

## Enhancing Humans with Artificial Intelligence and Emotional Intelligence

Humanity takes a leap with each improvement in cognitive abilities. Our meat bag bodies and gooey gray brains are the baseline. It gets interesting when we hook up with technology – symbiosis with language, fire, sticks, and silicon. The result is better communication, memory, and processing. Is there a role for Artificial Intelligence (AI) or Emotional Intelligence (EI)?

Consider arriving in Zanzibar and you need to ask for directions. The local language is Swahili. You furiously gesture and they stare at you like a space alien. A few words per minute at best. Imagine if everyone on the planet spoke a different language -- or none at all. That's the world before language was invented. The technology of language developed over thousands of years, enabling human communication bandwidth of hundreds of words per minute.

Other technologies have increased communication too, in terms of bandwidth, convenience, or distribution. Songs helped distribution - you no longer had to be face to face to transmit your idea. Leave it to the country bard. You could even be dead and your idea would spread. Writing improved bandwidth (less lossy than songs) as well as convenience and distribution (books are easier to clone than bards). Paper pressed this further. The carrier pigeon, the pony express, the telegraph, the telephone, email, and instant messaging each increased the convenience in sending our ideas to another person. Radio, TV, the WWW, and Twitter increased our abilities to broadcast our ideas to many people.

Memory and computation also drive human cognition. Memory improvements come as increases in capacity, throughput, physical volume, and reliability. Computation gains are in terms of speed, throughput, and reliability.

Can AI help our cognitive abilities? The simple answer is yes! For example, it can manage data that would be too complex for humans. I spent the last 15 years of my career using AI to help circuit designers create crazy complicated chips. Transistors these days are at the scale of nanometers, and the physics have gone crazy. Intuition that worked a decade ago has left the building. We used AI to enable a new abstraction layer: the high level suitable for gooey gray brains, the low level manna for the silicon-based AI. This sort of technology is starting to pervade our everyday lives. It's how you find that next plane ticket, how you get instant credit card approvals or rejections (instant rejection!), and how Facebook auto-tags photos to better connect people.

We can extrapolate to the future. If a picture is 1000 words, wouldn't it be cool to communicate in pictures, by simply thinking about it? It's closer than you think: imagine wearing contacts that record everything you see in video (the tech exists: Google Glass). Then imagine a thought-based interface to browse those recordings (the tech exists: EEG systems to type and to drive a mouse cursor). Click on a recording, and send it to your friend's eyepiece video viewer. Pragmatic telepathy - in pictures!

Let's consider EI. Specifically, auto-tagging our verbal communications with emotions. This could help our cognitive abilities – communication bandwidth -- but with caveats.

-When humans communicate to humans, the emotion is already picked up: it's partly built into us and we learn the rest. But we're not perfect at conveying our emotions, or deciphering others'. Emotions

increase bandwidth but the emotion signal is error-prone. EI tech auto-tags emotions can help the sender and receiver. The sender gets feedback on emotions he's conveying, whether he meant it or not. The receiver gets hints about sender emotions (especially useful if you're for less skilled people readers). Is the invasiveness worth the payoff? I'm not sure. It depends how invasive it is, and how big the payoff is.

-When humans communicate to computers, will emotion help? After all, computers don't run on emotion. Nonetheless, it can help in some contexts. If you're on the phone with the bank robot and sound super-frustrated, it's useful for the system to escalate the call. It helps when there is room for ambiguity in the situation, or if emotion changes how the response happens. It doesn't help when it's important to precisely specify what you want, such as programming a computer. There isn't an assembly instruction for "aaagh!"

There's plenty of opportunity for manipulation on both the sender and receiver sides. Arms races will emerge. And the auto-tagging EI tech itself will be imperfect – for example it says you're sad but you're actually nervous. Nonetheless, humanity will emerge the better, because our communication cognitive abilities have been enhanced.

AI-powered think-by-picture? Sign me up. EI-powered auto-tagging? Not sure. Both? Definitely.