busy with her own work. Bob, on the other hand, is doing far less. Yet when the VP of Marketing wants another pair of eyes to review the newsletter, he asks Carol, not Bob. He knows that Carol is methodical, will do the best possible job, and will meet his deadline. Bob, he fears, will not prioritize this extra work, or will not treat it with the same seriousness as his normal workload. Bob, in other words, is less likely to accommodate an extra demand.

Carol knows that she can do a good job on the requested review. She is too busy, and she knows that there are other writers or editors in the Tech Pubs department who are equally qualified to do the work. But she has trouble saying "No" to any request for help. Whether through social conditioning or corporate culture, Carol has become an easy target for everyone. While statistically, the overworked over-obliger is a female over 35, we recognize that anyone, of any age or gender, could be the one who has trouble saying "No".

Jess Ekstrom, a successful young business entrepreneur, wrote about the jam-packed busy schedules that have become the norm [1]. "I started to realize that saying yes to everything was putting me on a path to burnout."

Why do we say "Yes"?

There are many good reasons to say "Yes" but, unfortunately, there are also many bad reasons:

- Fear of not being liked. Of course, it is nice to have people like us, but it is unrealistic and

counterproductive to prioritize likeability on the job. It is sufficient that people respect your knowledge and skills and do not have any problems working with you; they don't need to consider you a dear friend as well.

- Fear of being fired. If you take on extra work because you are afraid to say "No", you are being coerced. You are doing things that are outside the scope and understanding of your contract and are not being paid or rewarded for that work. This is an unfair and toxic situation that will ultimately create an unpleasant work environment.
- Lack of clarity about who is really responsible. It is not always a bad thing to step in and help when no one else is responsible. But what about when there is a designated person who is supposed to handle this work? Poor communication may lead to duplication of work, scheduling conflicts, and angry coworkers.

Why I choose to say "No"

Before I agree to something, I ask myself the following questions:

- Does this help my business? If doing something outside the scope of a project with a client will not improve my work relations with them or create an opportunity for additional billable work, it is much easier to say "No".
- Does this help my career? If doing this does not teach me new skills or allow me to try something that I would not have an opportunity to do within my regular work or put me in contact with people in different departments or groups, then there is little benefit.
- Will doing this create problems with my regular work? If doing this will force me to work unreasonable hours to meet my deadlines, I don't need that kind of stress!
- Does this promote a cause that I support? I may choose to do something because I believe in the goal or the organization. It is far easier for me to say "No" to volunteer work that is not connected to something that I consider worthy.
- Does this sound fun? I like live music, but I know myself well enough to know that I will not enjoy a crowded, smoky nightclub, or a show that doesn't start until well past my normal bedtime. With each passing year, I find it easier to say "No" to invitations to something with which I have a proven (negative) track record.
- Is the commitment reasonable? If this thing requires a long, ongoing commitment (for example, joining a choir and being available for rehearsal twice a week), then the potential risk is far greater than a one-time event, such as reviewing a document or writing a recommendation or going out to see a movie.

When you do say "Yes", mean it!

Being more discerning and saving my time and energy means that when I do say "Yes", I can commit wholeheartedly. I won't feel coerced or uncertain. I can choose my volunteer work to suit my schedule and interests rather than be pressured into something that only adds to my stress. Further, what may be OK right now may not suit me in another year or two. Don't be afraid to say "No" to something that no longer suits your schedule, your interests, or your goals. Too often, people remain stuck doing something over and over that they no longer value or enjoy.
So, by all means, say "Yes" – but only if you have carefully ruled out the many reasons to say "No"!

What do you think? Do you need to embrace more risk and adventure by saying "Yes" or do you need to protect your time and energy by learning to say "No"? Do you have any tips to share on how to say "No" gracefully?

[1] Jess Ekstrom, "The 6 Questions I Ask Before I Say 'Yes' to Anything," Entrepreneur, 27 April 2018, www.entrepreneur.com/article/309695

ABOUT THE AUTHOR

Leah Guren is the owner/operator of Cow TC. She has been active in the field of technical communication since 1980 as a writer, manager, Help author, and usability consultant. She now devotes her time to consulting and teaching courses and seminars in technical communication, primarily in Israel and Europe.

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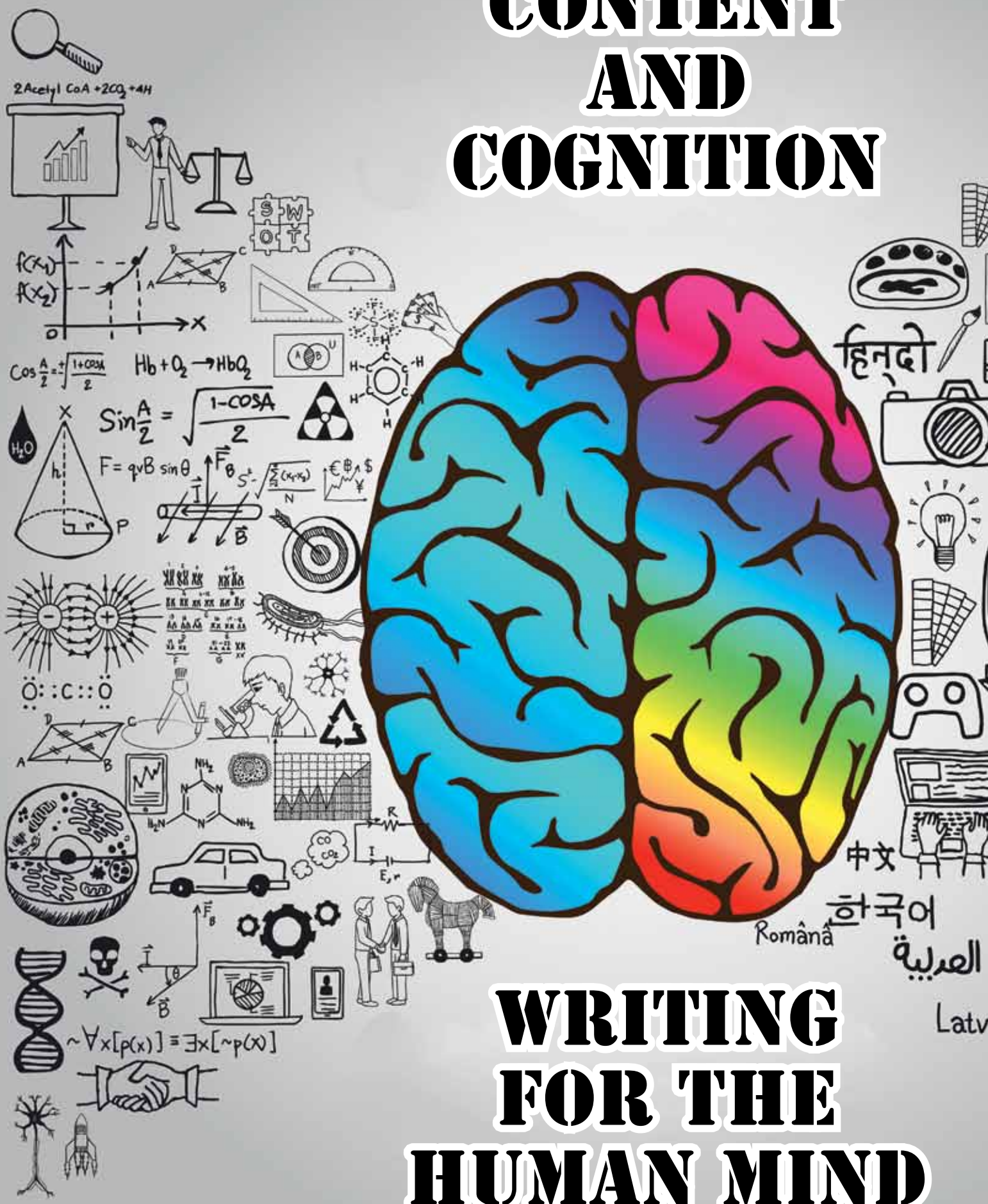
CONTENT AND COGNITION



WRITING FOR THE HUMAN MIND

Image: © bimdeedee/123rf.com

Ever since the beginning of the technological age, sci-fi forecasts were quick to render the human mind obsolete. Psychology has since highlighted the role of emotion and cognitive biases in how people understand and consume content. Here are some strategies for how to speak to customers old and new – and to their brains.

Text by Alberto Ferreira

Writing for the average user is a tricky affair. Unlike machines, our mind can only hold a very restricted amount of information. Ask somebody to tell you ten random single-digit numbers and try to repeat them. You will soon find that the more numbers you hear, the harder it is to remember the sequence of digits. Remembering anything beyond the first seven digits will be a Herculean task. This is our working memory in action, and its middling capacity also limits the number of individual words you can remember outside the context of a sentence.

Our working memory works along with our iconic memory, which stores everything we see, albeit very briefly and often with selective attention focus. These limits impose heavy constraints on the way we do digital design.

Take passwords, for instance. According to recent research by Panda Security, up to 52 percent of users reuse their passwords across different sites. Complex passwords are hard to remember and protect. With increased demands on security, companies have pushed users to adopt alternative methods, with fingerprint and facial recognition becoming standard methods of identification. This is an example of how user experience is trying to compensate for and alleviate cognitive stress, particularly as the number of stimuli is increasing every day.

The brain: friend and foe

How many decisions do you make per day? From which train to catch to the food you eat, every little act takes a decision. Researchers at Cornell University (2007) have estimated that on an average day, we make 227 decisions on food alone. Other sources point towards a total of 35,000 decisions taken every day.

Thinking is an intense process, consuming energy and resources that are already in short supply. Our mind usually takes shortcuts and adopts biases in order to respond quickly to unknown situations and minimize cognitive processing. This set of effort-saving strategies is typically labeled "cognitive biases", a term first introduced in the 1970s by social scientists Amos Tversky and Daniel Kahneman. Cognitive biases are mental shortcuts that are often systematic and devoid of reason (read more about cognitive biases on page 38). Combined with habit, they are one of the main drivers of digital behavior.

For example, consider the way people generally consume information on a website. Skimming (even when scrolling on mobile devices) is the default action here. Long-form reading requires attention, time, and effort – resources that are in great shortage these days. This partly explains Twitter's success.

Recent studies have demonstrated that the brain is inherently selective in the amount of content it consumes, and seeks to reduce cognitive load by focusing our attention and reading direction on an F-shaped pattern (particularly in Western users) that avoids the bulk of the perceived non-essential text elsewhere on the page. Headers and large type receive the most attention, which works great in an online newspaper, but less so when the user is going through an insurance form with several T&Cs attached.

Therefore, the most effective structure for an article on a printed page emphasizes key points through **titles**, **subtitles**, and **image captions**. Images are the eye candy that draws attention to the text around them. The content on the page becomes easier to process with shorter

paragraphs and a logical flow that reinforces the punchy nature of the headers.

Who are you writing for?

Research has shown that most of the time, an impulsive choice for a product is purely intrinsic and not significantly affected by advertising (Sofi & Nika, 2016). From an online perspective, for marketing purposes, the role of content is primarily to appeal to and connect with the reader's desires.

The best way to be engaging is to empathize with the users' needs. But the only way to understand these is to research the audience thoroughly. However, checking on content requirements can be tricky, particularly with companies that don't have a human-centered approach.

The best strategy to overcome this is to conduct **qualitative research**. This type of research aims to uncover the hidden attitudes and motivations of customers through interviews and surveys. Interviews and focus groups help to understand the themes that appeal to your clients. Quantitative research like Web analytics and A/B tests are also essential to uncover which copy can impact the user most effectively. A few words can have a disproportionate impact on conversion.

What's the story?

Storytelling is at the root of our content experience. Not because we want a story told in every single interaction with a brand or platform, but because aspects of storytelling help to build a sense of continuity and flow into our actions. This is partly why checking on social media notifications is so addictive. We want to see what happens next. We want to be entertained. We want to find closure.

Storytelling is also a masterful way to address morals, identity, and create a example with the customer. Showcase, for example, the identity of founders, CEOs, team members, and the people picking up the phone. Don't use "Established in 2014" as if it inherently means something. Tradition is not merely a factor to be stated, and the authority of time is not granted, but needs to be earned.

To apply storytelling in a persuasive way, one of the most often used frameworks is the triad of logos, ethos, and pathos developed by Aristoteles.

Ethos is largely associated with the ethical stance of the proposition you are conveying. One of the most frequently used strategies is to highlight companies you have worked with, awards you have won, or testimonials from satisfied customers. These sources should be realistic. No matter how many reliable sources you mention on your website, users will always search online for brand reviews and user forums. Conduct research on your brand's SEO ranking and find out which search results can impact perception indirectly.

Logos is related to the rational side of judgement. Vague promises such as "Register to receive exclusive benefits" might be your only

option if you do not have a clear USP to offer. However, users respond much better to a specific and realistic benefit such as a 5 percent discount or additional points.

Pathos is related to the empathetic side of the story, the sympathy aspect of establishing a definite emotional response. This is where the value proposition must be prominently placed. Authentic testimonials and loaded terms like "thrilling" and "outstanding" can work for the copy – but it can also backfire. Several studies have shown that being overenthusiastic about a rational subject actually decreases trust rather than build it.

Establish a relationship

Who are the people that call you by your first name? Most likely they are your partner, friends and family, and perhaps your colleagues at work. But how do you feel about an absolute stranger using your first name?

Overfamiliarity without context can be as off-putting as the strictest formality and establishes the undertone of the relationship with the brand. The right balance is delicate, but achievable. Speak to your customers as a soon-to-be friend. Establishing a connection with customers is difficult. Prospect fear is the key driver keeping people away. People might feel reluctant when faced with a new situation (be it online or in real life): the fear of being tricked, making the wrong choice, or being taken for a fool. Sales content is typically seen as high-risk – and our brain rejects it as such.

This means that everything on your site needs to show that your brand can be trusted. A combination of real contact information with photos of team members, thorough responses to FAQs, a lack of outlandish promises, clear calls to action, and other customer reviews are some of the more typical strategies used to clarify the proposition.

Cognitive overload

According to the Hootsuite Digital in 2019 report, social media has a total of 3.4 billion users, which matches a penetration of 45 percent of the world population. Social media is a distinctive way of reaching users, but the global trifecta of Twitter, Facebook, and Instagram fulfill very different purposes in users' minds. A 2018 ComScore study found that users in nearly every country in the world spend by far the most time on Facebook (70-90 percent of total social media time). Instagram is growing and accounts for 10-20 percent of all social media time in most countries.

As social media communication becomes more pervasive, so does its visual language. Every day, more than 350 million photos are uploaded to Facebook. Over 900 million emojis are sent without accompanying text on Facebook Messenger each day. One billion people use Instagram monthly. Copy can leverage this proliferation of visual content by including better structured content, color coding, emojis, and iconic imagery. A header becomes more memorable with an icon next to it.

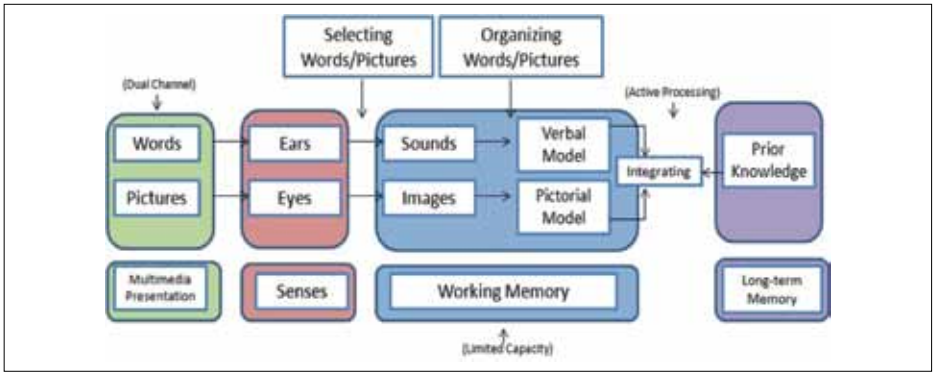


Figure 1: The cognitive theory of multimedia learning is one of several models of how the brain processes information when presented with digital information.
Source: https://campus.digication.com/cognitive_theory_of_multimedia_learning_mayer/Home

Mark Zuckerberg once famously said that "a squirrel dying in your front yard may be more relevant to your interests right now than the self-serving people dying in Africa." This is reflected in the self-serving online user behavior. It is in our nature to focus on our short-term interests rather than on the greater good. This also relates to the way people browse information online. There are two distinct modes to consider:

Flow-oriented: The user wants to be entertained. Tasks are open-ended and there is no specific goal. Normally, the user is particularly sensitive to visual content. A lot of the mental processing is pre-cognitive, which implies that the user is very vulnerable to simple trigger-

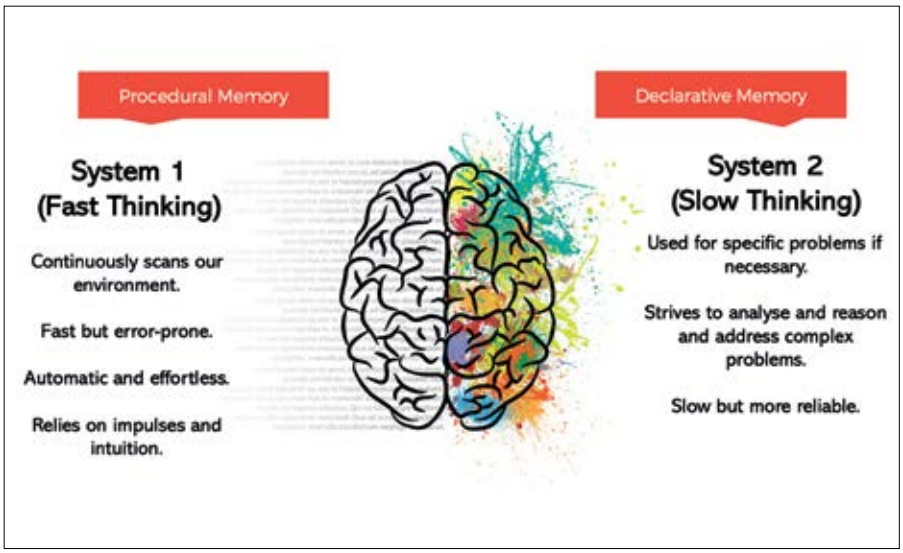


Figure 2: The way our brain processes information relies on two different frameworks. System 1 is intuitive and immediate. System 2 is a parallel mode of information processing.

rewards. This is the basis of the interaction models used by social media such as TikTok, Instagram, Twitter and Facebook.

Task-oriented: The user is trying to fulfill a purpose or complete a task. In this particular mode, the user is seeking efficiency in the process and is much more discriminating in terms of information processing.

Users in a flow-oriented mode are not able to remember individual elements of the page unless they are particularly memorable, and long texts are definitely not attractive as they require heavy cognitive power. This is particularly relevant for our current user experience requirements, as text skimming has become inherent to the digital experience. The use of simpler and more visual communication is essential to appeal to a wider audience.

Persuading and influencing

As the science of communication advances, so does the sophistication of the techniques we use to "nudge" behavior. Some of these techniques can also be applied to content. Here are some of the popular ones:

Scarcity

Scarcity is one of the most common strategies for persuasion and plays on limited access and the fear of missing out. The less there is of something, the more exclusive it becomes and the quicker it sells. It is the most common strategy in e-commerce, with the most common example akin to "only 2 left in stock". However, scarcity's efficiency depends on how it is framed. A 2009 study by V. Griskevicius and colleagues tested ads for products that contained social proof ("over a million sold") and compared them with scarcity ("limited edition"). While fear made social proof more effective in situations where participants found a possibility of personal harm, participants in a more positive mindset privileged scarcity. The possibility of belonging to a million-user club was not as appealing. Everyone wants to be special. Studies have actually shown that scarcity can be the least persuasive technique in absolute numbers (Orji et al., 2010). The key recommendation for scarcity is to assuage the customers' fears of missing out while clearly conveying the ultimate benefits.

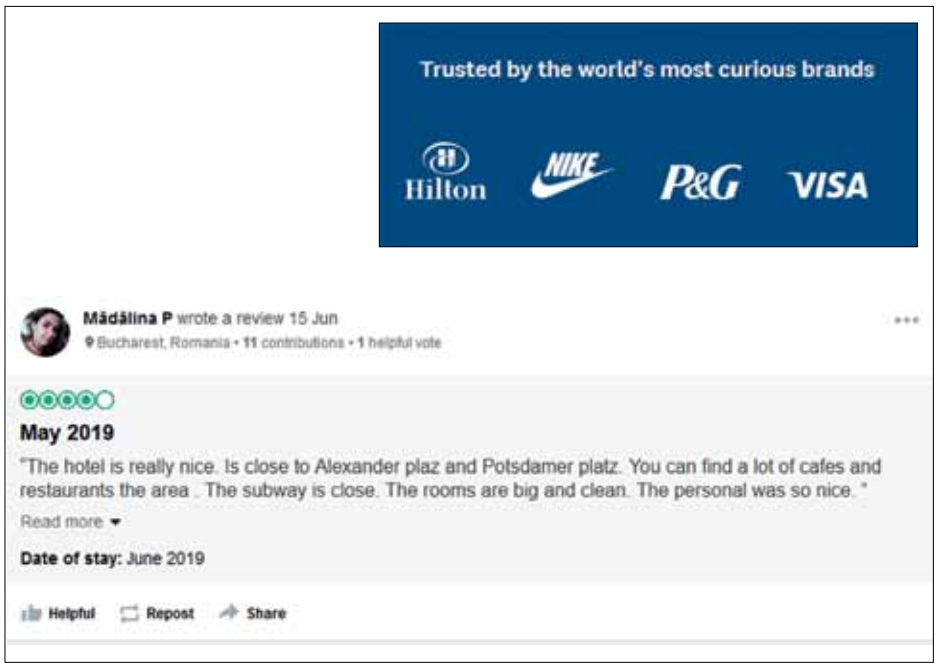


Figure 3: Authority and social proof are two of the most powerful principles that can be used in validating users' perceptions.

Loss aversion

Imagine you are given two uncooked pizzas. One of the pizzas has only the dough and you are told to add any ingredients you would like. The other pizza comes with toppings and you are told to remove or replace any of them as you wish. Which of these pizzas would end up with more toppings? In the 2002 study "A Tale of Two Pizzas", researchers found that the pizzas that already had the toppings on were the ones that ended up with the most toppings.

The hypothesis here is that participants did not want to lose the toppings that were already given to them, regardless of whether they liked them or not. This is a bias commonly known as loss aversion and it is deeply related to the idea that consumers do not want to lose benefits they perceive as having already. For instance, there is a huge difference between:

"Only 3 days left on your free trial"

and

"Upgrade now to access the full feature set"

Loss aversion is not necessarily negative, depending on the context. In one-off cases with no long-term return, also called myopic loss aversion, it is, however, driven by fear. Gains and losses are closely connected to emotions of pleasure and pain. For example, surprise makes gains more pleasurable and losses more painful. In fact, losses are almost always compared with similar situations that occurred in the past.

In order to bypass this bias, people prefer to avoid losing something they already have, rather than winning something of the same perceived value. Some ways to address this include:

- Mention the benefit at risk of being lost, then state the risk, including a proposed action such as "Act now to use your 5% discount."
- Use possessive pronouns ("your") to give the user a sense of ownership

Framing

The way you frame facts and figures can indirectly minimize cognitive biases. Research has shown that negative messages require more mental processing and have a less than ideal impact on comprehension (Jacoby, Nelson & Hoyer, 1982), as they increase stress and cortisol levels. Framing something in a positive

Figure 4: A sequential linear set of steps appeals to the user both intellectually as well as viscerally.

light is more effective and more memorable. For instance, a 2018 Deloitte report claimed that 22 percent of consumers were "happy to share some data" in exchange for a more personalized customer service. Although this was framed positively in the report, the fact that only 22 percent are willing to exchange data for product targeting is actually quite telling, especially as it was left unclear what "some data" actually means.

Therefore, the way you present information makes a huge difference. Express risks negatively, but present solutions in a positive light. Use simple figures.

Anchoring

Anchoring refers to the tendency to rely heavily on the first piece of information available when making decisions. The first piece of information is used to judge any of the data immediately following it. Exposure to a value or statement (even indirectly) will serve as a reference for other judgements. Users can also be influenced by anchoring prices to a high arbitrary price. A persuasive message with a price that is 50-75 percent higher than the cheapest price (or average price) can influence users.

Social proof

Social proof is one of the most commonly used online strategies. It falls into a pattern of social referencing, which deals directly with imitation – a basic mechanism for our development as a species. We look at social references to reinforce our beliefs and behaviors. Social proof is better when used for initial impressions (as in homepages) and moment-of-truth points when users have to make a decision that carries some risk. As far as possible, it should reflect real references in order to be more believable.

Bringing it all together

The most important part of integrating psychology in your content strategy and guidelines is to not expect a silver bullet. Behavior design and nudging are still in their infancy despite decades of research. As we understand the human brain better, we will become more effective in influencing human behavior through design patterns and words. However, this will only be valuable when addressing the fundamental objective of any technology to help us make the best of every day as a community and as individuals.

This is where the integration of psychology into content can help, showing us how to better align with the minds of our users and reduce their stress and frustration.

ABOUT THE AUTHOR

Alberto Ferreira is a user experience researcher and globalization services expert with over ten years of hands-on experience in UX on the client and agency side with some of the biggest companies in the world, including Sony, BBC, and Mars. He is the author of *Universal UX: Building Multicultural Experience*, and writes and speaks frequently on topics ranging from Agile to persuasion design.

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Understanding human perception to improve experience design

The quality of customers' experiences with a company determines whether they choose to be loyal to it or switch to a competitor – Forrester's data has proven it. So, it's crucial for companies to better understand how people's interactions with them shape their perceptions.

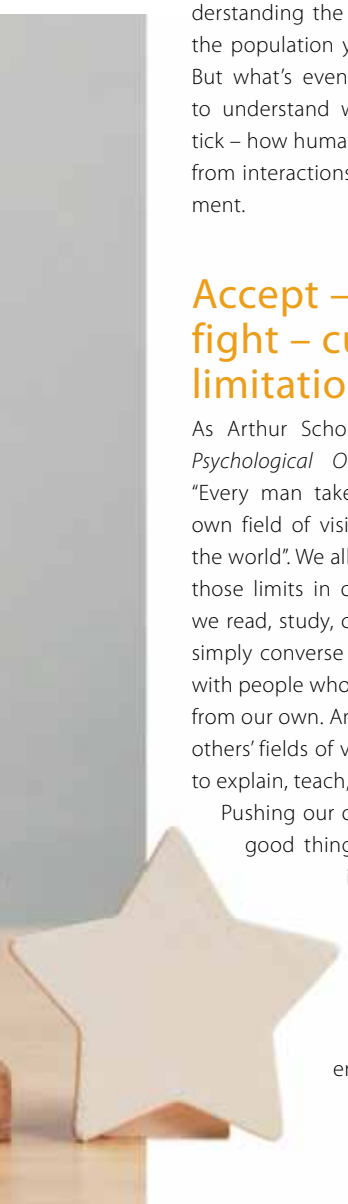
Text by David Truog

Image: © marchmeena29/istockphoto.com

Acquiring a new customer costs far more than retaining one. And when your company retains customers (i.e. they buy again and perhaps buy more), they're also more likely to recommend your company to others, making acquisition less costly. Therefore, basic business sense dictates that if your company's rate of customer retention is less than 100 percent, it should prioritize investing in improving customer experience (CX) over acquisition tactics like advertising and marketing campaigns.

But improving CX is harder than it appears. Above all, it means that the people inside a company who design experiences for customers – from products and services to documentation, stores, commerce sites, customer support, and more – must be experts at perspective-taking (seeing a situation from another person's point of view) on behalf of the intended customers.

Effective perspective-taking requires understanding the needs and goals of the population you intend to serve. But what's even more important is to understand what makes people tick – how humans' perceptions arise from interactions with their environment.



Accept – don't fight – customers' limitations

As Arthur Schopenhauer wrote in *Psychological Observations* (1851), "Every man takes the limits of his own field of vision for the limits of the world". We all try to push beyond those limits in our own lives when we read, study, conduct research, or simply converse with an open mind with people whose worldviews differ from our own. And, we try to expand others' fields of vision when we seek to explain, teach, or persuade.

Pushing our own limits is often a good thing to do, as is pushing others' limits, in many contexts. But it's a bad thing to do in the context of customer experience (CX). Instead of trying to push customers beyond their limits, experience design (XD) professionals strive to work *within* the limits of each user's "field of vision," to use Schopenhauer's term. Therefore, leading companies design their products, services, and related interactions in such a way that they require as little explanation as possible, thus making it easy for customers to use them in an easy, effective, and emotionally satisfying manner.

Affordances: What people can do with a product or service

This notion of what the user can do to make use of everything companies design is what XD professionals refer to as "affordances." The term, coined by psychologist James Gibson, refers to all possible interactions between an animal (such as a human) and its environment (including products and services). Gibson's broad definition recognizes that, while the designer of a spoon may intend for people to use it to feed themselves (and others), users also have the option of using it in a game, as a paperweight, a crude weapon, or whatever else they can imagine.

Human-computer interaction (HCI) pioneer Don Norman later introduced the term to the world of design but narrowed the psychological definition of "affordance" to include only those uses that the designer intends or that are obviously visible to the user: "For designers, their visibility is critical: visible affordances provide strong clues to the operations of things. A flat plate mounted on a door affords pushing. Knobs afford turning, pushing, and pulling. Slots are for inserting things into. Balls are for throwing or bouncing." More importantly, Norman also distinguished affordances from what he chose to call *signifiers* (adapting the term from semiotics, i.e. the study of signs and symbols).

An affordance is the "what you can do" relationship between a person and a thing. A signifier is a property of the thing that makes it clear to users what its affordances are. A signifier might be, for example, a visual cue in a user interface (UI) that indicates whether a UI element can be clicked, tapped, swiped, etc., or a sound that indicates that a digital voice assistant has begun listening for input in the form of speech from a human user.

The mechanisms of people's perceptions

So how do people discover, process, and use affordances? The best answers to this question are derived from the latest scientific research into human cognition, psychology, and behavior.

One of the pioneers applying this research to designing experiences is John Whalen. In his book *Design for How People Think: Using Brain Science to Build Better Products* (2019), Whalen explains that six "minds" are at work when customers have experiences (i.e. interact) with companies and their products and services (see Figure 1).

These six minds each contribute in their own way to how people perceive an experience – varying step by step as it unfolds:

- **Vision/Attention** – Which aspects of an object, environment (including employees), or UI do customers focus on, and when?
- **Wayfinding** – Do customers understand how to navigate through the features and functions of the experience – whether physical or digital?
- **Language** – If an experience includes text or speech, do customers expect or look for certain words or phrases? Are those clear?
- **Memory** – Is the experience consistent with customers' expectations based on what they remember of similar experiences in the past?
- **Decision-Making** – What choices do customers have to make throughout the experience? And how do they make them?
- **Emotion** – What feelings do customers have at each step and how do feelings fuse into an overall enduring emotion about the experience?

Whalen's book goes into detail about the latest findings on how each of these six minds functions and how companies can improve their XD capabilities to make the most of this new understanding.

Designing for the largest possible portion of your target audience

There is another important consideration to take into account when designing experiences based on a better understanding of how cognition works. Many companies tend to design ex-

periences for what they consider their "average" customer. But this is a mistake. Why? Because there is no such thing as an average customer. There are typically wide variations among people in any target market (different "fields of vision," to use Schopenhauer's phrase), including differences in how they form perceptions.

This is the reason many companies are increasingly prioritizing inclusive design. Forrester defines inclusive design as "designing experiences that are effective, easy, and emotionally positive for all customers in a target market by factoring in variations in customer age, ability, language, culture, gender, and other traits" (see *The Inclusive Design Imperative: Win And Retain More Customers* by Gina Bhawalkar, 2019). These variations affect how experiences shape perceptions and are therefore crucial for companies to factor into their design work.

Coping with the complexity of human perception

Do companies really need to delve into these complicated fields that – until now – have been mostly the province of academia and scientific research institutions? The answer is: Yes.

To get a better grasp on this, consider how digital technologies and the internet have gradually become essential to doing business over the past few decades. Many companies balked at the novel challenge of acquiring the expertise needed to build customer relationship management (CRM) systems, websites, apps, and the like. But some firms (both established ones and start-ups) embraced the change quickly, making the most of these technologies in order to serve their customers better. Those that did so established a solid lead compared with competitors that dragged their feet – and in some cases, these leaders have won out entirely in their markets.

The same will happen with companies that recognize the value of understanding the science of human perception and apply it to designing experiences. They will be able to outpace their competition in retaining customers and attracting new ones.

How companies can improve understanding of human perception

To respond successfully to the digital revolution, companies have had to boost their technological expertise. Similarly, companies will have to increase their expertise in the new understanding of how perceptions arise from experiences.

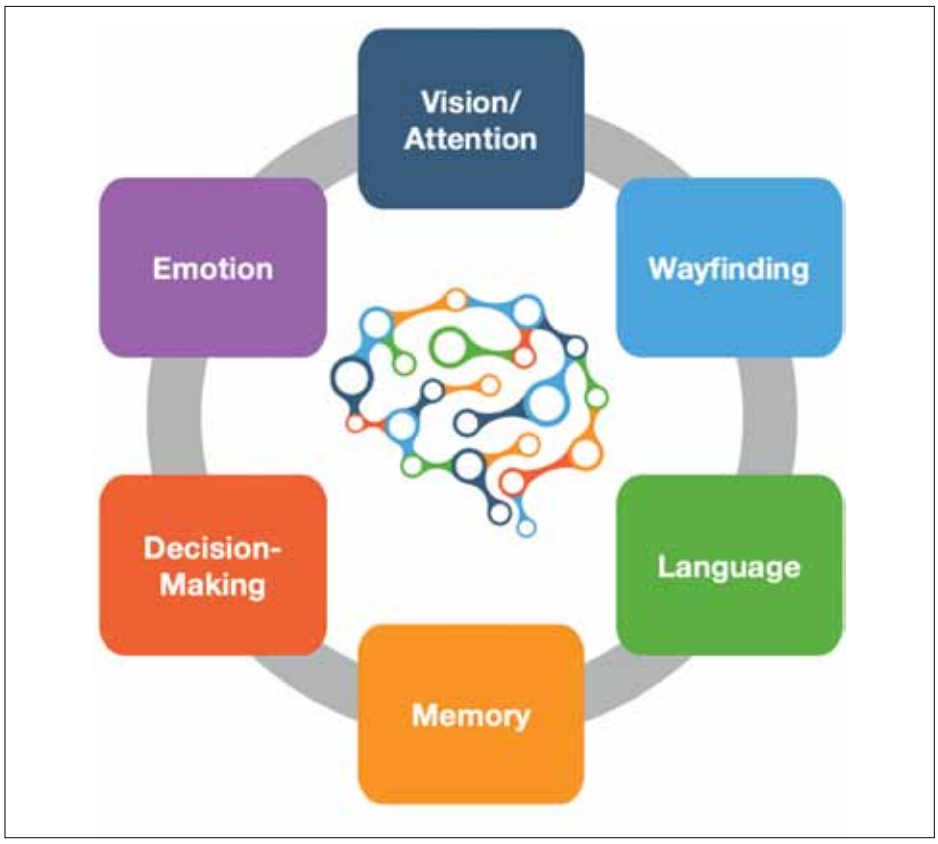


Figure 1: The six minds of experience (adapted from Design for How People Think: Using Brain Science to Build Better Products by John Whalen, 2019)

But how can they achieve this? In the same way that companies over the past few decades have elevated their technology expertise: by hiring trained experts from cognitive neurophysiology and related fields, like neuroscience and linguistics. And by contracting with specialized consultancies that help with designing experiences and training employees (especially those employees involved in designing these experiences).

The help with design that these consultancies offer will come in the form of either design collaboration with the company or design work done entirely on its behalf. Smart executives will prefer to keep their own employees closely and collaboratively involved in this work, to ensure that they build the expertise of their own workforce in this newly important domain.

Over time, business-education curricula (such as MBA programs) will begin to include training in the essentials of human cognition, to prepare graduates for careers as executives that will increasingly require a sound knowledge of this subject. In a similar fashion, design-education programs will incorporate more and more in-depth education about human cognition, psychology, decision-making, and related fields.

Applying human perception to writing

In the realm of user experience, one crucial domain where all companies can begin to implement better design is in their language interactions with customers. Writing is a form of XD. Many of the experiences that companies design involve extensive use of language in both long and extremely short forms. For example:

- Product documentation
- Text labels on UI elements such as digital buttons, links, and the like in UIs, as well as their physical equivalents

- Speech elements used for digital voice interfaces based on technologies like Alexa, Cortana, Google Assistant, and Siri
- Content marketing writing
- Marketing campaign communications

When customers read text or hear speech as part of the products and services (and related elements) that companies design, those are crucial parts of the experience.

This is already reflected in how companies write their language content. The best among them use well-established principles of information architecture as well as textual design techniques that are consistent with a basic understanding of how the brain processes language. For example:

- The best writers intuitively avoid creating what cognitive scientists call "garden path" sentences. Consider this example: "We painted the wall with cracks." Most people reading this sentence for the first time expect the word "with" to be followed by a reference to a kind of paint, so the word "cracks" seems to be an error. But the majority of people then realize that "with" is ambiguous and can also be followed by a word that refers to an attribute of the wall rather than to something applied to the wall. Experiments that track eye movements while subjects read sentences like this one show that the subjects' gazes skip backward after reading the word "cracks" to reread the sentence.
- High-level structural choices about layout and how to use and phrase headings and subheadings effectively make it easier for readers to skim content efficiently (as explained by Barbara Minto in her book *The Minto Pyramid Principle: Logic in Writing, Thinking and Problem Solving*, 2010).

New findings about human cognition will advance our understanding of what good writing is and how to effectively adapt it to reading or hearing, to the context of the experience, to the intended audience for that text or speech content, and to their needs and goals.

Many companies that design digital voice experiences, for example, are already employing linguists to learn how human conversations unfold – including turn-taking, contextual cues, ambiguity resolution, and more.

The future of experience design

The field of XD is becoming more important than ever to business success, and our growing understanding of human cognition is making it both more complex and more powerful. But as companies go deeper into applying these findings to how they design customer experiences, they will sometimes face stark choices between their own immediate, short-term financial gains and their customers' well-being. There are three important points to keep in mind about this dilemma:

- It's not a new dilemma. Since humans began engaging in trade and commerce, many individuals and businesses have profited by tricking their customers – convincing them to buy products and services that were not in their best interest. Although the tricksters' reputations often suffered as a result, others continued to do the same. Today, these practices – where companies give themselves license to design experiences that, while legal, are predatory – are sometimes called "dark patterns". They result in experiences that attract customers in the short term, thus providing short-term benefits for the company but damaging the customers' well-being in the long term. Good examples of this are smartphone apps that are deliberately designed to become addictive, therefore yielding more revenue from ad impressions. In a similar vein, many companies are using high-pressure and deceptive sales tactics.
- A deeper understanding of what makes people tick will give companies more power to intentionally help as well as to intentionally hurt their customers' well-being. And history shows that many will not resist the lure of short-term gains that can arise from deploying dark patterns. But others will seize the many opportunities that arise at the intersection between the company's best interests and its customers' best interests. They will favor long-term rather than short-term interests for the simple reason that customers' well-being and loyalty are both about the long term. Some might even strive for transparency, shedding light on the cognitive patterns they are tapping into – and thus earn customers' trust and loyalty.
- There is reason to be optimistic about the future of customer experiences because companies that guide their design choices by prioritizing their own long-term success will, by doing so, benefit customers in the long term too.

It's worth considering the position of Apple, which is known for its excellence at design and its deep understanding of what makes people tick — and also for being consistently in the upper echelons of the world's most valuable publicly traded companies. It is the record holder by this measure, having reached a market capitalization of 1.1 trillion USD in November 2018, which no other company has yet exceeded at this point. As Apple CEO Tim Cook put it during an interview the year before: "I care very much about our users, and I strongly believe that if they're happy over the long term, other things will take care of [themselves]… But we don't really look at the stock, you know? Because for us, it's about the long term. And so we're very much focused on long-term shareholder value, but not the short-term kind of stuff."

Companies that invest in mastering the new understanding of how the mind works and what makes people tick, and that apply this understanding to designing experiences that benefit the maximum number of customers over the long term, will themselves reap the rewards in the form of sustained growth and success.

ABOUT THE AUTHOR

David Truog is a Research Director at Forrester Research, Inc., where he leads a team of analysts who research and advise clients about experience design (XD), primarily in two domains: how to understand the needs and goals of users, and how to design experiences that let them meet those needs and goals in a manner that is easy, effective, and emotionally resonant – whether the medium is physical, digital, or a blend of both.

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Digital change – it's here to stay

Digital transformation is calling organizations to rethink not only their products and services but also internal processes and company structures. Is it time to take some daring risks?

Text by Charles Richard

Image: © alphaspirit/123rf.com

It has been more than a decade since we witnessed the global expansion of smartphones, tablets, social networking, cloud and mobile computing, Artificial Intelligence, Big Data, and the Internet of Things. Today, the digital space is expanding at a frightening pace. Enterprises are striving hard to sustain the momentum in the ever-changing markets shaped by technology-driven change. But it is not only our products and services that need to be adapted to the constantly changing expectations. Our workspaces are also calling for digital transformation.

> *"The impact of digital on an organization is top to bottom – from strategy to customer engagement, operations, risk, and tax. Digital should, therefore, be everyone's job."*
>
> Laurence Buchanan, Partner at Ernst & Young LLP

Only a few decades ago, reaching new customers was a matter of creating a compelling message that could move your product from rags to riches. Technology has since moved alarmingly fast – today, consumer technology can reach a critical mass of 50 million users in fewer than 35 days. Digital technology is starting to reach even the most remote places on our planet. You might experience its impact as slow and steady; however, the pressure is mounting. To survive in our digital universe, companies today are required to have a firm grasp on how to utilize the latest technological trends.

Below are a few suggestions for how businesses can make optimal use of digital developments and improve their effectiveness.

1. Own digital

Consider hiring a chief digital officer, or set up a dedicated digital business unit. A good digital expert or team should sooner or later provide enough value to pay for itself. Remember that implementation is key here. You might have spent an enormous amount of time doing research and structuring your content, but all of that counts for nothing if you don't know how to implement it right. The term digitalization is no longer a buzzword; it has become a norm in every single part of the business – be it customer experience, business model, technology in the workforce, risk management, cyber security, data privacy, and so on. Make sure to implement it right across your business.

2. Start and end with the customer

To win early support, companies must keep their end customers in mind right from the beginning. And, customers don't come to you for your technical know-how, they come to you looking for solutions. So, provide solutions! Try creating the smart and connected products that will help your customers complete the job they are trying to achieve in a faster, cheaper, and better manner.

3. Executive vision and leadership

Lead from the front! Management needs to be exceptionally digitally savvy and capable of using the right combination of carrots and sticks if they wish to move the organization through the challenges of the digital journey. Keep in mind that to provide a good level of digital leadership, executives don't need to be expert technologists. Start with the occasional social media post. They have become very meaningful in improving operations, revenue, customer experience, and competitive position.

4. Encourage new cultural norms

Pursue a digital transformation strategy with a broad view on innovation. Seems risky? Think of it this way: In the long run, it might turn out to be riskier to not proactively disrupt and transform your business. The ongoing digital transformation demands innovation and risk-taking. Organizations are encouraged to look beyond the usual paradigms of their traditional markets and competitors, perhaps even borrowing business models from other industries. Of course, this might mean entering unknown terrain, but that shouldn't stop you from trying. Start with small experiments and gather feedback from stakeholders. This can then help you to plan the next small experiment until you discover the most effective outcome.

5. Keep pursuing new technology

With the implementation of new technology, businesses are able to evaluate their current stack against the goals of the digital transformation to find functionality or data gaps. Also, notice different behaviors for digital transformation, such as:

- Data-driven decision-making
- Increased ROI of transformation activities
- Increased productivity
- More competitive products and services
- Greater customer satisfaction
- Increased revenue

It all starts with engaged and digitally savvy executives who drive the overall strategy including collaboration, faster innovation and time-to-market, new revenue opportunities, and, most importantly, serving customers in a unique and compelling manner.

Final word

No matter how challenging or costly digital transformation is, businesses must give it a shot by opening themselves to collaborate, to innovate and market faster, to generate new revenue opportunities, and to serve end customers in unique and appealing ways.

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Charles Richard has eight years of experience as a business analyst with TatvaSoft. In this role, he analyzes data and information to generate increased business value. Prior to joining TatvaSoft, he worked as a programmer. He holds an MBA and a Computer Science degree.

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What happens in our mind when we read

How does our mind process technical instructions? A look into the psychology behind the reading process may assist us in producing more efficient technical content.

Text by Masayasu Watai

Image: © Freddy Cahyono/123rf.com

While reading documents and comprehending their contents, we are forming knowledge. Although Information and Communications Technology (ICT) is evolving, it is safe to say that, even in the future, people will continue to acquire knowledge in their brains while reading documents.

Reading documents, comprehending contents, and forming knowledge are all internal activities that are implemented in the minds of people (as readers). Unfortunately, we cannot observe these internal activities. Even just recognizing them within our own minds is difficult. Most of the time, even the most proficient internal activities are automatically implemented within the unconscious mind.

While there are no scientific methods that allow us to observe mental activities, psychology has been able to shed some light on those mechanisms. In educational psychology, research is being conducted that is focused on cognition, memory, and comprehension. In Japan, these findings are provided to schools and implemented to enhance education.

In this article, I will introduce the psychological theories and research findings regarding reading and comprehending document content. In particular, I will focus on the internal activities of the readers – after all, our readers play the leading role in technical communication. Creating an awareness for how our readers read and comprehend our documentation can help us to produce better content and become better technical communicators.

Reading comprehension process models

Based on the information processing model of traditional psychological theory, the internal processes that form the reading and comprehension of sentences are configured via the interactions of bottom-up and top-down processing. Final comprehension is formed by integrating the two parts of the comprehension generated by the bidirectional processing. Figure 1 illuminates this process.

In bottom-up processing, the mental activities line up in the following pattern:

1. Visual processing of the characters and words printed in the document
2. Semantic interpretation of the sentences and words
3. Comprehension of the contents in each paragraph
4. Formation of the final comprehension of the entire document
5. Storage of information in the memory

In top-down processing, on the other hand, the activities are implemented in parallel:

- The utilization of existing knowledge (available knowledge that is already stored in the memory) that relates to the content being read
- Anticipation via stereotyped knowledge such as schemas and scripts
- The utilization of existing knowledge relating to sentential structures

So, rather than "stacking up" the interpretations of words, phrases, and sentences, the existing knowledge about the written content is retrieved and applied accordingly. With this type of processing, we form comprehension right at the time of reading, allowing us to predict subsequent content. Bottom-up processing can be viewed as a process, where comprehension starts with recognizing words and finishes with fully understanding the entire document. It is an accurate and appropriate method. However, it comes with great psychological burdens on readers. Top-down processing, on the other hand, prioritizes assumptions and predictions, which are formed by applying existing knowledge and forms comprehension from there. This process is more natural for readers and involves strong mental activities. In general, documents that encourage top-down processing tend to be evaluated as "readable and comprehensible".

The situational model

A prominent psychological theory that refers to comprehension processes is the "situational model" (Kintsch, 1994). It integrates bottom-up and top-down processing, and proposes both processes to achieve optimal comprehension. Kintsch describes the first process as "learning how to read sentences". In this process, similar to the aforementioned bottom-up processing, sentences are correctly interpreted, and sentence summaries (called text-based) are formed. This process also includes acquiring the skills required to interpret sentences and create summaries. Kintsch's second process is "learning from the text". Here, mental models are formed. These models provide the reader with a deeper knowledge,

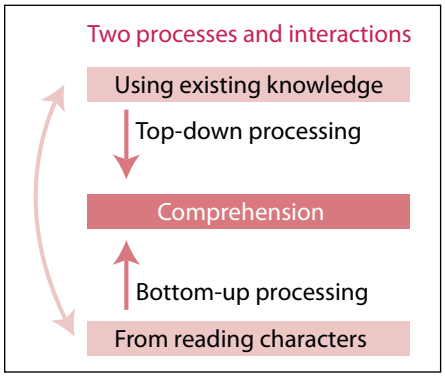

Figure 1: Overview of the traditional process model

which he can then explain to others, apply to new problems, and eventually use to solve problems. However, in order for these mental models to be formed, two processes need to be carried out that are formed via "learning how to read sentences": The first is to apply the knowledge that the reader has retained and to add specific information to the text-based learning, so that a more sophisticated comprehension is formed. The second process organizes and integrates the comprehended contents into the reader's understanding.

These mental models have been converted into applicable knowledge through the process of comprehending by reading documents. Guiding and supporting these mental activities to help our readers form knowledge is our task as technical communicators.

Comprehension strategies for explanatory text

Explanatory text is defined as "sentences that attempt to accurately and comprehensibly convey knowledge and information". Based upon this definition, the sentences that are written in school textbooks can all be viewed as explanatory. When reading explanatory sentences, only experienced adults can automatically implement the two processes of the aforementioned situational models. In school education, young pupils develop into excellent readers in all subject classes. In other words, the aim is to foster the abilities and skills for implementing the two processes; thus, they are being taught and conveyed explicitly as well as implicitly.

In Japan's educational psychology, research is being conducted with the aim of acquiring strategies for reading explanatory sentences that will

be helpful for school education, young pupils and knowledge formation. One of these studies, by Inuzuka (2002), conducted investigative research in order to systematize explanatory text reading strategies.

As the subjects in this study were university students, the research data was gathered via questionnaires. Forty-three reading strategy actions (e.g. underline important passages, think of summaries for each paragraph, etc.) were presented in the questionnaire. The students were asked to which extent they implemented each strategy when reading the explanatory sentences (five levels from "I do not use at all" up to "I definitely use").

As a result of the approximately 400 responses, 37 types of reading strategies (six strategies were excluded) were identified, which could be classified into seven main strategy categories. These seven categories were "semantic clarification", "controls", "grasping of key points", "remembrance", "monitoring", "structural attention", and "utilization of existing knowledge".

Further statistical analysis was conducted to clarify the relationship between the categories, and as a result the seven categories were subdivided in such a way that the three types of strategies (partial comprehension strategies, content learning strategies, and comprehension deepening strategies) could be allocated respectively (see Figure 2).

Inuzuka also conducted a survey to validate the strategic use of developmental changes pertaining to the reading strategy categories and category structures. The participants in this survey were junior high school, senior high school and university students. Having read the explanatory sentences for five minutes, the students responded to a questionnaire that included the same reading strategies as the former survey.

The analysis of the response data also confirmed the validity pertaining to the categories. Furthermore, it highlighted the specific strategic uses of the different academic age groups. Thus, it became evident that the "structural attention" and "utilization of existing knowledge" strategies that belong to "comprehension deepening strategies" are used more frequently by university students than by junior high school students. However, the study also revealed that "semantic clarification" and "controls", which are defined in the "partial comprehension strategies", were used frequently and to a similar extent by all students, regardless of their academic year.

These findings can be interpreted in relation to the situational models. The "partial comprehension strategies" were implemented in equal measure regardless of the academic year. The "comprehension deepening strategies", on the other hand, were used more frequently by university students.

We can derive from these studies that TC documents such as manuals should first be embedded in devices that promote and reinforce the usage of basic strategies. In the future, however, we might see the development of devices that also support the use of the comprehension deepening strategies.

Promoting comprehension deepening

The ultimate goal of reading is that the reader attains a level of comprehension where he can comfortably explain the content to others. Thus, accuracy of the information plays a key role in the comprehension deepening strategies.

Japan's educational psychology focuses a lot on activities that help students to comprehend the content they learn in their classes. Reconfirming facilitates the self-monitoring of comprehension, which can enhance the accuracy of the knowledge gained. Through experimental research, Kobayashi (2013) demonstrated how knowledge accuracy is increased when learners re-explain the scientific knowledge obtained during their classes. This research involved university students, who were tested on explaining the theme of atmospheric pressure. Classes were conducted using explanatory sentences that included graphic illustrations of gas molecular models. After class, the university students performed one of the two following activities: In the explanatory group, the contents were re-explained. In the transcription group, the teacher's explanations were copied.

The students were tested three times to measure the degree of comprehension: before the class, immediately following the class and the activities, and one week later. The objective of the test was to find out which method attained the best knowledge accuracy.

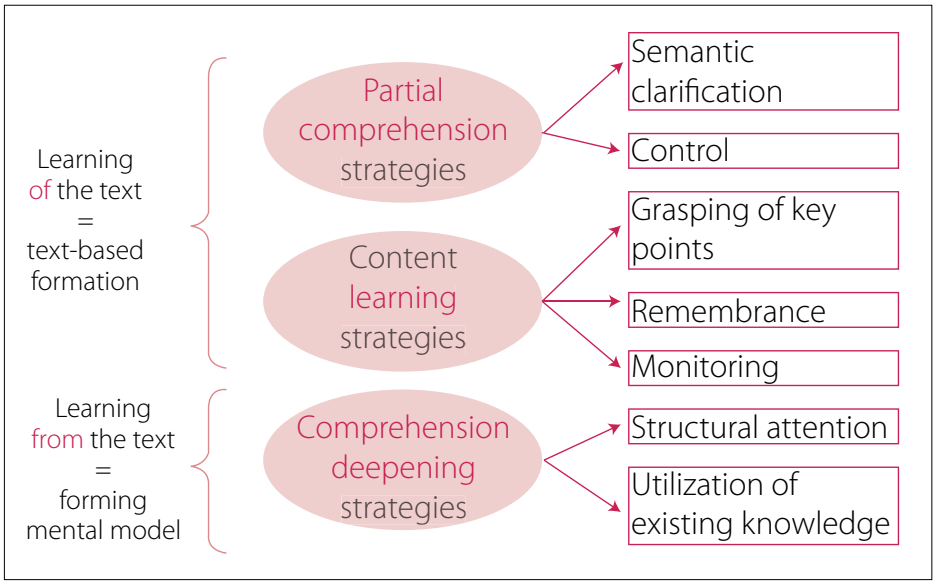

Figure 2: Situational model and three strategies

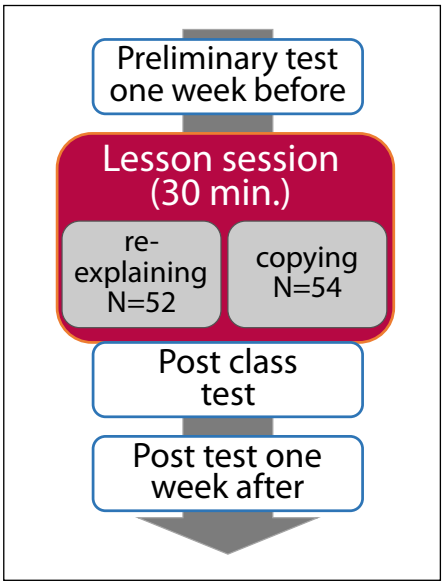

Figure 3: Overall procedures (Kobayashi, 2013)

The results revealed that on the two tests following the classes, the explanatory group of students achieved more correct answers. The results are very simple, but they demonstrate that the knowledge that was formed from the teacher's explanations and the reading of explanatory sentences improved knowledge accuracy via the subsequent self-explanations. Technical communication would also benefit from "mechanisms" that provide readers with re-explanations and room for self-explaining. Therefore, we need to prepare mechanisms that improve comprehension and knowledge accuracy, and thus make life easier for our readers.

Conclusion

In psychology, theories are generally based upon scientifically compiled data. Therefore, in this article, I have included the theoretical perspectives as well as the findings of empirical research.

What I would like to emphasize the most is that comprehension is a creative activity that adapts to situations. Comprehending documents and forming knowledge both greatly involve the readers' knowledge and situations, and these are internal activities.

More accurate and more applicable comprehension and knowledge can be created via accomplished internal activities. TC technologies can help us to appropriately guide and support these internal activities.

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Localization engineering: Bridging language and technology

To succeed on the global market, companies need to make their content available across a multitude of digital platforms. Localization solutions promise to do the job, but how do we choose the best solution?

Text by Jen Horner

Image: rawpixel/123rf.com

Localization engineering bridges language and technology by making content available for translation and localization across digital platforms. Many localization solutions are available for fully or partly automating this process for mobile- and web-based applications and websites. If you understand the goals and processes of localization engineering, you can make a more informed choice for localizing your own digital product. Do you choose a subscription-based localization solution with the expectation of ongoing maintenance? Or do you make a one-time investment in hands-on engineering up front, then pay for updates on an ad hoc basis? This article explains what localization engineering is, what distinguishes the two approaches, and how to choose a method for localization engineering for software and websites.

Hands-on localization engineering solutions

The cost and efficiency of a hands-on solution depends on how difficult it is to distinguish the translatable content from the coding and/or formatting. Essentially, hands-on localization engineering isolates the source content for translation and provides it to linguists in a user-friendly format, while protecting the code from corruption. Processes such as "pseudo-translation" are used to ensure that all the content has been secured and all the code and formatting has been flagged and excluded. Once the translation is complete, the application or website is reassembled and delivered to the client.

Most document translation projects require hardly any preparation because their formatting is common, standardized, and easily recognized. For example, translation management tools are fully compatible with Word documents, so no "localization engineering" is required to "find" the text. On the other hand, if you are looking to translate custom-built software in an unusual file format, quite a bit of extra effort can be required to sort out the content.

Even commonly used file formats such as .json, .xml and .po can pose issues for industry standard translation tools. Translatable content can be missed, and tags can be corrupted in such a way that scripts and programs crash or do not run correctly after the application or website is re-assembled and delivered to the client.

What are localization management solutions?

If you have researched translation for multilingual websites and mobile apps, you've seen a wide range of solutions for translating and updating multilingual digital media. These are packaged as translation "platforms" or "proxies" or, more recently, "localization management solutions." Some are developed by startups focusing specifically on websites and mobile apps, while others are proprietary tools that have been developed by language service providers. In this article, we will refer to these as "automated solutions."

In general, automated solutions establish a cloud-based framework to translate a website or app and, in some cases, for continuing translation updates on an ongoing basis. After the initial translation project, the client can use the interface to make updates, which trigger micro-translation projects for translators to fulfill almost in real time. Translators log in directly to the tool to translate the client's changes. The leading platforms can handle an impressive array of file formats, even converting them on the fly. Many also provide the translators with an interface that "mirrors" the look of the source application or website. This helps the translators see the content in context and compensate for text expansion or contraction during translation (some languages use more characters than others, which impacts the "look" of the project).

When an automated solution claims that it provides a seamless alternative to what they characterize as tedious "manual" processes, be skeptical. Translation project managers are already skilled in managing digital content, and industry-standard localization project management is NOT limited to cutting and pasting content to and from Excel worksheets. The translation industry has embraced content management technologies on pace with the field of technical communication in general. In fact, automated platforms offer many of the functionalities of translation tools that have been in use since the 1990s. Although we use the term "hands-on" processes to distinguish them from automated solutions, they are still a far cry from "manual."

What tools are already in use?

Like professional technical writers, professional translators use tools for structuring content, ensuring consistency of style and terminology, and performing quality assurance. Market leaders like MemoQ and SDL Studio (and a host of competitors) have been developing and refining their products for decades. Increasingly sophisticated CAT (computer aided translation) tools are available as both desktop applications and cloud-based collaborative platforms. Competition between brands is intense, but a certain amount of compatibility has developed between them. The industry standard XLIFF file (XML Localization Interchange File Format) allows for translation files to be shared between different tools, with only occasional issues caused by variations in implementation. Nowadays, being able to use these tools has become necessary for a successful translation career. Practically every reputable freelance technical translator and every professional language service partner or agency has expertise with one or more CAT tools.

CAT tools break content down into segments and present them in a two-column source-target interface. The tools provide termbase management, controlled authoring, style guidance, and QA functionality. Translation memories (TMs) make pre-translated segments available for re-use across media platforms and over a lifetime of updates. Automated solutions have adopted these capabilities as well, albeit with varying levels of quality and degrees of success.

From the translator's point of view, years of subject matter expertise is codified in their own personal termbases and CAT tool customizations, in addition to investments in training time and licensing fees. Translators prefer to use their own tools (or combination of tools), and in-demand translators can be choosy in declining projects that require them to learn new tools. When quality is paramount (and it usually is), businesses should avoid automated solutions that very few translators are willing or able to use.

Why is localization engineering necessary?

In a sense, the purpose of CAT tools has always been "automated localization engineering" for digital content. Most file formats have become so commonplace that we hardly even consider them "digital" anymore. Twenty years ago, translation looked very different than it does today. Today, a translator can import a Word document or an InDesign file into a CAT tool, view the text without the distraction of markup/tags, translate it, and export a target document with the formatting intact. SDL Studio, for example, currently supports 70 different file types.

For mobile apps, websites, technical drawings, and elearning modules, separating content from code is rarely as simple. Putting the application or module back together again after translation can also pose challenges, especially when multiple languages are involved. When code is mistaken for content and vice versa, problems occur. Recoding can be required to create a usable deliverable.

As digital technologies multiply, technical translators face these problems:

1. CAT tools are compatible with many file formats. However, they are not compatible with ALL file formats.
2. Even if the file formats are compatible, the export and import functions for the client's authoring platforms will vary in quality.
3. Authoring standards for the source content itself can also vary in quality. Custom coding, shortcuts, and workarounds can all interfere with the CAT tool's ability to read and manage the content.

When choosing a localization strategy, a client should not assume that "automating" the process is going to be more cost-effective. Instead, they should ask these questions:

1. How localization-friendly is the website or app?
2. What is the expected frequency of changes and updates?
3. What in-house resources can I devote to localization engineering?

Regardless of whether you will use automated or hands-on solutions, the best way to reduce the costs of localization engineering is to follow best practices for internationalization from the start.

Internationalization best practices

What is the first step toward localization-friendly content for apps and websites? Protect the code. Keeping the content separate from the code makes it easier to isolate the content for translation.

- Don't hard-code dates, times, measurements, or currencies.
- Don't concatenate strings to form sentences. Remember that grammar and word order vary across languages.
- Don't embed text in graphics.
- Support different character sets by using Unicode.
- If certain features won't be used internationally, make them easily disabled options.
- Store strings in resource files.

If an app or website is not already internationalized, recoding will be necessary to accommodate the needs of a global audience. Some automated solutions promise to take the internationalization step out of the equation by creating a proxy site or replica to serve as the source for the localized sites.

Automated solutions: upsides and downsides

When an app or website is being localized, automated and hands-on solutions are two different methods for doing the same type of work: isolating content to facilitate translation while protecting the code.

As we discussed above, there are lots of variables that impact how much time needs to be spent making sure all the content can be "found" and translated. On one hand, a client may prefer to involve his developer(s) in the process, taking on some of the tasks in partnership with a translation provider. For other clients, the value of the developers' time may be greater than the savings from hands-on localization engineering. Automating the process may engage the development team to a lesser extent than a hands-on solution will.

Costs

The costs of automated solutions can be an important factor. Different localization platforms offer different fee structures. Some website translation platforms require a monthly or yearly fee. This will vary, depending on the number of languages hosted, the site traffic, the word count, additional services such as SEO, and the frequency of changes and updates. In exchange, the burden on your development team will be reduced, particularly if you expect a lot of updates.

If you leverage a language service partner's hands-on engineering, you pay once for the initial internationalization and localization engineering. Certain tasks can be assigned to your development resources to balance the workload and decrease the fee. Future updates occur on an ad hoc basis.

It is not at all unusual for a client to use an automated solution in conjunction with their regular language service partner or translation team. For example, a client may decide to use an automated platform to manage the localization engineering, while drawing on their usual team of subject matter experts to do the translations.

Either way, the translation of the content itself is generally billed separately. The price will be determined by:

1. The word count or volume.
2. The linguistic skill and subject matter expertise of the translators, if human translation is used.
3. The source-target language pairs, if machine translation is used. Machine translation generally works better for translating English into European languages than into Asian languages.

How can localization engineering methods impact quality?

One of the upsides of an automated solution is reduced demand on your own development team. One of the downsides of an automated solution is a potential narrowing of the field with respect to translation talent. As we mentioned earlier, professional translators prefer to use their own tools rather than invest time in learning a new one. Some leading automated solutions have cultivated networks of translators who are expert users of the tool. More recently developed options can't always make that guarantee. Others rely on crowd-

sourcing, which can be fine for certain things, but completely inappropriate for any translation that requires specialized knowledge of the subject matter.

A second downside to automated solutions is that their embedded termbase, translation memories, and QA tools generally cannot match the quality and reliability of the standard CAT tools used by professional translators. As we mentioned earlier, the purpose of a translation memory is to ensure consistency across all media (mobile app, website, documentation, sales materials). If an automated solution can give you access to the translation memory in an XLIFF format, this can help. But if the solution specializes in only apps or only websites, you will still need to translate your other materials. Language service partners who provide translation for all types of media may be in a better position to make sure the content of the website and app are consistent with the rest of your publications.

How do I decide?

Whether or not we recommend an automated solution depends on the estimated frequency of your updates and the complexity of the authoring process. These, in turn, correlate with your plans for using your multilingual website and mobile app.

Is your website relatively static?

If you distribute your products exclusively through a network of foreign distributors or maintain sales offices overseas, you may not need frequent updates. In this case, you might use your localized website primarily as a means for

- **Reputation management.** A translated website demonstrates that a brand is committed to serving a region. It also builds authority with the search engines used by customers in that region.
- **Access to local sales channels.** Many multinationals use translated websites to provide contact information for local offices or distributors.
- **Meeting legal requirements.** Regulators may require you to make certain information available to the public on your corporate website (for example, the European Union Regulation on Medical Devices specifically refers to websites as resources for public information).

If you expect relatively few updates, hands-on localization engineering could be performed without the use of an automated solution. The scope of work will depend on the site architecture and content management system (WordPress, Drupal, or a custom solution) that you are using, and whether you want your development team to take on some of the tasks.

Do you use your website for advertising and content marketing? In this case, your localized site primarily serves as a gateway for:

- **Lead generation.** A translated landing page attracts interested prospects and provides opportunities to engage them in your sales funnel.
- **Establishing search authority.** Even though your flagship website is available around the world to anyone specifically seeking it out, if it's not optimized for search engines outside of the U.S. (including google.fr and so forth), it won't be served to searchers.
- **Content marketing.** Your blog and thought leadership content are important assets for your flagship site and can serve the same purpose internationally.
- **Light customer support.** Depending on the subject domain and the language, FAQs or machine translation of chat interactions can suffice for answering questions from your customers.

For this type of localized website, updates may be frequent, but they are also predictable. If you've chosen a hands-on solution, the same localization engineering workflow and team from the initial translation project can remain available. However, if you expect the size and scope of your digital property to grow significantly within the next few years, an ongoing contract with a localization platform or proxy solution may be more efficient in the long run.

Do you provide e-commerce and SaaS?

If you anticipate frequent changes to your website and applications, we would recommend a platform or proxy service. The platform communicates content changes directly from your source to the translation team.

- **Dynamic e-commerce.** If you are selling products through your site, and you expect a lot of content changes over time, the platform allows translators to be "on call" to translate small "chunks" as needed.
- **Lots of user-generated content.** If your customer support strategy includes maintaining an online knowledge base (as for business software), or you invite reviews and other commentary that you want translated, a platform will be better able to accommodate an unpredictable, time-sensitive workload. As with customer support, machine translation might be a suitable option for this type of user-generated content.
- If localization will be included as part of an Agile software development process, the tools and workflows of automated solutions will help tremendously.

If you expect frequent changes, an automated solution would make the ongoing maintenance of the website more cost-effective. However, an important question you'll need to consider when selecting one is how much the content will vary across regional sites (e.g., will you highlight certain products in certain markets?) and whether the platform is flexible enough to handle differences across localized websites.

As global markets mature, options will continue to multiply. Your localization management tactics should be viewed in the context of your global business strategy. Choosing the best fit for your team requires research, inquiry, and flexibility.

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Changing lives with language in Mozambique

When providing translation support in a humanitarian crisis, language can protect and change lives.

Text by Christine Fricke

On March 14 and 15, 2019, Cyclone Idai made landfall in Mozambique, Malawi, and Zimbabwe. The storm affected the lives of millions of people, leaving destruction and flooding in its wake. On April 25, 2019, a second cyclone, Cyclone Kenneth, struck the north of Mozambique, further impacting a country already struggling to recover from a disaster. Much help was needed, and the humanitarian world responded with aid, shelter, and food. But people had another important need: communication.

They needed information about their rights, where to seek and use humanitarian services, and how to stay safe. But they also needed to be able to tell responders what they needed. It's not enough to hand out information without asking questions. Relief and recovery achieve best results when everyone can participate in the conversation. But this conversation needs to happen in the right language.

That's where my organization, Translators without Borders (TWB), comes in. In just two months, we activated a community of translators, worked with international humanitarian organizations, conducted a language needs assessment, and developed a glossary for humanitarian responders in four local languages, plus English and Portuguese.

We knew that language would be critical to make sure everyone affected by the cyclones had what they needed to recover and thrive. During my time responding to the crisis, I saw what can be accomplished when language professionals and humanitarian responders come together to use words, not only to communicate, but to change lives.

Remote response to a complex linguistic landscape

When Cyclone Idai struck, we jumped into action. Our priority was to work with existing language sources and data to develop a "crisis language map" for the affected part of Mozambique.

The map showed humanitarian organizations which languages are spoken in different areas. With this information, they could begin planning their programs and response plans – in the right language.

In a country with over 40 mother tongues, it was our job to figure out which languages made the most sense for humanitarian communicators to use. But the sheer number of languages was not the only problem we had to face. We also had to deal with the fact that Portuguese, the lingua franca in Mozambique, is not widely understood within the country. In addition, the literacy rate is also quite low, particularly among women, so we knew that audio communication would be important and helpful.

Armed with this information, we requested support from translator communities in the languages we identified as the most important: Ndau, Nyanja, Sena, and Mozambican Portuguese in Mozambique, and Shona for Zimbabwe. We were very happy that the community of linguists responded to our call.

Partnering with organizations and the community

TWB provides the connection between these translators and international humanitarian response organizations. Following Cyclone Idai, we worked with organizations such as the International Federation of Red Cross and Red Crescent Societies, Save the Children, and the World Health Organization.

Our translators and project managers worked across time zones to respond quickly to the wide-ranging needs of these organizations. When a sudden-onset crisis hits, it can be a struggle to prioritize translations, as the needs in the response are always shifting. Information about how to access basic needs, e.g. clean water, is paramount. But people also needed information about how to stay safe from threats such as fire or cholera. And finally, these organizations needed to train local staff in their own language and share policies and expectations to prevent the exploitation of vulnerable people.

Some of our translators were locals from the affected area, who worked through power outages, harsh weather, and damaged technology to deliver critical information. One translator,

Daniel, even declared: "I am writing to express my interest in working with Translators without Borders, especially in this moment of pain and mourning for the people of Mozambique… I live in the central region of Mozambique in the affected area, I live the drama created by Cyclone Idai day by day."

Learning about languages on site

One of the incredible powers of translation is that a lot of support can happen from desks around the world. However, we knew that we needed to be in the country to identify all those languages that people affected by Cyclone Idai understood and preferred.

Thus, in April 2019, I flew to Mozambique to conduct a language assessment. I met with affected people and conducted surveys in four temporary relocation sites in Beira, a major city in central Mozambique.

Through these discussions, we were able to better understand the language needs in the affected area. We learned that 65 percent of women do not understand written messages in any language. And, we learned that 41 percent do not understand written Portuguese, the main language that humanitarian responders were using.

We also learned that 33 percent of people we surveyed didn't have or weren't sure they had enough information about humanitarian services. Clearly, there was still work to be done. We therefore distributed our findings to key humanitarian leaders. We made recommendations such as to "prioritize audio messaging in local languages," and "to urgently set up confidential and language-appropriate feedback mechanisms." Recommendations like these not only help humanitarian groups to distribute much-needed information but also to incorporate suggestions and ideas from the very people who are trying to cope with inconceivable conditions.

Our community of translators and humanitarian partners undoubtedly changed lives with the help of translated information. However, the word still needs to be spread that communication – just like food and shelter – is as much a right as it is a need. In fact, it is communication that ensures that people can access these basic needs.

As one woman in Beira, Mozambique commented: "In the tent there is someone who does not understand Portuguese. When she was supposed to receive food, she did not understand and I had to translate for her." This person was lucky that she had a helpful friend. But we must continue to work towards including everyone in the conversation.

Image 1: A scene from Inhamizua, Mozambique, following Cyclone Idai. Credit: TWB

Translators without Borders (TWB) is a nonprofit that provides language support to humanitarian and international development organizations around the world.

In 2018, TWB translated 22 million words in 277 language pairs, helping countless people access critical information in a language they can understand. TWB also responded on the ground to humanitarian crises in Bangladesh and northeast Nigeria, developing innovative glossaries, training interpreters, and mapping language needs.

TWB relies on the support of donors, sponsors, and volunteer translators to achieve its mission: a world where knowledge knows no language barriers. If you'd like to use your skills to help people access information in their own language, apply as a volunteer translator at **kato.translatorswb.org/signup.html.** Or make a donation at **translatorswithoutborders.org/donate/.**

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Image 2: A health center in Picoco refugee camp, Mozambique. Credit: TWB

The Memphis innovation model:

Building a blockchain community

Creating an innovative environment fostering growth and a strong economy is the aim of any metropolis. By focusing on blockchain technology – both in their educational institutions and in the business sector – Memphis, Tennessee has redefined itself as an innovation hub.

Text by Cody Behles

Image: © FedEx Institute of Technology

When thinking of cities associated with technology innovation, your mind might jump to places such as San Francisco or Boston. These "idea capitals" are naturally well-situated to take on the role of innovation leaders with companies such as Google, Facebook and Boston Dynamics sustaining the image in our minds that everything is possible in these places. While the major tech players have become the defining feature of the innovation landscape in these markets, it was the concentration of research universities that initially helped to attract and retain top talent in these cities. In fact, if you look at any city that lays claim to a leadership role in the innovation landscape – Seattle, Chicago, Atlanta, London, Toronto – you will find a landscape that includes multiple research institutions working in close geographic proximity.

Simplifying the formula for success to "more research universities equals more technology innovation" doesn't do complete justice to why certain cities succeed as capitals of innovation while others flounder, but it is certainly a key contributing factor. Every city aims to take a leadership role and to be seen as a hub for innovation, but the reality is that resources are scarce, talent is even scarcer, and building a reputation is an uphill battle. Midsize to large cities around the world want to be relevant nodes in the innovation network but are disadvantaged compared to their larger and more established urban counterparts.

Memphis – an innovation hub on the rise

With a population of approximately 650,000 within the city limits and 1.2 million in the wider surrounding area, Memphis, TN, is an example of a large city that few today would consider to be in the same class as the innovation hubs mentioned above. The city's research landscape is defined by two principal institutions: the state medical school, UTHSC, and for all other disciplines, the University of Memphis. A collection of smaller liberal arts colleges (Rhodes, Christian Brothers University) round out the higher education options. Though every midsize city has its own unique mix, the distinguishing role of research institutions in the innovation landscape is a common feature of all urban centers. For a city of its size, Memphis has relatively few high-impact research institutions.

Given the role of large cities as powerhouses of innovation and the competition among other cities for a seat at that table, how does an individual city distinguish itself? The answer lies in the ability of each city to play to its strengths and for the universities in those cities to foster innovation through public-private partnerships. These partnerships can solve big challenges but, more importantly, they contribute to the transformation of the innovation landscape, so that others begin to see your innovation climate as strategically differentiated on a national level. We will examine how Memphis has done this by looking at the work of the University of Memphis and the FedEx Institute of Technology in the space around blockchain – one of several emerging technologies. From this example, we will provide practical guidelines for urban centers to cultivate their innovation reputations and help grow their competitive advantage in cultivating an innovation ecosystem.

The FedEx Institute of Technology model

The FedEx Institute of Technology at the University of Memphis was founded in 2003 to foster technology innovation and entrepreneurship across the midsouth region. In 2015, the FedEx Institute of Technology was reorganized to focus exclusively on emerging technologies innovation research. Since the Institute's founding, Memphis had grown substantial entrepreneurship resources, but the relatively low level of competition in the research landscape meant that the University of Memphis was sorely lacking the resources to turn research into innovations that translated clearly to and resonated with the private sector. The FedEx Institute solved this by adopting a research innovation cluster model that brought together research leaders from across our campus to think deeply about big trends in emerging technologies that resonated with industries in our area: additive manufacturing, biologistics, unmanned and autonomous systems, agriculture and food science technologies, smart cities, and others. Each of these clusters was informed by trends that we recognized would impact our partners and our city in some way, and by having a research community that focused on the topics early, we could play a crucial role in cultivating the direction of the conversation within our city as well as in a national context.

This model relied on the faculty to help cultivate community by leading their peers in exploring the trends. By allowing the faculty to lead, the institute was also able to focus on identifying rising trends in technology that would impact the businesses and industries that comprise the largest industries in our metro area: logistics, medical devices, finance, etc. Blockchain was one of the first technologies that we began to seriously consider after reorganizing the institute because of the impact of this technology on several different industries in our area. It is important to the larger narrative to understand that when the FedEx Institute first started developing programs in blockchain, there was little serious research happening at any institution in our region, but there was a clear potential commercial value to the technology.

Research is the driving force of the FedEx Institute model, but the roles of workforce development and community development are equally important. It doesn't help to serve as a leader in technology innovation if the work does not translate into something that companies can learn, apply, and use to improve their businesses. Universities are by their very nature workforce development engines, but the nature of a traditional degree program is inherently slower than the pace of modern business. In order for teams across an organization to stay nimble, it is critical that research institutions provide modified corporate training opportunities designed to equip teams quickly with a particular skillset in order to assist corporations in advancing their objectives and growing their companies. The FedEx Institute does this by examining the market for our region and filling gaps in professional development. Our goal is not to compete with training shops that do their jobs well, but to serve as a bespoke rapid training solution so that corporations have what they need in order to stay competitive. While that sometimes includes programming languages such as R for stats or machine learning, it also includes things like Virtual Reality object-oriented programming and Agile testing. Whatever is needed – we will do it until someone else can do it better.

Community development is the third piece of the puzzle, and this is where we create the intersecting opportunities for technologists in our area to work together – a critical requirement for companies looking to attract top talent. By host-

ing meetups, hackathons, game jams, and tech conferences at no cost we encourage a dialogue that, when combined with the research and workforce components, solves some of the largest challenges in building Memphis as a destination for technology innovation.

Phase 1 – Blockchain as an emerging technology

The first blockchain workshop ever held in Memphis was held at the FedEx Institute of Technology in the fall of 2016. Building upon the recent eruption of the Ethereum platform and the promise of blockchain for a number of industries in our area, the Institute realized that a greater emphasis on professional development was needed in order for people to understand what the technology was, how it could be utilized, and where it was going. We partnered with a team from Dalhousie University in Nova Scotia and their company Peer Ledger to build the first blockchain workshops.

As a result of that first training, the nonprofit Blockchain901 came into existence, and several of the founders of blockchain companies based in Memphis as well as teams that would eventually comprise FedEx's leadership on the topic were in attendance. Blockchain, a transparent, distributed, ledger-based technology, is ideal for industries that handle thousands of transactions where monitoring the status is critical. Due to the distributed nature of the chain, actors in transactions can minimize the trust required by any one individual by moving transactions to the blockchain. Whether you are shipping cotton from Uzbekistan and need to ensure that no child labor was used in the process, or conducting a legal transaction between multiple parties, the distribution of trust to all parties ensures that the financial and social values placed on the transaction can be preserved from one end of the process to the other.

That first workshop led to more workshops that were focused on specific applications. The institute partnered with the Memphis Bar Association to conduct a recurring workshop for lawyers on smart contracts and their role in the legal field. We held the first blockchain hackathon EthMemphis, bringing together over twenty teams of developers from as far away as Argentina to explore specific application developments. We started making contacts and bridging connections to create dynamic engagements in blockchain. We also started to see our faculty working on topics around blockchain across campus, which culminated in the last two years with several new faculty hires who emphasize blockchain in their research.

Phase 2 – Public-private partnership speeds up

We had a great deal of momentum in the blockchain space and were starting to see companies such as FedEx taking up leadership roles at a national level in the blockchain conversation. As all of this was happening, the Institute began developing the University of Memphis's first research park. The UMRF (University of Memphis Research Foundation) Research Park, which opened in January 2019, was designed to address the end of the innovation lifecycle in the same way that the FedEx Institute addressed the beginning: The research park would help companies that had gone through incubation find a home to scale up and grow in Memphis. The tremendous logistics networks in Memphis (98 of the Fortune 100 companies have a logistics footprint here) positioned the UMRF Research Park to attract companies in that sector from across the country – but that wasn't exactly what happened.

The work we had been doing in blockchain for the last three years began to attract companies that recognized Memphis as a leader in the space. These companies saw the value of the logistics infrastructure in Memphis but were also leveraging unique perspectives on blockchain and tying different industries together in innovative ways. XYO from San Diego, DexFreight from Texas, MinuteSchool from Toronto, plus four local blockchain-based companies in Book Local, Web3Devs, and Good Shepherd Pharmacy, and Blockchain901 meant that a majority of companies in the park had a blockchain focus. As a result of this concentration, other research park companies such as IMC Corps, DayaMed, and Green Mountain Technology began exploring how to apply blockchain within their businesses.

The ripple effect from a single technology workshop that started at the FedEx Institute of Technology only three years before had grown into research, professional development, and a concentration of over ten companies in one space working on blockchain. As the partnerships and opportunities continue to grow, combined with the additional efforts in the blockchain healthcare space from organizations in the Nashville area, Tennessee is fast becoming the largest single concentration of blockchain talent in the United States.

This could not have happened without the willing partners and innovators that carried the community forward. It also isn't over yet. While we have made great strides, the coming years will provide even more possibilities for this technology, and we look forward to helping enable their success.

The Memphis model for innovation

Every city will tell you that they are unique – they aren't doing their job if they don't sell what's special. While we certainly have great companies such as FedEx to partner with, every city has corporate entities that they can point to with pride that help to define the unique character of their city. The Memphis model for innovation is one that has developed out of practical considerations and resource limitations. It relies on partners, community, and accelerating the things that the city does best. Every research landscape is unique and, leveraged correctly, it can serve to build your city's capacity as a center of innovation. Below are some distilled guidelines for how the Memphis model has worked.

City, know thyself. Innovation capitals such as San Francisco and Boston have become increasingly competitive and astronomically expensive. As these places become untenable, smaller cities with specific industry focuses will grow in popularity among startups and innovators in specific sectors. For Memphis, the logistics, medical device, agriculture, and education industries are key. For your city, it may be something else. Celebrate

Image: © FedEx Institute of Technology

Image 1: The University of Memphis is a public research institution with more than 21,000 students in over 250 areas of study.

the industries you have, look at the intersecting research interests at your universities, and explore the resources that make your city a unique investment for innovators.

No collaboration is off limits. Whether you are a company, a university, or a nonprofit, you all live in the same city. Maximizing efficiency in innovation means being open to collaborating with everyone – even your competitors. If you can't bring yourself to partner directly, go talk to a third party such as a university and find some common ground.

Technology innovation and workforce development are inseparable. No company is going to be able to adopt a new technology if your workforce isn't able to

1. understand how the technology is good for business,
2. help you scale the technology,
3. tell you when the technology isn't working and why.

Leverage your universities to create novel training approaches if you can't find exactly what you are looking for.

Invest smart and often. Your money goes further in smaller cities, but putting all your eggs in one basket is never a good idea. Look for innovators that have big ideas or novel approaches and grow with them. Encouraging students, researchers, and the technology community can sometimes pay bigger dividends than capital investment in startups and the initial investment is usually smaller. Invest in the junior faculty at your research institutions – they are the future of innovation in your city.

Find good ROI on university investments. Partnering with a university has traditionally been a largely philanthropic effort. This might be the case, but if you can find relationships that generate real and immediate ROI for both parties, then the relationship can lead to much stronger ties and benefits for both parties. Students are the best employees you will ever find.

Pass the baton: For the FedEx Institute of Technology, our best successes are the ones we can hand off. We help to cultivate good ideas and get them started, but you need to have teams ready to help carry the ball forward. Your best ideas will never succeed if no one else believes in them. The handoff may mean passing the ball to another company or organization entirely, and you have to be open to that.

It doesn't matter what technology you are considering, and it doesn't matter which city you're looking at. Every person has the capacity for innovation and every city has the capacity to grow into a destination for innovators. For Memphis, blockchain has been a great success. It won't be the last, and it may not be the biggest, but the model we have established ensures we can give every technology the best shot at success.


Image: © FedEx Institute of Technology

Image 2: The University of Memphis Research Park is home to a large number of blockchain companies.

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Cognitive biases in technical communication

We are nowhere near as rational as we might think. How we make decisions, hold conversations, and even write documentation or train Artificial Intelligence is greatly influenced by our previous knowledge and experience – which are by no means objective.

Text by Dimiter Simov

Image: © ALLVISIONN /istockphoto.com

We all make decisions every day. Technical communicators are no exception. Should I accept that job offer and join the big team in a big enterprise? Or should I join the small team in the startup business and be the one and only person responsible for documentation? Or should I freelance instead? How much should I pay for my DITA-based authoring system? Should I add more details to the description of the feature that I am explaining? Should I rewrite the procedure based on the feedback from that user, or just ignore him? The product owner and a developer have read through the documentation and told me that it is ok, so do I still need to ask users to read it as well before launch?

The answers will differ, of course, depending on various factors. When faced with these questions, we would rationally consider the different factors and base our decisions on the pros and cons. Sounds reasonable. Yet, many times this is not how we go about finding the answer. Usually our subconscious is ahead of us – it has processed the information based on what it already knows, and the decision is there. We just follow. Unfortunately, sometimes we later realize that we have made a mistake. Our subconscious brain has acted too quickly and has led us in the wrong direction.

This predisposition of our brains to decide fast based on the available information and previous experiences and err, is a known phenomenon called cognitive bias. We cannot eliminate this predisposition but understanding that cognitive biases exist can help us make correct decisions more often.

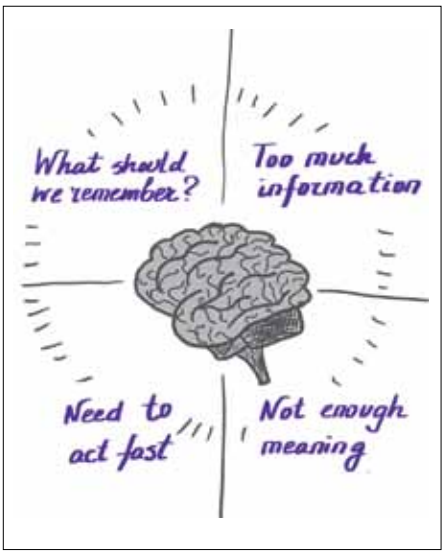

Image 1: The categories of our brain

Cognitive biases

The theory behind cognitive biases claims that they represent a limitation in objective thinking. These seemingly irrational patterns of thinking are caused by the tendency of the human brain to filter the information that it receives through personal experiences and preferences while attempting to make fast and risk-averse decisions. According to Wikipedia, "a cognitive bias is a systematic pattern of deviation from norm or rationality in judgment."

You can think of cognitive biases as shortcuts for quick decisions without wasting much energy on processing information. As a result, these shortcuts do not always lead us to correct decisions. The human brain is a very complex system that requires a lot of energy to work. It has evolved over millions of years and has helped us survive and become who we are today. During this time, it has learned to process and use information in a quick and efficient manner. Unfortunately, these ways are often inefficient and ineffective.

Cognitive science, social psychology, behavioral economics, and other sciences have been exploring and describing cognitive biases for years. As of today, the number of described cognitive biases exceeds 180 and is growing. You can find a list of cognitive biases [1] on Wikipedia.

The Cognitive Bias Cheat Sheet [2] classifies cognitive biases according to four factors:

1. There is **too much information** in the world but our senses cannot process everything, so we have found ways to filter it.
2. There is **not enough meaning** in the information we have because it is not complete, so we have found ways to fill in the gaps with things we know or assume we know.
3. The question **"What should we remember?"** is crucial because our brain is constrained by its capacity and by the speed at which it processes and stores incoming information, so we have found ways to store only the most essential. What we remember is what has made it through the filters in factor 1 and what fills in the gaps in factor 2.
4. Often, **we need to act fast** because the world will not wait. We have limited time and information to make a decision, so we have found ways to make good decisions as quickly as possible. Our survival depends on this.

Whether we realize it or not, we all share these predispositions or, in other words, we are all biased. Technical communicators are no exception.

Here are a few examples of cognitive biases and how they affect technical communicators.

Halo effect

The halo effect is the tendency of humans to create opinions about people and things based on partial information collected through initial impressions and observations. For example, when we see attractive people, we tend to think of them as being smart, happy, competent, and successful in their careers. We create our opinions based only on their appearance without any other information. The same applies to websites, products, and even documentation. If we like them at a first glance, we are more likely to think they are better and more functional. The halo is also transferable: If I think that a product is good, I will assume that the company that makes this product is good too. I am also very likely to think that other products by the same company are good.

What this means for technical communicators:

- We might be more lenient with colleagues who have an attractive appearance.
- Users might think better of our documentation when it is nicely formatted and visually appealing.
- If your documentation is good, you will be indirectly raising the opinion of users about the product and the company.

Confirmation bias

Confirmation bias is a tendency to seek and interpret information in a way that confirms our own knowledge and expectations. Let's say

we're developing a chatbot for ordering pizza. We believe that pizzas should be savory, so we will teach the bot to offer different cheeses, vegetables, and spices as ingredients – that is, the standard offer with commonly used products. Then, we take our bot to testing. Every person who uses our chatbot the way we expect them to, we will view as a successful example, and thus will deepen our belief that pizzas must be savory. As we do not believe in dessert pizzas, we will not teach the bot to offer chocolate, fruits, and sugars as ingredients. If there are people who try to order a dessert pizza, e.g. chocolate pizza, their attempt will fail. Probably, we will simply interpret their attempt as an error or view them as people who are just challenging the bot. Most likely, we will ignore them.

What this means for technical communicators:

- We are likely to ignore feedback that we do not agree with and pay more attention to feedback that confirms our beliefs.
- When reviewing the work of a colleague, we might fail to see gaps when the content matches our own expectations and knowledge.

Curse of knowledge

The curse of knowledge is our tendency to assume that everyone around us has the same knowledge as we do and thus can understand us. When we know something, we struggle to imagine that someone else does not know this. We tend to remember only the essentials and erase from our memory how we got to know a certain thing and what it was like to not know it. Take online banking, for example. Often it contains information and terms known to people in the banking and financial spheres: bankers, accountants and financiers. For non-professionals, on the other hand, it can be a challenge to differentiate between "balance" and "available balance".

What this means for technical communicators:

- Developers, product owners, and other colleagues on your team might not be perfect reviewers for your content because, as product experts, they might not notice omissions.
- We must be careful with what we omit from instructions, because what is obvious to us might not be obvious to our readers.

Bias in AI

So, we are biased, okay. But computers aren't, right? Unfortunately, we can even pass on our biases to our products and services. This is particularly important when it comes to Artificial Intelligence (AI). So, how do we transmit our biases to the AI that we build?

Machines have no conscious need to survive. When there is a shortage of memory, people add more memory. When processing speed is insufficient, people increase the CPU power. When the battery is low, people plug in the power cord. Accordingly, machines, including the ones running on Artificial Intelligence, are not subject to the limitations that we see in humans. So, machines cannot be biased. However, the people who create the machines are biased, and the machines depend on the algorithms, patterns, and data that people create and provide. Thus, people transfer their biases to AI.

Here is an example to illustrate this: In 2015, Andrej Karpathy, now director of Artificial Intelligence Development at Tesla, conducted an experiment as a student in Artificial Intelligence at Stanford. His goal was to teach the machine to recognize good selfies. Karpathy used pictures of men and women of different ages and races. To determine which selfies are good, he used the number of "likes" each selfie received on social networks. A photo that received many "likes" was considered good. [3]

For everybody with a basic knowledge of photography, the requirements for a good portrait are clear: The object is in focus, the lighting is right, the head is not cut off, and the camera is not too close to the face. The result of Karpathy's experiment, however, told a different story: According to social media users, to take a good selfie you need to be a young white woman. All pictures classified as "good" by the AI algorithm turned out to be of young white women. If someone did not meet this requirement, his or her picture was not in the category of "good selfies", even if the picture was perfect.

The data used to train the model was influenced by the preferences of the people who voted for the pictures. This is just one of many examples of how we influence the Artificial Intelligence systems that we create, how they resemble us, and how we need to be careful how we create and train them.

Unlike machines, people have ways of noticing their mistakes and can take action to fix them. A machine that is incorrectly trained cannot repair itself; human intervention is needed.

Ideally, we would not transfer our biases to machines at all. Instead of creating biased Artificial Intelligence and then correcting it, we would create unbiased AI. Unfortunately, we are not there yet, so we need methods of debiasing. Not much research has been conducted on the subject of how we pass on biases to machines and how we can avoid it or neutralize the effect. However, some guidelines are already in place. A team of researchers from the Czech Republic and Germany have examined 20 different cognitive biases and derived guidelines for neutralizing their effect when developing rules and models for machine self-learning. The full report is available online. [4]

Conclusion

Cognitive biases affect our work: how we approach tasks, design and write documentation, make videos, structure conversations, train AIs, and so on. As

a result of their influence, we often think and act irrationally, and thus miss important facts and gaps. As the effects of biases can vary from mildly negative to disastrous, it is important to know how to mitigate them.

This article only scratches the surface. Explore the field of cognitive biases and train yourself and the people you work with to be aware of and understand cognitive biases.

The halo effect is strong. It is not always easy to avoid its influence. To see its impact, try blind reviews, in which you do not know who wrote the respective content.

Regarding confirmation bias, postponing the final decision and delaying the work might help. Make sure you do not come to conclusions in a hurry, and that you have time to review and edit your work.

Set explicit guidelines for writing and reviewing in favor of and against a hypothesis. This will help to counteract the curse of knowledge as well.

Although there is no easy solution to the effect of cognitive biases in Artificial Intelligence systems, it is important to stay alert when creating such systems. We need to be aware that these biases resemble us, their developers, and are part of our vision of the world.

After all, we do not need documentation and smart machines filled with human prejudices and cognitive biases, do we?

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