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HUMANS OR AI?: **THE EDGE OF INNOVATION**

Fact Sheet

No matter where you are, who you're with, or what you're doing, you don't have to look far to appreciate human beings' ability and predilection for innovation.

From cave paintings and early agriculture to electric vehicles and virtual reality, the human history of creativity is long and rich. But with the recent advancements in generative AI, many are left wondering if humans are still the only—or even the most—creative beings in the world.

Whether GenAI can truly be creative and innovative is still up for debate, and there is no shortage of opinions on the topic. One viewpoint suggests that AI simply reworks existing concepts drawn from human-generated data it has been trained on, making creativity and innovation uniquely human attributes. It implies that GenAI cannot generate truly original ideas or lacks the capacity for transformative creativity. However, an opposing opinion proposes that creativity boils down to three basic operations: bending, blending, and breaking—all of which GenAI can indeed do.

Within both the scientific community and public discourse. there are vastly differing perspectives on whether humans are uniquely creative and innovative. Will creativity remain a defining human trait, or will GenAI become the next big innovator? By comparing human and GenAI creative abilities, we can understand how organizations can leverage both to create an efficient—and even more ethical—innovation system.

Human Creativity: Understanding the Original Innovators

Human creativity is a multifaceted phenomenon that springs from individual experiences, emotions, thoughts, knowledge, and skills that each person possesses. It is deeply rooted in human consciousness and the complex interplay of physical, cognitive, emotional, and social processes. This unique makeup lends itself to several unique human capabilities that support creativity and innovation, such as:

- **Mental imagery:** The cognitive process of mental imagery uses the same brain regions involved in visual perception. These regions are even active in people born blind, allowing them to form mental images based solely on verbal descriptions. Mental imagery plays a crucial role in artistic, scientific, and verbal creativity, and neuroscience research shows that the brain's visual system is highly leveraged by various creative tasks.
- **Mental time travel:** The default mode network (DMN), known for its role in mental imagery, also helps with creativity by allowing us to mentally time travel. This brain region becomes active when we daydream or let our minds wander, helping us effortlessly remember the past and imagine the future. This type of spontaneous cognition allows us to quiet our minds, making it easier to connect different ideas and produce creative solutions on the spot.

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- **Counterfactual thinking:** GenAI tools excel at producing content by analyzing data they were trained on, enabling them to understand existing or past situations. However, GenAI cannot imagine *what could have been*. When humans imagine different outcomes for past events, we're engaging in a mental exercise that opens up new possibilities. Humans are highly skilled in counterfactual thinking, hypothesizing "what if" scenarios. This ability is supported by unique circuitry in the brain that includes the default mode network, reward circuitry, and cognitive control areas, which work together during both spontaneous and more deliberate counterfactual thinking.

- **Empathy:** Humans have the capacity for intuition, emotion, cultural sensitivity, and the ability to infer the best solutions from past events. Consciousness affords humans the unique capacity for emotional empathy, which contributes to spontaneous innovation by sparking novel ideas or gut reactions.

These four capabilities illustrate something else unique to humans: natural creativity. Natural creativity is a byproduct of cognitive processes like daydreaming and mind-wandering, which means humans can have sudden bursts of creativity without even trying. (Think of this as that "eureka" moment.) Humans also have various—and unique—ways to express creativity, such as by creating other creative machines, sculpture or other tangible art, and group improvisation.

AI Creativity: The Rise of Generative Models

Human innovation has led to a host of GenAI tools—ChatGPT, Copilot, Claude, and Bard, to name a few. Alongside conventional text-generating AI chatbots, emerging GenAI tools like OpenAI's Sora and DALL-E have ventured into new territory by generating outputs in the form of pictures and videos. Do these capabilities mean GenAI is indeed creative?

Unlike humans, GenAI relies on explicit algorithms and datasets from which it learns rules, patterns, and structures to create content based on input or prompts. This results in a complex statistical abstraction of digital data. Its programming enables GenAI to quickly process and analyze data to identify patterns or generate ideas, making it remarkably fast and scalable—it doesn't suffer from very human issues like writer's block or mental fatigue. While the human brain is constrained by energy limitations, GenAI can work continuously without breaks.

GenAI tools excel at generating high-quality content using their training data, as well as completing repetitive, data-driven tasks and processing data much faster than humans. Some argue that GenAI's creativity is limited because it requires human prompts, operates deliberately through programming instead of experience, and lacks the capacity for inspiration. However, research suggests that AI can exhibit creativity on its own, as seen with OpenAI's GPT-3 model generating poetry, stories, and code.

As such, the debate over whether GenAI is creative or not becomes a matter of semantics. Generative AI tools can contribute to creative processes, and they can certainly generate new material through their own capabilities. Instead of focusing on whether GenAI is creative, let's explore how it operates.

Shared Capabilities and Uniquely Human Features

Both humans and GenAI share capabilities that contribute to creativity, such as making unrelated associations and imitative learning. AI can make unrelated associations because it can process large amounts of data quickly to identify latent patterns and generate new ideas. For humans, this happens through semantic memory processing, which can happen automatically or in a conscious, intentional manner. We store information about the world in our long-term memory, and then we recall, interpret, and use that distant knowledge to innovate and find solutions. Gen AI tools are also excellent at handling repetitive tasks and making decisions based on the data from which they were trained—though much faster than humans, and potentially without some of the biases we hold. These systems, in other words, "imitate" the data they analyze to learn new knowledge or skills.

Humans are skilled at imitative learning too. What sets us apart, however, is our deeper appreciation of others' intentions. When we imitate others, our brain uses a complex array of neural mechanisms like visual perception, short-term memory, social cognition, empathy, and agency. This allows us to not just copy speech or behavior but also understand the reasons behind them and their impact on the outcome. Therefore, humans can iterate, extrapolate, and build upon what they've learned in the name of creativity and innovation.

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There are other crucial human traits that generative AI lacks. GenAI, for example, relies solely on learned patterns because it does not have the innate reality of human experience. Innovation is often closely tied to lived experience and is most valuable when it solves problems. In business, novelty alone isn't enough—something innovative must enhance skills, improve efficiency, or offer utility. Without firsthand experiences of the world and empathy for the experiences of others, GenAI cannot identify or understand the impact of innovation. What's more, GenAI's lack of real-time perception and human-like understanding puts it at a creative disadvantage. Beyond business, creativity thrives on emotion and timing—factors that GenAI's lack of empathy may cause it to struggle to grasp or replicate effectively.

Challenges and Opportunities in GenAI's Creative Impact

The polarized reactions to GenAI's ability to create and innovate are reflective of the real challenges and opportunities of GenAI's presence in creative spaces. On one hand, many experts worry about the flood of content due to emerging AI models. These tools can now create large amounts of text, images, and videos, inundating the internet with GenAI-produced content, including product descriptions, blog posts, and deep-faked celebrity videos.

This influx raises real concerns about copyright, plagiarism, privacy, and disinformation. If someone using GenAI fails to do proper research, they may inadvertently share content that duplicates existing human-created work. GenAI tools have been used to spread fake human-like content online to support certain agendas, incite conflict, and create videos that use the likeness of real people in events they weren't part of. When it comes to GenAI-generated and human-produced content, we risk total erosion of trust and authenticity online.

On the other hand, human-AI creative teams have the potential to enhance each other's creative capabilities. Innovation can be approached as a collaboration between humans and GenAI tools. In some cases, humans may bring creativity, intuition, and experience to the table, helping define the big picture and set goals, making sure the effort is aligned with business objectives. AI can act as an amplifier or accelerator of innovation by providing support with data analysis, pattern identification, predicting trends, and optimizing resource allocation.

Humans might be well suited to ideate and outline concepts, whereas AI might be used to iterate en masse or automate repetitive tasks. More than likely, we will create human-AI feedback loops where the two systems can continuously learn from one another; humans will continue to be necessary to evaluate content quality, adjust parameters, refine models, and apply outcomes. This hybrid approach combines AI's computational power with human intuition.

Innovation often happens at the intersection of different fields. By bringing together different disciplines and combining human and AI efforts, new ideas can emerge. The partnership between humans and AI—often referred to as collaborative intelligence—aims to augment human capabilities, increase efficiency, and facilitate higher-value work. This symbiotic relationship leverages the strengths of both humans and machines to drive innovation.

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Key Takeaways for Organizations

- Leaders shouldn't look at creativity as an either-or debate. Rather, they should encourage professionals to use AI tools to augment their creative work. GenAI helps automate tasks so people can focus on being creative at work, which helps companies foster innovation and encourage personalized skill development.
- Be aware of the oversaturation of AI-generated content and strategize accordingly. Plan for how your team or organization is going to identify material produced by GenAI versus humans, both in what you produce but also in what you ingest. Establish and enforce high ethical standards for the utilization of GenAI in your world and work.
- Recognize the unique qualities of human creativity and invest in nurturing it. Human intelligence brings creativity, intuition, and a deep understanding of complex social and cultural contexts that are crucial for truly groundbreaking innovation. Valuable human creativity might be about creative ways to interact with or prompt AI to optimize efficient collaboration.

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