

# Everything you think a hero is... and then some

One of the most important parts of good storytelling is the ability to give the reader what they expect and surprise them at the same time. If someone is told they will be offered a story about a hero from WW2, They would probably expect something with fighter planes riddling each other with bullets until one hits the mark and crashes down. Or, perhaps in your brain it's a big strong soldier that defies orders of his commanding officer to save the lives of hundreds or thousands of his comrades.

Now if the writer does not fill those expectations then the reader feels lied to, cheated, or at best confused. And the story falls faster than those fighter planes. On the other hand, if all the reader is given is exactly what they already know then they may feel their time has been wasted, and the story is beyond saving.

Now, I am going to share with you the story of a World War II hero. He deals with bullets, and fighter planes shredded by gun fire, and he will absolutely have to defy his superior officers to save thousands of lives.

---

This story began in Austria, which is a stunningly beautiful country in Eastern Europe. A bunch of famous people lived there: Mozart<sup>1</sup>, Beethoven<sup>2</sup>, Arnold Schwarzenegger<sup>3</sup>, and Sigmund Freud<sup>4</sup> all grew up there. The true "Sound of Music" family was Austrian.<sup>5</sup>

In 1938, Austria was a very good place not to be. The Nazi party had won big in the German elections and top on their list of things to do was take back Austria, which they lost after World War I<sup>6</sup>. That made Austria a very very good place not to be if you were Jewish in '38 because the Nazis were seriously cruel to the Jews.

Which is why Abraham Wald, who was a Jew living in Austria, and the hero of our story moved to America. Frankly, the US was happy to have Abe. His English was sometimes tricky to understand, but he was a great guy, a brilliant mathematician, and good teacher. He started working at Columbia University in New York City.<sup>7</sup>

By 1940, The Nazi problem was still spreading across Europe and the United States was into the action<sup>7</sup>. The U.S. was working hard to stop Hitler in Europe

## Everything you think a hero is... and then some

and around the Atlantic as well as fighting Japan in the Pacific. The US Military knew that wars are won more by small percentages as much as brave soldiers. The group that is able to eat 10% better, use 13% less bullets or stays 8.5% warmer. Those small advantages are hard to find, but so important that the army set up a secret group of mathematicians called the SRG Statistical Research Group<sup>3</sup> and then asked Abe Wald to be in charge.

Mostly the SRG worked on Top secret stuff that is still not talked about, but at one point early on, Admiral Nimitz, who was commander of the Pacific Fleet<sup>4</sup>, came to Wald with a big problem.

U.S. fighter planes were coming back riddled with holes from Japanese bullets in the Pacific and German bullets over Europe. The Japanese planes (called zeros)<sup>5</sup> were fast and more agile than most of the American fighters, but their bullets were smaller and slower. In Europe, the German planes used bigger bullets that came out faster but from slower less agile fighters.<sup>7</sup>

"I need you braincases to figure out where to put the armor plating to protect these planes and the men inside."

Wald and his crew of rugged and ready math geeks accepted the mission. From their top secret apartment in Manhattan. Under the code name "Manhattan project"<sup>8</sup> they analyzed both photos of planes and real pieces of wings and side panels. They diagramed the bullet patterns, looking at how the angles of bullets changed the size of the holes. They factored wind speed, bullet calibers, and the atomic weight of like 8 different metals, and the angles of the bullet holes. When they had finished considering counting, calibrating, and calculating, Abe Wald went back to Nimitz with a brilliant solution.

Admiral we have looked at all your data, and come up with the best possible answer to save the greatest number of da boys in da kook pits. But Admiral, I do not believe you will like our recommendation. We do not think you should change anything on the planes.

There are those moments when the silence is the loudest thing in a room. History has no record of that conversation, we only know the gist of what was said, but there must have been some very loud silence.

Admiral Nimitz was not a man used to people defying him. Most of his orders were responded to with a snappy salute and sentences that started with "Sir, yes sir". Here was a math geek with a funny German accent telling him... what?

## Everything you think a hero is... and then some

Don't change a single thing. Leave the armor exactly where it is..

Wald must have explained this answer to the admiral.

"Admiral, you did not bring mathematicians to a problem like this to crunch numbers and do calculations, there are machines that will do that. You bring us in to find you information you did not know you had.

Math is about interrogating the questions asked and the information available to get answers.

In this situation, the information that you forgot you had was that all of these planes, and most of their men came back. Some of them in pieces, but they came. What we do not have is data on the planes that have been shot down.

So thinking mathematically about what is missing as well as what we have been able to analyze, I can tell you, our boys in the *kook pits* are as protected as the can be. Moving the armor would result in more deaths.

It is strange to think that the best answer is a negative one, but in this case it saved countless lives.