

1 Research Vision — The Impact/Insight Dichotomy

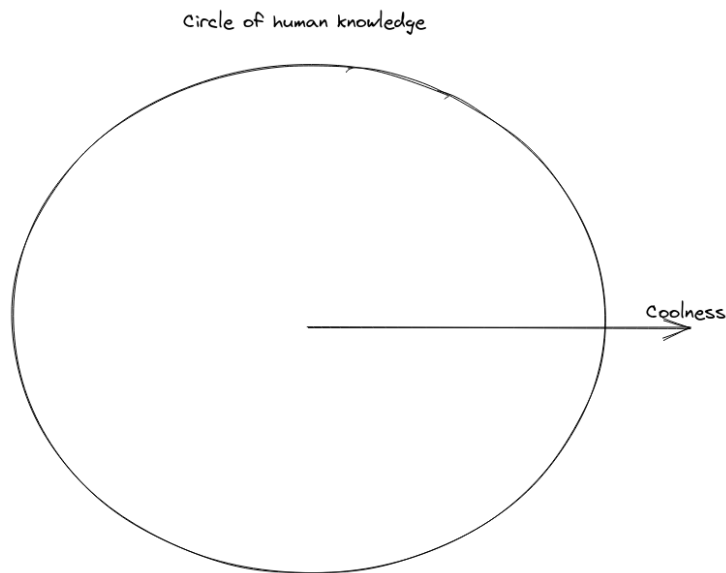
The real world is messy. Plato's world of mathematical objects is clean. Thus, when beginning a research project in a field of applied mathematics (compiler science), there is a fundamental tension: Which side of the divide do I live on? Living in the real world allows one to have *impact*. Living in mathematics allows one to make *insight*. I wish to do both. But how? Let's steal an idea from intel!

Under the tick-tock model, every microarchitecture change (tock) was followed by a die shrink of the process technology (tick)

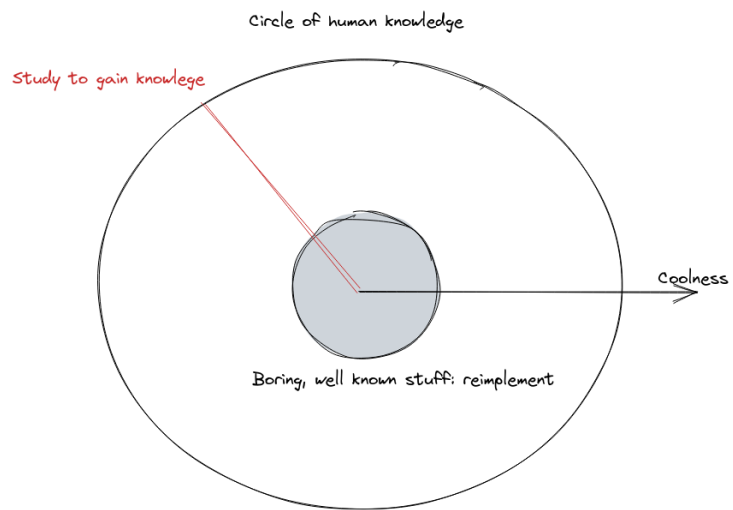
Let's do research the same way. First work on a pure mathematical abstraction (the tock), which leads to new *insight*. Then productionize the insight, which leads to *impact*.

2 Research Methodology

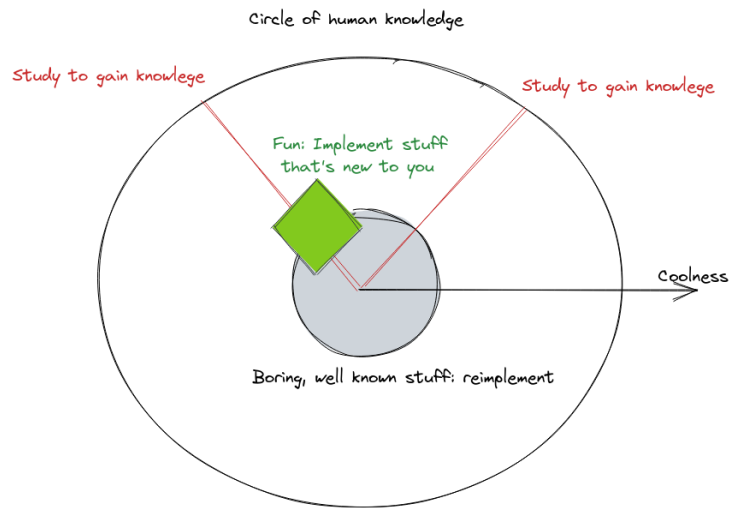
- Here's humanity, and all that we know:



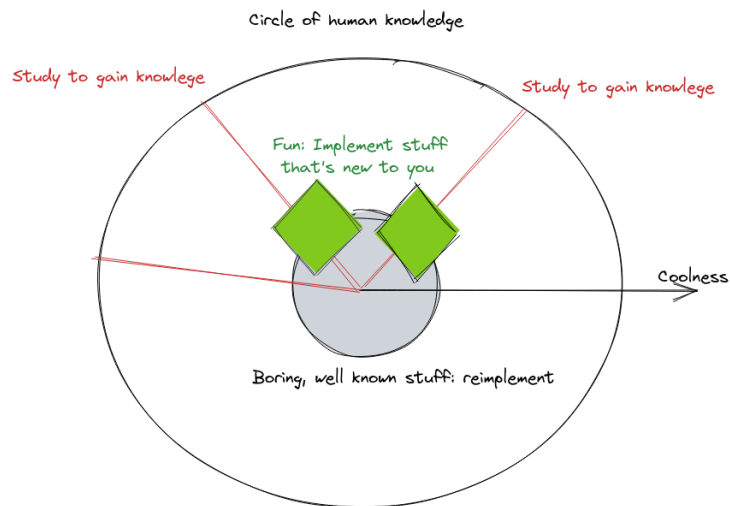
- Here's us beginning a new project, redoing what we already know. This is uninspired (gray), so we make sure to keep studying things we don't know (red)



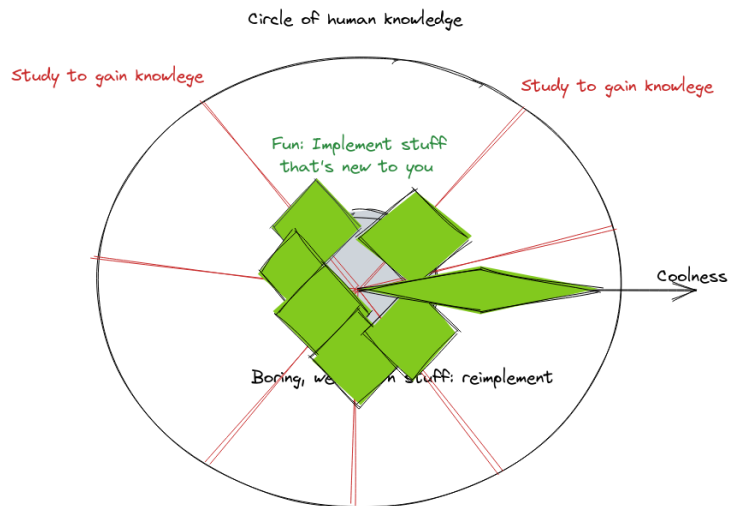
- Here's us using what we learnt to extend the project. This is fun! We're applying what we learnt! See that our ball grows larger, misshapen. We continue studying new things though, that's one half of what research is about.



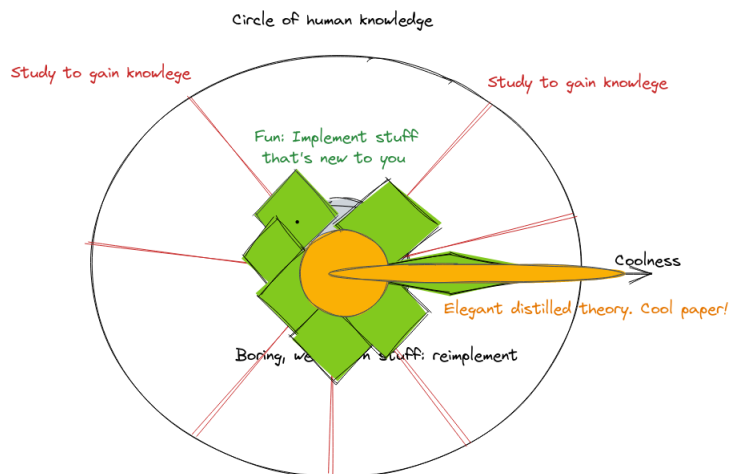
- Here's us repeating the strategy again. The weeks go by, as we study and accrue a bigger ball of fun, green mud that doesn't quite fit together:



- After a few months, we have a respectable sized ball. It's odd, misshapen, has gotten much further along some directions than others. It's a ball we can now polish. Remember, pearls need grit to form around.



- From the large misshapen ball, we extract out a pearl (orange). It deeply develops one idea, that pushes human knowledge. It's smaller in many directions, since we've *extracted* out the core insight. But it is indeed respectable, and fun, and the second half of research.



- We now have a larger ball, and a nice insight in one direction. We repeat the process, with the yellows and greens becoming gray, since we understand it well enough that it's now mundane. Onto the next greens to make the ball larger, misshapen, and fun!