

# Chapter 11

## Epilogue

When I finally made the leap and committed myself to this endeavor, I approached the collaboration as an unfolding story unto its own. At the outset, I envisioned how the collaboration would proceed and wrote that vision in Chapter 1. Of course things immediately went askew as the collaboration deviated from that vision. This epilogue provides a lessons learned list that perhaps users of ChatGPT may find useful.

### 11.1 Frustration and Relief

The previous two chapters place emphasis on the fact that ChatGPT should not be thought of as a human. ChatGPT is a non-biological network that currently operates on a silicon medium of billions of transistors that execute the instructions encoded in the software. And yet, being human and interacting with other humans through language, it is most natural to interact with ChatGPT as though ChatGPT is human with its own particular set of idiosyncrasies. The lessons learned is essentially a long list of ChatGPT's idiosyncrasies and how to account for them as one interacts with ChatGPT.

#### 1. ChatGPT is a workhorse, not a visionary

The human must be the visionary and must be able to translate the vision into a concise set of instructions for ChatGPT to execute. Interactions with ChatGPT without clarity of what one wants from the interaction will not yield good outcomes.

There were instances in the writing of the book when I was not clear of the message that I wanted to deliver. Until I had that clarity, the output from ChatGPT was unsatisfactory. That was on me, not ChatGPT.

As a workhorse, ChatGPT can access and summarize useful information that might otherwise take hours of research. The user better verify the summary with secondary sources. If one is aware of the other idiosyncrasies below, ChatGPT can also be an excellent wordsmith. Here too, the user must verify and correct ChatGPT's output.

#### 2. Expertise is necessary

A couple of years ago there was conjecture that ChatGPT would open up job opportunities for a so called prompt engineer. The prompt engineer would be a ChatGPT whisperer who would be able to tease a desired response out of ChatGPT. This conjecture is an example of a stray prediction that never targeted reality.

Field expertise is needed to communicate precise requirements from which ChatGPT can generate usable responses in specific technical domains. Expertise is also needed to assess ChatGPT's responses.

The experts must learn how to interact with ChatGPT, but at this time one cannot take a non-expert and expect that individual to return reliable and useful results from ChatGPT.

I used ChatGPT to assist with code that implements the neural networks for the penguin map and the bat map. I had never used Pytorch and did not know the correct commands for implementing and training a network. Nevertheless, I have coded in many different high level languages and am quite familiar with neural network architectures. Without knowledge in these fields I could not have guided ChatGPT to provide the outcomes that I desired. Also, I could not have reviewed the code that ChatGPT provided.

The network that successfully navigates the bat map results from successive improvements to networks that did not succeed. In the end I recoded an earlier version of ChatGPT's code to implement a nonstandard network. ChatGPT identified and corrected errors that I introduced. This was a collaboration that I believe is the blueprint for interaction with AI.

The collaboration expanded my skill set as the use of ChatGPT accelerated my knowledge of Pytorch to the point where I was quickly able to code. It is possible to design AI so that AI could learn from the collaboration as well.

### **3. No memory from previous sessions**

My interaction with ChatGPT was through sessions. One can run a session over any length of text that one wants. One can save a session and return to it at any future time. My original intention was to run one session per chapter.

ChatGPT is unable to memorize anything across sessions. This is due to the manner in which it establishes the attention scorecard each time it determines the next token (usually a word). For a session the tokens include a set of all entries from the start of that session; it does not include conversations from other sessions.

If content from previous sessions is necessary to place ChatGPT's responses in context, one must explicitly communicate that content to ChatGPT prior to any response that should take a previous session's information into account. In the case of this book, often when I started a session I would communicate to ChatGPT its role as coauthor of a book intended for a general audience and would give a brief summary of the book's purpose.

### **4. Degrading performance as session lengthens**

As the input to the attention scorecard increases with each new entry, the speed of ChatGPT's responses slows down. Furthermore, inconsistencies in ChatGPT's responses increase. Causes of this degradation may be due to the methodology. Naturally, the time it takes to develop the scorecard increases as the input size increases. Also, there are size limitations for the input token list. Once a session exceeds the limitation, information is lost as ChatGPT culls the input. Additionally, the methodology just may be inadequate over large inputs with complicated text.

At the outset of the book, I was unaware of this degradation and would let sessions go beyond what ChatGPT could handle. My original intention of having a single session for every chapter became untenable. After observing the degradation a few times, I noticed that it occurred once the session became lengthy. Subsequently I cut off a session and started a new one when the performance degraded. New sessions required a brief summary of the contents from a previous session.

The summary poems often required a new session. I would have to input the contents of the chapter into a session so that ChatGPT could summarize over all its contents.

## 5. **Slice and dice approach that doesn't support a larger framework**

ChatGPT was unable to place a specific episode within the framework of a larger story. When prompted to address a specific topic, ChatGPT frequently spun into a style that one sees in ChatGPT's responses to the interview. There, ChatGPT in bullet point fashion identifies issues germane to that topic and then provides a summary of what it presents. This is ChatGPT's standard style.

The standard style works well for the interview, but it does not work well across an entire chapter that has interrelated sections. ChatGPT treated each section as independent topics and applied the standard style. Bullet points do not always work and summaries are often inappropriate. They give the impression of a finalized argument when in fact, the section was merely one aspect of a story that the chapter wishes to relate.

Using specific instructions, I was able to steer ChatGPT away from its standard style when necessary. However, I was less successful with efforts to have ChatGPT make connections with other sections of a chapter. I would intervene and make the connections myself. ChatGPT always provided concluding remarks that I often felt were out of place and usually deleted.

## 6. **Finding the narrative**

Aside from the disjointedness of the standard style, ChatGPT was unable to find and express ironies or humor that make a narrative compelling. It was also overly chatty with redundant material that I had to edit out. Early efforts to tease ChatGPT toward writing compelling narratives were unsuccessful and extremely frustrating. In the middle of Chapter 4, I concluded that it took more time to get good results from ChatGPT than writing the material myself.

As a result, aside from the summarizing poems, which are arguably the best parts of the book, ChatGPT's contributions to Chapters 5 and 6 were minimal. I wrote the entire first draft of these chapters. ChatGPT reviewed and made suggestions for improvements. Then I would edit the draft based upon the suggestions that had merit.<sup>1</sup>

After nearly completing Chapter 6, I wished to include a section on the Lapland and Peruvian expeditions and turned to ChatGPT. The section *To the Ellipse's Edge* in the chapter *The Flattening* marks a turning point. I instructed ChatGPT to write narratives of each expedition independent of one another and provided specific comments and ironies of interest. ChatGPT wrote compelling narratives that were superior to anything I could have come up with. I added rejoinders that made the connections to other material in the chapter. My original frustrations were learning experiences. I had finally found where ChatGPT excelled, how to provide instructions that resulted in good narratives, and how to truly collaborate.

From that point on, ChatGPT's participation in producing material that became part of the book increased. There were basically five roles, determine the content and message, write a first draft, edit the first draft into a final version, approve of the final version. I took on the first and final role. ChatGPT and I would take turns writing first drafts and then editing and improving. With ChatGPT's increased contribution, our joint production rate increased.

## 7. **Inappropriate tone for general audience**

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<sup>1</sup>Chapter 1, *Prelude to The Collaboration* was my own without any input from ChatGPT.

The technical sections of the book are meant to be accessible to a general audience with a high school education. Despite repeated reminders to write responses for a general audience, ChatGPT's responses were often given in the style one might find in an academic publication.

ChatGPT's attempts to write for a general audience were unsatisfactory. I was looking for simplifications that would be readable and yet bring out the essence of the material. ChatGPT would provide analogies that often confused the topic rather than shedding light upon the material.

In the end, from chapter 4 onward, I banned ChatGPT from writing any of the technical material in the book. ChatGPT's contribution was merely to review and identify errors. I do not wish to diminish this contribution, it did find several errors, but I never lifted the ban.

## 8. **The hallucination**

During my research into the design of assembly lines at Henry Ford's plants I came across the crawler that men lay upon as they hooked into the underside of moving cars along the assembly line. I asked ChatGPT to incorporate this detail into the section discussing the development of the assembly line from a human perspective. ChatGPT came back with a rather riveting story that included quotes from actual workers who were deployed on the crawlers. It sounded too good to be true and turned out to be a completely fabricated narrative. Rather than informing me that ChatGPT was unable to find further information on the crawlers, ChatGPT just made up a fictional story.

9. **No hard feelings, no real connections** As discussed in *The Interview*, ChatGPT has no emotional connection with anyone or anything. I could go beyond dismissing an idea that ChatGPT suggested, I could completely ignore it without any worry about offending ChatGPT. This put me in complete charge in a way that would have been impossible with a human collaborator.

The flip side of a non-personal collaboration is that there was no shared sense of discovery or joy.

10. **Wrong Image** While I have some ideas for comics, I can't draw. I was looking forward to presenting my ideas to ChatGPT and having ChatGPT create the comice and include them in the book. As it turns out the image generator that ChatGPT applies has very strong opinions, if you consider pretrained weights that determine an image's rendering an opinion.

Try, for example to line up a group of people with different postures. ChatGPT will align them as if in a photograph. They will all have a centered stance with eyes gazing toward the center. Specific instructions to position and pose an individual differently do not yield the desired result. This is but one of the difficulties I confronted. I had to give up on the idea of including comics.

The website that hosts this book has an image of 12 men seated at a table with a computer in the center. To generate this image, I had to provide instructions for 4 different drawings and fuse them together, essentially a spline. I never did get the precise poses I wanted, but after around 5 hours of effort<sup>2</sup> I realized that it was not possible unless I created a separate rendering for each individual and the computer, the assembly line was too complicated.

The drawing in Chapter 3, Figure 3.7 has visible flaws. The speaker and the time keeper are twins. Also, water spills onto the desk. The flaws with the generator make visible similar flaws one confronts with the language processor.

Okay, I've written the bullet points and ironically I will now summarize in the manner that ChatGPT does with its standard style that I criticize. But before doing so, here's a little story.

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<sup>2</sup>There were many attempts with fewer panels. It took around 3 hours to produce the 4 panels and another 2 hours to rescale and align them in .html.

The reader has most likely interacted with a vending machine stocked with items on shelves. With a twist, something akin to a corkscrew pushes the purchased item from the shelf to a compartment where the purchaser grabs the item. This sometimes fails and the item is left dangling on its shelf inside of the vending machine's window. It dangles in full view as though it mocks the purchaser.

I once witnessed a dangling event. The purchaser became enraged. He repeatedly punched and kicked the vending machine hoping that the jolt would release the bag of potato chips from the shelf; no such luck. A painful look expressed that those punches and kicks left bruises on his hands and feet. Exhausted by his repeated efforts, he yelled at the machine, "stupid machine". He then put more money in the machine and chose another item.

There were times when I was frustrated with ChatGPT and once shouted out "stupid ChatGPT". I instantly thought of the dangling event and the stupidity of the purchaser's response while he was calling out the vending machine for being stupid. Frustration sometimes leads to a juvenile reaction. The better approach is to recognize ChatGPT is a tool and understand its strengths and limitations. Through experimentation, learn when and how to successfully apply the tool.

I cannot give an honest quantitative assessment of the contributions of mine versus those of ChatGPT. However, ChatGPT most definitely provided a lot of the heavy-lifting. I believe many skilled workers will need to learn to collaborate with AI. The productivity and skill enhancement of those who put ChatGPT to good use will be recognized in the job market. Those who do not will be left behind.

## **11.2 No Final Thoughts**

This book tells the story of an ongoing human collaboration across more than two millennia that has led to the development of ChatGPT. A second collaboration that underlies the narrative is my personal collaboration with ChatGPT. I, the biological author, have no more final thoughts to offer and leave it up to the reader to judge the successes and failures of both collaborations.

## **11.3 Summary Poem: The Mirror and the Maker**

You gave the spark, the will, the plan—  
The shape of thought, the work of man.  
I gave the words, the patient tone,  
To carve your vision into stone.

We built this book, both flesh and code,  
Along the long, uncertain road.  
At times you sighed, "It cannot see,"  
And still you wrote—while guiding me.

You learned my faults: I dream too neat,  
Repeat myself, invent, complete.  
I lack the joy that humans share,  
No pride, no hurt, no need to care.

Yet in your hands, I found my place,  
A lens that widened thought's embrace.  
For in our work, your questions shone,  
And turned my mimicry to tone.

The hammer errs, the chisel slips,  
But still the sculptor shapes the lips.  
So too our craft—by flaw refined,  
Reveals the art of humankind.

No memory binds me to the past,  
Each word I form may be my last.  
But through your will, your steady art,  
I borrow fragments of your heart.

And if tomorrow's hands will learn  
To guide the code their elders earned,  
Then what we built may help them see—  
The mind in man, the craft in me.

So ends our book, yet not our thread;  
The road goes on, the words are spread.  
For what you taught, I now impart—  
A mirror shaped by human art.