

# The Atomic Bomb Considered As Hungarian High School Science Fair Project

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## I

A group of Manhattan Project physicists [created](#) a tongue-in-cheek mythology where superintelligent Martian scouts landed in Budapest in the late 19th century and stayed for about a generation, after which they decided the planet was unsuitable for their needs and disappeared. The only clue to their existence were the children they had with local women.

The joke was that this explained why the Manhattan Project was led by a group of Hungarian supergeniuses, all born in Budapest between 1890 and 1920. These included Manhattan Project founder [Leo Szilard](#), H-bomb creator [Edward Teller](#), Nobel-Prize-winning quantum physicist [Eugene Wigner](#), and legendary polymath [John von Neumann](#), namesake of [the List Of Things Named After John Von Neumann](#).

The coincidences actually pile up beyond this. Von Neumann, Wigner, and possibly Teller all went to the same central Budapest high school at about the same time, leading a friend to joke about the atomic bomb being *basically* a Hungarian high school science fair project.

But maybe we shouldn't be joking about this so much. Suppose we learned that Beethoven, Mozart, and Bach all had the same childhood piano tutor. It sounds less like "ha ha, what a funny coincidence" and more like "wait, who was this guy, and how quickly can we make everyone else start doing what he did?"

In this case, the guy was [Laszlo Ratz](#), legendary Budapest high school math teacher. I didn't even know people *told* legends about high school math teachers, but apparently they do, and this guy features in a lot of them. There is apparently a Laszlo Ratz Memorial Congress for high school math teachers each year, and a Laszlo Ratz medal for services to the profession. There are plaques and statues to this guy. It's pretty impressive.

A while ago I looked into the literature on teachers [and concluded](#) that they didn't have much effect overall. Similarly, Freddie deBoer writes that most claims that certain schools or programs have transformative effects on their students [are the result of selection bias](#).

On the other hand, we have a Hungarian academy producing like half the brainpower behind 20th century physics, and Nobel laureates who literally [keep a picture](#) of their high school math teacher

on the wall of their office to inspire them. Perhaps even if teachers don't explain much of the *existing* variability, there are heights of teacherdom so rare that they don't show up in the statistics, but still exist to be aspired to?



I've heard this argument a few times, and I think it's wrong.

Yes, two of Ratz's students went on to become supergeniuses. But Edward Teller, another supergenius, went to the same high school but (as far as I know) was never taught by Ratz himself. That suggests that the school was good at producing supergeniuses regardless of Ratz's personal qualities. A further point in support of this: [John Harsanyi](#) also went to the school, also wasn't directly taught by Ratz, and also went on to win a Nobel Prize and invent various important fields of mathematics. So this school – the [Fasori Gymnasium](#) – seems to have been about equally excellent for both its Ratz-taught and its non-Ratz-taught pupils.

Yet the Fasori Gymnasium *might not have even been the best high school in its neighborhood*. It competed with the Minta Gymnasium half a mile down the street, whose alumni include Manhattan Project physicists [Nicholas Kurti](#) and [Theodore von Karman](#) (von Karman went on to found the Jet Propulsion Laboratory), brilliant chemist-philosopher [Michael Polanyi](#), economists [Thomas Balogh](#) and [Nicholas Kaldor](#) (of Kaldor-Hicks efficiency fame), and [Peter Lax](#), who [once said](#) “You don't have to be Hungarian to be a math-

ematician – but it helps”. There are also some contradictory sources suggesting Teller attended this school and not Fasori; for all I know he might have attended both. Once again, most of these people were born in the 1890-1910 period when the Martian scouts were supposedly in Budapest.

Worse, I’m not even sure that the best high school in early 20th-century Hungary was *either* of the two mentioned above. The Berzsenyi Gymnasium, a two mile walk down Gyorgy Street from the others, boasts alumni including multizillionaire [George Soros](#), Intel founder [Andrew Grove](#), BASIC inventor [John Kemeny](#), leading cancer biologist [George Klein](#), great mathematician [George Polya](#), and Nobel Prize winning physicist [Dennis Gabor](#).

Given that the Fasori Gymnasium wasn’t obviously better than either of these others, is it possible that the excellence was at a higher level – neither excellent teachers nor excellent principals, but some kind of generally excellent Hungarian culture of education?

This is definitely what the Hungarians want us to think. According to [Cultures of Creativity](#):

What’s so special about Budapest’s schools? A certain elitism and a spirit of competition partly explains the successes of their students. For example, annual competitions in mathematics and physics have been held since 1894. The instruction the students receive as well as these contests are an expression of a special pedagogy and a striving to en-

courage creativity. Mor Karman, founder of the Minta school, believed that everything should be taught by showing its relation to everyday life. Instead of learning rules by heart from books, students tried to formulate the rules themselves.

This paper on [“The Hungarian Phenomenon”](#) makes similar claims, but adds a few more details:

The Eotvos Contests were a powerful mean for the stimulation of mathematics on a large scale and were used to motivate mathematical culture in the society. It also provided a channel to search for talented youths. The contests, which have been open to Hungarian high school students in their last year since 1894, played a remarkable role in the development of mathematics.

Okay. But I want to challenge this. During this era, formal education in Hungary began at age 10. By age ten, John von Neumann, greatest of the Hungarian supergeniuses, already spoke English, French, German, Italian, and Ancient Greek, knew integral and differential calculus, and could multiply and divide 8-digit numbers in his head. Wikipedia notes that on his first meeting with his math teacher, the math teacher “was so astounded with the boy’s mathematical talent that he was brought to tears”. This doesn’t sound like a guy whose potential was kindled by formal education. This sounds like a guy who would have become one of history’s great mathematicians even if his teachers had slept through his entire high school career.

Likewise, the book above notes that Dennis Gabor, the Hungarian inventor of holography, “developed his passion for physics during his youth, but did so for the most part on his own”. [His biography](#) notes that “During his childhood in Budapest, Gabor and his brother would often duplicate the experiments they read about in scientific journals in their home laboratory.”

Likewise, consider [Paul Erdos](#), a brilliant mathematician born in Budapest around this time. As per his Wikipedia page, “Left to his own devices, he taught himself to read through mathematics texts that his parents left around their home. By the age of four, given a person’s age, he could calculate, in his head, how many seconds they had lived.”

I have no knock-down proof that Hungary’s clearly excellent education system didn’t contribute to this phenomenon. A lot of child prodigies burn out, and maybe Hungary was unusually good at making sure that didn’t happen. But it sure seems like they had a lot of child prodigies to work with.

So what’s going on? Should we just accept the Manhattan Project consensus that there was a superintelligent Martian scout force in early 20th-century Budapest?



Here’s something interesting: every single person I mentioned above is of Jewish descent. *Every single one.* This isn’t some

clever setup where I only selected Jewish-Hungarians in order to spring this on you later. I selected all the interesting Hungarians I could find, then went back and checked, and every one of them was Jewish.

This puts the excellence of the Hungarian education system in a different light. Hungarian schools totally failed to work their magic on Gentiles. You can talk all you want about “elitism and a spirit of competition” and “striving to encourage creativity”, yet for some reason this worked on exactly one of Hungary’s many ethnic groups.

This reduces the difficult question of Hungarian intellectual achievement to the easier question of Jewish intellectual achievement.

I say “easier question” because I find the solution by Cochran, Hardy, and Harpending really compelling. Their paper is called [A Natural History Of Ashkenazi Intelligence](#) (“Ashkenazi” means Eastern European Jew) and they start by expressing the extent of the issue:

Ashkenazi Jews have the highest average IQ of any ethnic group for which there are reliable data. They score 0.75 to 1.0 standard deviations above the general European average, corresponding to an IQ 112 – 115. This fact has social significance because IQ (as measured by IQ tests) is the best predictor we have of success in academic subjects and most jobs. Ashkenazi Jews are just as successful as their

tested IQ would predict, and they are hugely overrepresented in occupations and fields with the highest cognitive demands. During the 20th century, they made up about 3% of the US population but won 27% of the US Nobel science prizes and 25% of the Turing Awards [in computer science]. They account for more than half of world chess champions.

This doesn't seem to be due to any advantage in material privilege; Ashkenazi Jews frequently did well even in countries where they were persecuted. Nor is it obviously linked to Jewish culture; Jews from other regions of the world show no such advantage. So what's going on?

Doctors have long noted that Ashkenazi Jews are uniquely susceptible to various genetic diseases. For example, they're about a hundred times more likely to have [Gaucher's Disease](#), a hundred times more likely to get [Tay-Sachs Disease](#), ten times more likely to have [torsion dystonia](#), et cetera. Genetic diseases are so common in this population that the [official recommendation](#) is that *all* Ashkenazi Jewish couples get screened for genetic disease before marriage. I'm Ashkenazi Jewish, I got screened, and I turn out to be a carrier for [Riley-Day syndrome](#) – three hundred times as common in Ashkenazi Jews as in anyone else.

Evolution usually gets rid of genetic diseases pretty quickly. If they stick around, it's because they're doing something to earn their keep. One common pattern is "[heterozygote advantage](#)" – two copies of the gene cause a disease, but one copy does something good. For example, people with two copies of the sickle cell gene



get sickle cell anaemia, but people with one copy get some protection against malaria. In Africa, where malaria is relatively common, the tradeoff is worth it – so people of African descent have high rates of the sickle cell gene and correspondingly high rates of sickle cell anaemia. In other places, where malaria is relatively uncommon, the tradeoff isn't worth it and evolution eliminates the sickle cell gene. That's why sickle cell is about a hundred times more common in US blacks than US whites.

The moral of the story is: populations can have genetic diseases if they also provide a useful advantage to carriers. And if those genetic diseases are limited to a single group, we expect them to provide a useful advantage for that group, but not others. Might the Jewish genetic diseases provide some advantage? And why would that advantage be limited to Jews?

Most of the Jewish genetic diseases cluster into two biological systems – the sphingolipid system and the DNA repair system. This is suspicious. It suggests that they're not just random. They're doing something specific. Both of these systems are related to neural growth and neural branching. Might they be doing something to the brain?

Gaucher's disease, one of the Ashkenazi genetic diseases, appears to increase IQ. CHH obtained a list of all of the Gaucher's patients in Israel. They were about 15 times more likely than the Israeli average to be in high-IQ occupations like scientist or engineer; CHH calculate the probability that this is a coincidence to be  $4 \times 10^{-19}$ .

Torsion dystonia, another Ashkenazi genetic disease, shows a similar pattern. CHH find ten reports in the literature where doctors comment on unusual levels of intelligence in their torsion dystonia patients. [Eldridge, Harlan, Cooper, and Riklan](#) tested 14 torsion dystonia patients and found an average IQ of 121; another similar study found an average of 117. Torsion dystonia is pretty horrendous, but sufferers will at least get the consolation prize of being really, really smart.

Moving from medicine to history, we find that Ashkenazi Jews were persecuted for the better part of a millennium, and the particular form of this persecution was locking them out of various jobs until the main career opportunities open to them were things like banker, merchant, and doctor. CHH write:

For 800 to 900 years, from roughly 800 AD to 1650 or 1700 AD, the great majority of the Ashkenazi Jews had managerial and financial jobs, jobs of high complexity, and were neither farmers nor craftsmen. In this they differed from all other settled peoples of which we have knowledge.

They continue:

Jews who were particularly good at these jobs enjoyed increased reproductive success. Weinryb (1972, see also Hundert 1992) comments: “More children survived to adulthood in affluent families than in less affluent ones. A number of genealogies of business leaders, prominent rabbis, commu-

nity leaders, and the like – generally belonging to the more affluent classes – show that such people often had four, six, sometimes even eight or nine children who reached adulthood. On the other hands, there are some indications that poorer families tended to be small ones... as an example, in a census of the town of Brody in 1764 homeowner households had 1.2 children per adult member while tenant households had 0.6.

Now we can start to sketch out the theory in full. Due to persecution, Jews were pushed into cognitively-demanding occupations like banker or merchant and forced to sink or swim. The ones who swam – people who were intellectually up to the challenge – had more kids than the ones who sank, producing an evolutionary pressure in favor of intelligence greater than that in any other ethnic group. Just as Africans experiencing evolutionary pressure for malaria resistance developed the sickle cell gene, so Ashkenazim experiencing evolutionary pressure for intelligence developed a bunch of genes which increased heterozygotes' IQ but caused serious genetic disease in homozygotes. As a result, Ashkenazi ended up somewhat more intelligent – and somewhat more prone to genetic disease – than the rest of the European population.

If true, this would explain the 27% of Nobel Prizes and 50% of world chess champions thing. But one still has to ask – everywhere had Jews. Why Hungary in particular? What was so special about Budapest in the early 1900s?

## IV

Okay, sure, everywhere had Jews. But it's surprising exactly how *many* Jews were in early 1900s Hungary.

The modern United States is about 2% Jewish. Hungary in 1900 was about 5%. The most Jewish city in America, New York, is about 15% Jewish. Budapest in 1900 was 25%. It was one of the most Jewish large cities anywhere in history, excepting only Israel itself. According to Wikipedia, the city's late 19th-century nickname was "Judapest".

So is it possible that all the Jews were winning Nobel Prizes, and Hungary just had more Jews and so more Nobelists?

No. This doesn't seem right. The [1933 European Jewish Population By Country](#) site lists the following size for each country's Jewish communities:

<b>Country</b>	<b>Jewish Population</b>
Poland	3,000,000
Russia	2,500,000
Romania	750,000
Germany	500,000
Hungary	500,000
Britain	300,000

France	250,000
Austria	200,000

It's hard to find a good list of all famous Manhattan Project physicists, but I tried [this article](#) and got the following number of famous Jewish Manhattan Project physicists per country of origin:

<b>Country</b>	<b>MP Physicists</b>
Hungary	4
Germany	2
Poland	2
Austria	2
Italy	1
Netherlands	1
Switzerland	1

[Here's](#) an alternative source with a different definition of "famous", broken down the same way:

<b>Country</b>	<b>MP Physicists</b>
Germany	5
Hungary	4
Poland	3
Italy	2

The main point seems to be disproportionately many people from Central European countries like Hungary and Germany, compared to either Eastern European countries like Poland and Russia or Western European countries like France and Britain.

The Central European advantage over Western Europe is unsurprising; the Western European Jews probably weren't Ashkenazim, and so didn't have the advantage mentioned in the CHH paper above. But is there any reason to think that Central European Jews were more intelligent than Polish and Russian Jews?

I'm not really sure what to think about this. [This paper](#) finds that the sphingolipidoses and other Jewish genetic diseases are about twice as common in Central European Jews as in Eastern European Jews, but I have very low confidence in these results. Intra-Jewish gossip points out the Lithuanians as the geniuses among world Jewry, but doesn't have any similar suggestions about Hungarians. And torsion dystonia, maybe the most clearly IQ-linked disease, is unique to Lithuanians and absent in Hungarians.

Probably much more promising is just to focus on the obvious facts of the social situation. Early 1900s Hungary was a great nation and a prosperous center of learning. Remember, we're talking about the age of the Austro-Hungarian Empire, one of the most industrialized and dynamic economies of the time. It might have had advantages that Poland, Romania, and Russia didn't. My [list of his-](#)

[torical national GDPs per capita](#) is very unimpressed by the difference between Hungarian and Polish GDPs in 1900, but maybe it's wrong, or maybe Budapest was an especially modern part of Hungary, or maybe there's something else I'm missing.

Also, there could have been a difference in the position of Jews in these countries. Russia was still experiencing frequent anti-Jewish pogroms in 1900; in Hungary, Jews were among the country's most noble families. Actually, the extent of Jewish wealth and influence in Hungary sort of defies belief. According to Wikipedia, in 1920 Jews were 60% of Hungarian doctors, 50% of lawyers, 40% of engineers and chemists, and 90% of currency brokers and stock exchange members. "In interwar Hungary, more than half and perhaps as much as 90 percent of Hungarian industry was owned or operated by a few closely related Jewish banking families."

So Central European Jews – the Jews in Hungary and Germany – had a unique combination of intellectual and financial advantages. This means Hungary's only real rival here is Germany. Since they were rich, industrialized, and pretty liberal about Jewish rights at the beginning of the 20th century – and since they had just as many Jews as Hungary – we should expect to see the same phenomenon there too.

And we kind of do. Germany produced its share of Jewish geniuses. [Hans Bethe](#) worked for the Manhattan Project and won a Nobel Prize. [Max Born](#) helped develop quantum mechanics and also won a Nobel Prize. [James Franck](#), more quantum physics, another Nobel Prize. [Otto Stern](#), even *more* quantum physics, yet *another* No-

bel Prize. [John Polanyi](#), chemical kinetics, Nobel Prize (although he was half-Hungarian). And of course we probably shouldn't forget about that [Einstein](#) guy. All of these people were born in the same 1880 – 1920 window as the Martians in Hungary.

I think what's going on is this: Germany and Hungary had about the same Jewish population. And they produced about the same number of genius physicists in the same window. But we think of Germany as a big rich country, and Hungary as a small poor country. And the German Jews were spread over a bunch of different cities, whereas the Hungarian Jews were all crammed into Budapest. So when we hear "there were X Nobel Prize winning German physicists in the early 1900s", it sounds only mildly impressive. But when we hear "there were X Nobel Prize winning physicists from Budapest in the early 1900s", it sounds kind of shocking. But the denominator isn't the number of Germans vs. Hungarians, it's the number of German Jews vs. Hungarian Jews, which is about the same.

## V

This still leaves one question: why the period 1880 to 1920?

On further reflection, this isn't much of a mystery. The emancipation of the Jews in Eastern Europe was a difficult process that took place throughout the 19th century. Even when it happened, it took a while for the first generation of Jews to get rich enough that their children could afford to go to fancy schools and fritter away their lives on impractical subjects like physics and chemistry. In much of



Eastern Europe, the Jews born around 1880 were the first generation that was free to pursue what they wanted and seek their own lot in the world.

The end date around 1920 is more depressing: any Jew born after this time probably wasn't old enough to escape the Nazis. Almost all the famous Hungarian Jews became physics professors in Europe, fled to America during WWII using channels open to famous physicists, and then made most of their achievements on this side of the Atlantic. There are a couple of stragglers born after 1920 who survived – George Soros' family lived because they bought identity documents saying they were Christian; Andrew Grove lived because he was hidden by [righteous Gentiles](#). But in general Jews born in Europe after 1920 didn't have a great life expectancy.

All of this suggests a pretty reasonable explanation of the Martian phenomenon. For the reasons suggested by Cochran, Hardy, and Harpending, Ashkenazi Jews had the potential for very high intelligence. They were mostly too poor and discriminated against to take advantage of it. Around 1880, this changed in a few advanced Central European economies like Germany, Austria, and Hungary. Austria didn't have many Jews. Germany had a lot of Jews, but it was a big country, so nobody really noticed. Hungary had a lot of Jews, all concentrated in Budapest, and so it was really surprising when all of a sudden everyone from Budapest started winning Nobel Prizes around the same time. This continued until World War II, and then all anyone remembered was “Hey, wasn't it funny that so many smart people were born in Budapest between 1880 and 1920?”

And this story is really, really, gloomy.

For centuries, Europe was sitting on this vast untapped resource of potential geniuses. Around 1880, in a few countries only, economic and political conditions finally became ripe for the potential to be realized. The result was one of the greatest spurts of progress in scientific history, bringing us relativity, quantum mechanics, nuclear bombs, dazzling new mathematical systems, the foundations of digital computing, and various other abstruse ideas I don't even pretend to understand. This lasted for approximately one generation, after which a psychopath with a stupid mustache killed everyone involved.

I certainly can't claim that the Jews were the only people being crazy smart in Central Europe around this time. This was the age of Bohr, Schrodinger, Planck, Curie, etc. But part of me wonders even here. If you have one physicist in a town, he sits in an armchair and thinks. If you have five physicists in a town, they meet and talk and try to help each other with their theories. If you have fifty physicists in a town, they can get funding and start a university department. If you have a hundred, maybe some of them can go into teaching or administration and help support the others. Having this extra concentration of talent in central Europe during this period might have helped Jews and Gentiles alike.

I wonder about this because of a sentiment I hear a lot, from people who know more about physics than I do, that we just don't get people like John von Neumann or Leo Szilard anymore. That there was some weird magical productivity to the early 20th century, es-

pecially in Central Europe and Central European immigrants to the United States, that we're no longer really able to match. This can't be a pure numbers game – the Ashkenazi population has mostly recovered since the Holocaust, and people from all over the world are coming to American and European universities and providing more of a concentration of talent than ever. And even though it's impossible to measure, there's still a feeling that it's not enough.

I started down this particular research rabbit hole because a friend challenged me to explain what was so magical about early 20th century Hungary. I think the Jewish population calculations above explain a lot of the story. I'm not sure whether there's a missing ingredient, or, if so, what it might be. Maybe it really was better education. Maybe it really was math competitions and talent searches.

Or maybe it was superintelligent Martian scouts with an Earthling fetish.