This is a submitted manuscript of the following conference paper: Bas, A & Dörfler, V 2024, 'Can AI have intuition?', Paper presented at AoM 2024: 84rd Annual Meeting of the Academy of Management, Chicago, United States, 9/08/24 - 13/08/24.

Can AI have intuition?

Alina Bas, Alina Bas Consulting, USA
alina@alinabas.com

Viktor Dörfler, University of Strathclyde Business School, UK

viktor.dorfler@strath.ac.uk

"Interpretation belongs solely to a living mind in exactly the same way that birth belongs solely to a living body. Disconnected from a mind, 'interpretation' becomes what 'birth' becomes when it does not refer to a body: a metaphor." (Roszak, 1986: 131)

Overview

We often talk about AI using an anthropomorphized language, describing AI as technology that can "understand" something, "make decisions", "hallucinate", "guess", "believe" in something, or "make sense" of an idea. Using such evocatively human language makes it easy to forget that such language is merely a metaphor rather than an accurate description of AI's capability. Anthropomorphizing AI makes it easy for us to endow AI in our mind's eye with the gift of intuition. We unpack the idea of AI's potential ability to intuit by assessing AI's technical capabilities against the six necessary features that define intuition, as agreed upon by the scholarly community (Bas & Dörfler, 2023).

Features of intuition vs. capabilities of AI

1) Intuiting is rapid, meaning that it occurs almost instantaneously, and in this respect, it is similar to guessing. However, it is guessing which is "frequently correct" (in line with Simon, 1983: 25). It is easy to argue that the speed of processing is one of the strongest features of AI, meaning that the sequential steps of algorithmic analysis are carried out at a great speed. In contrast, with reference to intuiting, 'rapid' signifies that the steps are *bypassed* rather than

carried out, which highlights a non-algorithmic nature of intuiting (cf Davenport & Prusak, 2000: 10-11; Prietula & Simon, 1989; Weick, 1995: 88).

2) Intuiting is *alogical*, meaning that it operates independently of the general principles of reasoning that we call logic (Russell, 1946: 379). Therefore, it is neither *logical* nor *illogical*, as it neither follows nor contradicts the rules of logic. In deliberate sequential reasoning we work our way through the logical connections from a particular problem to the idea that addresses it, while intuiting leaps to the solution. This also means that the states between the starting point and the final point of the leap may not all be represented and connected. On the contrary, AI's processing must rely on logic, and each step of the inference must be represented and connected into a sequence, from the starting point to the endpoint (cf Simon, 1973). For example, the type of AI known as expert systems uses explicitly defined logical rules, while artificial neural networks (ANN) replicate statistical frequencies that conform with logic.

3) Intuiting is *tacit* in the sense that intuitors can describe the outcome, but not the way they arrived at it. Although intuitors are often good at defending their intuitive judgments or insights, there is no evidence that the justification has anything to do with the way the intuiting was used. The tacit quality of intuiting suggests that the process of intuiting takes places outside the scope of the conscious mind, which is why it is also referred to as non-conscious. Although the way AI arrives to the precise solutions are also considered a 'black box' at times, this is not what 'tacit' means in the context knowing. Intuiting is tacit in the epistemological sense, i.e. we do not understand *how* the leap happens. In contrast, we do understand how the inference works in AI. It is only the particular outcome that is technically difficult to track, since there are too many steps, variables, weights, and connections. Thus, AI is not tacit; these details *can* be figured out in

principle, although it is impractical to spend necessarily excessive resources on figuring it out (Barredo-Arrieta et al., 2020; Holzinger, 2018).

4) Intuition is *holistic* or gestalt, as it is about the 'big picture' rather than details, including broad context, and far-reaching implications. It even takes into account items inaccessible to deliberate sequential reasoning, sometimes referred to as the 'unknown unknowns'. Furthermore, intuiting also involves the totality of the intuitor's experiences. In this case the contrast between intuiting and AI is clear and strong: AI works exclusively with details. AI can work with an extremely large number of details, which may lead some to mistake this for a holistic 'big picture', however, a sum of details is not equivalent to the 'big picture' (Köhler, 1959; LeCun, Bengio, & Hinton, 2015).

5) Intuition, as the outcome of intuiting, has an *intrinsic certainty*: intuitors are confident they have the right answer (or one right answer). Even though intuition often brings with it a feeling of knowing, this does not make intuiting infallible, and intuitors do not usually claim infallibility. Burton (2009: 101) points out that the feeling of knowing can occur with both proven and unproven insights, and is not a reliable indicator of accuracy. AI can 'be certain' only if we use anthropomorphized metaphorical language. Importantly, despite the sense of intrinsic certainty, humans can doubt themselves while AI cannot. People intuitively arrive to intrinsic certainty despite doubting; intrinsic certainty only makes sense as defined against the doubt. AI cannot doubt, therefore it also cannot be certain. (de Crescenzo, 1992; Dörfler & Cuthbert, 2024)

6) Finally, intuition is considered to be *spontaneous*. This means that intuition, as the outcome of intuiting, appears without a conscious effort. This is the one feature on which intuition scholars (i.e. academics who study intuition empirically) and intuition practitioners (i.e. practitioners who tap into their intuition in their practice) disagree, as intuition practitioners have

been reporting getting intuition on cue. The two contradictory views are reconciled by allowing for deliberately initiating *the process* of intuiting on cue, resulting into intuition as a spontaneous *outcome* (Dörfler & Bas, 2020). The notion of spontaneity cannot apply to AI, as AI cannot begin processing without an explicit command or program (Dreyfus & Dreyfus, 1986; Searle, 1994).

Besides the abovementioned six features of intuiting, it is also often mentioned that intuiting is frequently accompanied by somatic (visceral) effects and affective charges. The importance of sensing in intuiting has been widely discussed, and is considered instrumental (Bas, Sinclair, & Dörfler, 2022). At this time, there is nothing in AI that could be compatible to sensing, as the use of sensors is qualitatively different from human sensing (Dreyfus, 1992). For example, chefs may use intuiting to envision new dishes and decide whether these dishes may work in the context of their restaurants (Stierand & Dörfler, 2016). AI, on the other hand, relies on statistical frequencies divorced from the meaning.

Conclusion

Based on the current understanding of intuiting, and AI's capabilities, it is safe to conclude that currently AI cannot have intuition. There are six features that define intuition in the scholarly literature, and AI does not meet criteria for being defined by these features. The practical implications of this are: 1) do not expect AI to be intuitive, and interact with it in terms of clear prompts and commands, 2) take advantage of AI's processing capacity for identifying patterns in a huge volume of data, and use it to support human creativity and decision-making, and 3) use AI for identifying potentially useful patterns, but do not rely on it for things that people do intuitively, such as making value judgments about the significance of identified patterns.

REFERENCES

Barredo-Arrieta, A., Díaz-Rodríguez, N., Del Ser, J., Bennetot, A., Tabik, S., Barbado, A., Garcia, S., Gil-Lopez, S., Molina, D., Benjamins, R., Chatila, R., & Herrera, F. 2020. Explainable Artificial Intelligence (XAI): Concepts, taxonomies, opportunities and challenges toward responsible AI. ***Information Fusion***, 58: 82-115. DOI: 10.1016/j.inffus.2019.12.012

Bas, A., & Dörfler, V. 2023. Intuition. In J. Mattingly (Ed.), ***The SAGE Encyclopedia of Theory in Science, Technology, Engineering, and Mathematics***, Vol. 1. Thousand Oaks, CA, US: SAGE. DOI: 10.4135/9781071872383.n99

Bas, A., Sinclair, M., & Dörfler, V. 2022. Sensing: the elephant in the room of management learning. ***Management Learning***. DOI: 10.1177/13505076221077226

de Crescenzo, L. 1992. ***Il Dubbio***. Milano, Italy: Arnoldo Mondadori.

Davenport, T. H., & Prusak, L. 2000. ***Working Knowledge: How Organizations Manage What They Know*** (paperback edition). Boston, MA: Harvard Business School Press.

Dörfler, V., & Bas, A. 2020. Intuition: Scientific, non-scientific or unscientific? In M. Sinclair (Ed.), ***Handbook of Intuition Research as Practice***: 295-307. Cheltenham, UK: Edward Elgar Publishing Limited.

Dörfler, V., & Cuthbert, G. 2024. Dubito Ergo Sum: Exploring AI Ethics, ***HICSS 57: Hawaii International Conference on System Sciences***. Honolulu, HI.

Dreyfus, H. L. 1992. ***What Computers Still Can't Do: A Critique of Artificial Reason*** (revised edition). Cambridge, MA: MIT Press.

Dreyfus, H. L., & Dreyfus, S. E. 1986/2000. ***Mind over Machine***. New York, NY: The Free Press.

Holzinger, A. 2018. From Machine Learning to Explainable AI, ***2018 World Symposium on Digital Intelligence for Systems and Machines (DISA)***: 55-66. Košice, Slovakia: IEEE. DOI: 10.1109/DISA.2018.8490530

Köhler, W. 1959. Gestalt Psychology Today: Address of the President at the sixty-seventh Annual Convention of the American Psychological Association, Cincinnati, Ohio, September 6, 1959. ***American Psychologist***, 14(12): 727-734. DOI: 10.1037/h0042492

LeCun, Y., Bengio, Y., & Hinton, G. 2015. Deep learning. ***Nature***, 521(7553): 436-444. DOI: 10.1038/nature14539

Prietula, M. J., & Simon, H. A. 1989. The Experts in Your Midst. ***Harvard Business Review***, 67(1): 120-124.

Roszak, T. 1986/1994. ***The Cult of Information: A Neo-Luddite Treatise on High-Tech, Artificial Intelligence, and the True Art of Thinking***. London, UK: University of California Press.

Russell, B. A. 1946/2004. ***History of Western Philosophy***. London, UK: Routledge.

Searle, J. R. 1994/2002. ***The Rediscovery of the Mind*** (paperback edition). Cambridge, MA: MIT Press.

Simon, H. A. 1973. The structure of ill structured problems. ***Artificial Intelligence***, 4(3-4): 181-201. DOI: 10.1016/0004-3702(73)90011-8

Simon, H. A. 1983. ***Reason in Human Affairs***. Stanford, CA: Stanford University Press.

Stierand, M., & Dörfler, V. 2016. The Role of Intuition in the Creative Process of Expert Chefs. ***Journal of Creative Behavior***, 50(3): 178–185. DOI: 10.1002/jocb.100

Weick, K. E. 1995. ***Sensemaking in Organizations***. Thousand Oaks, CA: Sage Publications.