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**A Pendulum Swing – The process of A.I. integration in a Human World**

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## A Pendulum Swing – The process of A.I. integration in a Human World

Rob Harari

Every time a new technology is introduced, doomsayers say things like; it will take away jobs, it is not as good as the tried-and-true methods, there is potential for harm to be committed in one form or another. This happened in the 1980's with the music industry when the computer control language Musical Instrument Digital Interface - MIDI - was first introduced, and Broadway musicians were fearful of losing work. It happened in the film industry, the auto industry, and in all areas of manufacturing, with different forms of automation. In almost every case, there was disruption, and yet the new technology also provided new opportunities to learn new skill sets which involved retraining displaced employees. In the process of integrating anything new, there is what I call the **pendulum swing** of not yet understanding the capabilities of the new technology, and then the *mad rush* to find ways to implement it, followed by the *catch-up* phase for those who weren't early adopters, and ultimately the phase of learning how to make it useful in humanistic ways.

To define where we are in this cycle with Artificial Intelligence is complicated. Machine Learning, the basis for A.I., has been part of automated processes in multiple industries for more than a decade. Currently, the capabilities we are hearing about have been in development through R&D and implementation touching myriad aspects of our daily experience, and all these processes are in different phases of development. We are in the *mad rush* phase to understand, develop, and adapt at all levels, from the individual user all the way to top leadership in industry and government. As reported on August 14<sup>th</sup>, 2024 by [Adam Satariano](#) and [Paul Mozur](#) in the New York Times, governments are pouring billions of dollars into A.I. development, creating what they call **"A.I. nationalism - the idea that a country must develop its own tech to serve its own interests."** Seeing the potential capitalistic profit, Industry is pouring billions of dollars in A.I. development as well. This dramatic push is now furthering capabilities faster than implementation can be safely defined.

The fundamental mission for the many uses of A.I. is to conceive of how to do more with less. That can translate to, how can humanity use the computational power now available to pursue avenues of research, innovation and creativity, faster, more accurately and at lower human cost. People across the planet are looking at how this new technology can help to better impact their lives, and within this search, doors are open in as many areas as there are people who have agendas. With each new application being developed, the shared discovery and knowledge speeds up advancements in adjacent areas, creating excitement as well as concern. As with any

powerful tool, the application can be directed towards the good and also the nefarious. When you consider the latter, harmful intent is always a fear. Even with good intentions, what can be more dangerous is the result of unforeseen consequence. We have already experienced that the use of biased sources to train Large and Small Language Models LLM, has been known to result in false and inaccurate responses to the query submitted. Another significant concern of trying to make the output of A.I. more accessible to the user by making it feel more “Human”, crosses boundaries of meaningful human interaction causing isolation. Of imminent concern is that an A.I. system designed to help humanity determine the “best way” forward, may ultimately bypass fundamental morality and ethics that fosters a healthy civilization. Although this is often a common plot line prevalent in science fiction, with the new ability for A.I. to modify its own programming, we are now crossing into territories where unintended dangerous impact is truly possible. One critically important space to monitor is in the transfer of knowledge, and specifically in education at all age groups.

In higher education, universities have been struggling to come up with strategies to incorporate A.I., not just to prevent a generative form of plagiarism, but rather to use it as a teaching tool. I myself, had received a number of essays turned in that were eerily similar for an assignment last year. I was able to identify the use of A.I. in the student work by submitting the essay question to ChatGPT and found it to generate almost the identical opening paragraph. This is clearly a concern. Different institutions are defining their own rule book for how A.I. may be used. As reported by Isabel Bosquette in her August 26<sup>th</sup> article in the [CIO Journal](#) titled **“Inside Universities’ Love-Hate Relationship With ChatGPT OpenAI continues to expand some of its educational offerings, while holding others—including a tool that could be used to detect cheating—back”**. She reports that one Professor at Colorado State University tells his students not to use A.I. because the result will simply be worse than if you write it yourself and you will receive a lower grade. Yet another Professor at Columbia University **“hands students an answer to a coding problem that was generated by AI and asks them to identify the errors in it. It serves the additional purpose, he said, of teaching students not to blindly trust the A.I.”** In reference to that pendulum swing, with the beginning of understanding the new technology, we are trying to catch up on the ways to implement it. Currently, it is the wild west where every player is designing their own strategy in the moment of need. The previous examples are created, vetted, and analyzed by adults who have a fair understanding of how the material can be understood and received. What happens to the child, and what happens in grade school?

In a white paper published Jan 6, 2024, by Eastgate Software, they identify 10 potential negative effects of A.I. in Education: **Bias** – Not only bias from the source

material used to train algorithms and in education, but also those that can be manifest in the bias used in grading rubrics by teachers for certain groups of students, not a universal and equal grading paradigm. **Data Privacy & Security**- A.I. systems in schools often need personal student information to function properly, and these systems are subject to hacking as are so many globally. **Reduced Human Interaction** - The reduction in face-to-face communication can negatively affect the development of social skills in students and also a feeling of isolation. **Unemployment** – There's that thought that teachers can lose their jobs to A.I. **Technology Overdependence** – The possibility that students may become overly reliant on A.I. tutoring systems to solve problems or complete tasks possibly limiting ability or motivation to think critically and independently. **Increased costs** – It is expensive to introduce new technologies in school systems. Not only for the hardware and software costs, but also for training faculty to be able to implement the tools efficiently. **Ethical Issues** – (one of my primary concerns) A.I. often submits answers without the proper citations for transparency and accountability. **Technical Difficulties** – It's technology. It is going to glitch and crash and jeopardize student work, waste time and distract from the continuity of the lesson itself. **Lack of Personalized Feedback** – A.I. is "devoid of emotional intelligence". A teacher knows their students, can read the room, adapt a lesson accordingly. There is so much nuance in the classroom face to face that is not currently possible to recreate in the digital realm, something we saw during the pandemic. Finally, **Accessibility Concerns** – This is a challenge in all areas of ADA compliance. Physical barriers, especially in sight and sound require additional tools for those students in need, and although there is constructive progress on these fronts, there is an implementation gap between populations in different regions and especially in schools with limited resources.

The variability of understanding and the different points in the pendulum swing become evident when we compare publications on this subject. The previous white paper was published in 2024, yet many of these points were earlier identified in the 2019 UNESCO conference, **Beijing Consensus on Artificial Intelligence and Education - International Conference on Artificial Intelligence and Education, Planning Education in the AI Era: Lead the Leap**. As part of UNESCO's Education 2030 initiative, not only were these areas identified, but comprehensive analysis rendered significant strategies proposed for A.I. integration in the report titled, **K-12 A.I. Curricula – A Mapping of Government Endorsed A.I. Curricula**. Why isn't this publication more well known? This research produced nine Key Findings with associated recommendations that were segregated into four main stages of curriculum provision; development and endorsement, integration and management, content and learning outcomes, and implementation. I believe that this guidance should be more

universally publicized to start reining in the wild west while paying specific attention to the moral and ethical jeopardy that could possibly be infused in childhood education.

To change direction from education to the use of A.I. in the arts, let us consider some of the following recent events forcing better understanding of creative implementation as well as use with potential ethical harm requiring legal intervention.

Generative AI is one of the most exciting and simultaneously the most troubling usages. When we consider the potential for false and fake, certain industries have already taken to the streets to bring awareness of potential harm. When the recent release of a new Beatles song, complete with John Lennon's voice, came the first understanding of the difference between machine learning and A.I. In this case, the process employed tools that have been inherent in music production for years, noise remediation and modifications of waveforms, to enhance something recorded in analog. The song was recorded on a cassette tape and after being digitized, Fast Fourier analysis was used to identify good signal versus noise. The recording was then cleaned up and overdubs were added, including a recording of George Harrison who had heard and played to the tape before his death. This made it a BEATLES recording. These were digital music production processes using machine learning, not A.I. John Lennon's voice was not emulated by an algorithm, it was John, on a cassette before he died. This use contrasts with one of the negotiation points in the recent SAG-AFTRA strike where actors voices can be recreated to say anything the user wants bypassing the actor involvement altogether, also bypassing the need for remuneration as cited in Winston Cho's August 6, 2024 article in the Hollywood Reporter "**Hollywood's Divide on Artificial Intelligence Is Only Growing**". With the understanding that A.I. can mimic voices, a draft of legislation providing protections from unapproved uses was introduced in Congress July 31<sup>st</sup> by Senators Chris Coons, Marsha Blackburn, Amy Klobuchar and Thom Tillis. This shows an understanding that A.I. is here to stay and this proposed legislation provides a baby step in how to define a working relationship in the creative sphere. If passed, this would help address nefarious use.

Conversely, Brian Eno, who has long introduced innovation into his creative work, is an artist who is embracing A.I. As reported by Alissa Wilkinson in the New York Times, July 11<sup>th</sup>, when approached about making a documentary about his life, Eno wasn't interested in a static memorialization. He worked with director Gary Hustwit to imagine a new way to present a film, one that has almost infinite manifestations, meaning no matter how many times you see the movie, it is different every time. Eno has a history of creating generative art for the last 60 years. He is well versed in using new technologies to explore new avenues of creation. To try to understand how this works

for this film, imagine playing a video game where each decision the player makes defines a new direction to move forward, an if/then model. In gaming, not only does the gameplay alter, but so do the graphical and aural environments as well as the musical score. In the doc "Eno", 30 hours of interviews and 500 hours of film from Eno's personal archive were fed into the software platform **Brain One** coded by Brendan Dawes, and the sequence of film segments is then uniquely generated upon every playback. It's a new movie every time.

Already we see how potentially beneficial for creativity and how potentially destructive generative AI can be used in content creation.

Finally, other areas of potentially *magnificent* impact, is the use of A.I. in healthcare. Take for example the story as reported by [Benjamin Mueller in the New York Times](#) on Aug. 14, 2024, of Casey Harrell, who has A.L.S. taking away his ability to speak. He received surgically implanted electrodes last July that help connect his brain to a computer allowing him to speak with the assistance of an A.I. powered computer, reconnecting with his children, his family and his friends.

Finally, to touch on the area of A.I. controlled robotics, advances are now happening at hyper speed with the introduction of lighter and stronger materials being used in the structural design of prosthetics. With the reduced structural weight and miniaturization of the electronic components, "bionic" legs and arms are being fabricated reducing constraints of heavy and cumbersome mechanisms. Fiber optic cables have increased the speed of command transmission from the biological neural networks to the artificial ones allowing for better control of multiple systems simultaneously. This also improves two-way communication between the brain and the prosthetic, where sensors on the mechanisms are fed directly into the onboard A.I. processing to anticipate movement, stress loads, and direction for a more symbiotic and fluid collaboration between man and machine.

Final Thoughts:

A.I. is here to stay. A.I. will continue to proliferate into every aspect of our lives. Mankind has the responsibility to anticipate impact, and design universal guidelines to protect the integrity of morality and ethics in the decision-making process during innovation. Most importantly, humanity must remain grounded in the natural world, and in each other, as the digital world continues to envelop us all.

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