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Background paper for the conference on John von Neumann,  
organized by the Princeton Institute for International & Regional Studies  
and the John Templeton Foundation,  
The Witherspoon Institute, Princeton, NJ  
October 5-6, 2007

# **The Social Construction of Hungarian Genius**

## **(1867-1930)**

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## Abstract

Commissioned by the Princeton Institute for International and Regional Studies (Princeton, NJ) and the John Templeton Foundation (West Conshohocken, PA), the intention of this paper is to provide a broader background—historical, social, intellectual, and cultural—to understanding the admirable creativity in early 20th century Hungary, with the mathematician and scientist John von Neumann (1903-1957) in center focus.

As a starting point to a Princeton conference on John von Neumann, this text discusses many impulses influencing the making of this great mind, presenting him by way of *prosopography*, as a vision of his generation rather than just of his own personal biography. Nevertheless, the essay still focuses in many ways on John von Neumann—his birthplace, his national, social, religious and family background, his contradictory Judaism and conversion, his schooling, his early career in Hungary and Germany, his musical interest, his exile, and, yes, his genius. Readers of this paper should also look upon the chapters, connected by and through the unique mind and personality of von Neumann, as comments on his life and times as well as those of his brilliant Budapest contemporaries. An effort has been made to approach the thoughts and ideas, as well as the atmosphere and intellectual aura of von Neumann and his generation, the survivors of which the present author knew as a young man, and intimately well.

In an effort to identify the conditions of “Hungarian genius,” particularly, though not exclusively, in the case of a mathematician and scientist such as von Neumann, one may come to the following propositions:

1. Hungarian history witnessed innovation as a survival strategy, both for individuals and for the nation as a whole. A nation often on the defensive, surrounded by potential invaders, had to be inventive in order to survive, and this inventiveness was also evidenced in the Hungarian intellectual world, gradually overturning a conservative emphasis on authoritarian control, conformity and rote learning.
2. Because of the traditionally elitist nature of Hungarian (and Central European) education, universities could absorb only a fragment of the available research talent, and some of this talent found its place in high schools. Moreover, as the very definition of the teaching occupation included original research, gifted students of the best schools encountered brilliant researchers at a much earlier age than in the U.S.
3. As of the late 19<sup>th</sup> century, feudal privilege started to decline, hereditary prerogatives came under attack, and occupational status gradually evolved as a source of prestige. This was a particularly welcome opportunity for the transformation of a variety of marginal ethnic, social, and religious groups that never had access to hereditary privilege, and this encouraged the infusion of Jews into the world of learning – in exchange, as it were, for their growing willingness to assimilate into the *Magyar* nation. The fact that the state wished to increase the number of people self-identified as Hungarians in this multiethnic country, opened doors that were closed elsewhere, at least for a time. Previously excluded groups could flood into these vocational domains and make a mark for themselves.

4. The rapidly developing economy of the Austro-Hungarian Monarchy fostered a premium on the development of technology, mathematics, medicine, science and finance, whereas, conservative control was often exercised over humanities and the arts, both viewed as being more political.

5. The newly established (1873) capital city of Budapest played an outstanding role in generating new, modern culture, and spreading an innovative spirit in and out of the country. Budapest developed as a center of culture and learning, and by the beginning of the 20<sup>th</sup> century, a special social and intellectual chemistry there resulted in especially creative and productive thinking, with Mathematics and music the best examples of this “Budapest chemistry.”

6. Intellectual, artistic, and musical talent acquired high prestige. A cultural premium on the idea of competitive knowledge poured into education. Practices like competitions and specialized journals for high school students designed to surface unusual abilities, led to a celebration of gifted students, providing a different kind of prestige than occupational status alone. A cultural emphasis on modernism paved the way to an increasing internationalization, mainly in the best schools of fin-de-siècle Budapest that prized experimentation, inductive reasoning, pattern-breaking innovation, less formal relations between teacher and student, and personalized education.

7. Culture transfer, mostly from Germany, helped shape Hungarian arts and sciences at the highest level of European education. The influence of the German school system, of German art, music and science, directly benefited Hungary and had a major impact on teaching, learning and research. Much of the result was later exported once again by eminent exiles— from Hungary back to Germany, and then from Germany to the United States.

8. The period of 1918-1920 marked the end of the Austro-Hungarian Monarchy and historical Hungary within it, creating a vastly different period in national history, and with some of the best minds, most of them Jewish mathematicians, scientists and musicians, compelled to leave the country. Despite profoundly different political conditions that followed, some of the great traditions of education, particularly science and mathematics education have survived until today.

# I

## The Secret of Survival: An Introduction

### Problem Solving in Hungarian History

For all the centuries of political failure, Hungarians at the individual level have evidently thrived, developing an art of survival and a readiness to restart their lives against all odds. They have mastered a special kind of tenacity to prevail under highly adverse circumstances in the stormy heart of Europe into which their ancestors led them, late in the ninth century A.D., on what was no doubt originally seen as a temporarily forced stopover that has now lasted more than eleven hundred years. They have endured in those ‘Lands Between,’ to use the telling phrase of the British historian Alan Palmer, at the meeting-point of North with South and West with East, at the confluence of some of the largest and most powerful empires in world history. The Roman, Ottoman, Russian, Holy Roman, Habsburg, Napoleonic French, Nazi German, and Soviet empires all stretched as far as Hungary and at some time laid claim to part or all of her territory, treating it as war booty, a border area, a *cordon sanitaire*, or a defensive line.

The Hungarians have never been able to ward off such powerful empires for long, yet they have always been able to perpetuate themselves as a nation, even if that was sometimes merely a virtual entity, and as an indigenous culture. Located in a region of the world that has an almost in-built geopolitical menace as a honey-pot for hungry neighbors, Hungary and the Hungarians have been indefatigable and unwavering in their determination to outwit, outmaneuver, and outlast their adversaries, and continually resurrect their nation: predestined losers, perhaps, yet shrewd survivors all the same.

Hungarians typically tend to suppose that their country’s story is one of failure. They were beaten by many enemies, failed in repeated revolutions and wars of independence, and were on the losing side in two world wars. The country was overrun by Mongols in the thirteenth century, by Ottoman Turks in the sixteenth, by Germans and Soviet Russians in the twentieth and in between, it spent nearly half its entire history under foreign domination as part of the Habsburg Empire. When it finally regained sovereignty in 1920, after almost 400 years, that was at the price of losing over two-thirds

of its historical territory and some three and a half million kinsmen. Many national political leaders died in exile, including Prince Ferenc II Rákóczi, Governor-President Lajos Kossuth, President Count Mihály Károlyi, Regent Adm. Miklós Horthy, and the Communist dictators Béla Kun and Mátyás Rákosi. A distressingly long list of the country's best minds were also 'lost' to the West, including all (arguably fourteen) Nobel laureates of (sometimes arguably) Hungarian origin—among them, Georg von Békésy, János Harsányi, Georg de Hevesy, György Oláh, Albert Szent-Györgyi, and Eugene Wigner—as well as composers Franz Liszt, Béla Bartók, and Ernő (Ernst von) Dohnányi; Albert Szirmai, Paul Abraham; conductors Fritz Reiner, George Szell, Eugene Ormandy, Sir Georg Solti, Antal Doráti, Ferenc Fricsay, István Kertész, Eugen Szenkár, Georges Sebastian; internationally acclaimed violinists from the school of Jenő Hubay such as Joseph Szigeti, Stefi Geyer, Ferenc (Franz von) Vecsey, Emil Telmányi, Ede Zathureczky, and Yelley d'Aranyi; scientists Leo Szilard, Edward Teller, Theodore von Kármán, Michael Polanyi; mathematicians John von Neumann, George Pólya, John Kemény; film directors and producers Sir Alexander Korda, Michael Curtiz, and Joe Pasternak; pioneering film-theoretician Béla Balázs (*Der sichtbare Mensch*, 1924),<sup>1</sup> photographers Brassai (Gyula Halász), Robert Capa, and André Kertész; artists/designers Laszlo Moholy-Nagy and Marcel Breuer; social scientists and scholars such as Georg Lukács, Karl Mannheim, Arnold Hauser, Charles de Tolnay, Frederic Antal, Ernő Kállai, Otto Gombosi, Arthur Koestler, and Karl Polanyi, and a host of others. Though they made their reputation in Germany, many avant-garde artists such as Sándor Bortnyik, Lajos Kassák, Hugo Scheiber, and Béla Kádár returned to their native Hungary before Hitler took over, many in the 1920s.<sup>2</sup> Only a few artists stayed outside the country and left later for the United States.

Yet is it right to regard Hungary's history as one of either abysmal failure or unparalleled success? More likely, it is both these things at once. The outcome is a national mentality that is split between a sense of inferiority and an exaggerated sense of self-worth; insecurity and self-pity on the one hand, overconfidence and inflated national ego on the other—both extremes equally justified and unsound in their hyperbole.

Intellectual ferment in Hungary, particularly in fin-de-siècle Budapest, stimulated the growth of a uniquely gifted generation. Changes in the structure and organization of

Hungarian and particularly Budapest society, and the distinguishing features of Hungarian assimilation helped to bring about a typically Hungarian, and more particularly Budapest, talent. In order to better understand this social process, it is important to note that patterns of assimilation in pre-World War I (Austria-)Hungary and the United States demonstrated a number of remarkable similarities.

The Hungarian background, schooling, and social connections largely contributed to the future foreign, mostly American success of these easily assimilating achievers. Émigré Hungarians transplanted a set of values and patterns of thinking that were viewed as unique outside Hungary, and particularly in the United States — in Hungary, however, those were shared by a broad social layer, the emerging Hungarian middle class. With fascination, contemporaries tried to understand the hidden dimensions of what they labeled the “Hungarian mystery.”<sup>3</sup> This paper offers possible psychological, social, educational, political, and economic explanations for some of the special, distinguishing features of the Hungarian, in fact often Jewish-Hungarian mind, in and out of Hungary.

The social and legal interplay of Jewish-gentile relations such as religious conversion, mixed marriages, *Magyarization*, and ennoblement became relevant immediately before and after World War I, as well as during the social and political crises of 1918-1920. The early years of the 20th century were particularly prone to condition social and cultural change, while the immediate post-World War I scene favored intellectual and professional emigration from Hungary. It is from this period of upheaval, and particularly from the protracted turning point of 1918-1920 (the liberal-bourgeois revolution of 1918-1919, the Hungarian ‘republic of councils’ of 1919, the White Terror of 1919-1920 and the Treaty of Trianon, 1920) that social and political change in Hungary can be best understood and reinterpreted, particularly in terms of the problems of Hungary’s middle-class, for a long time more German and Jewish than Hungarian.

One of the central theses of this study suggests that most of the people who left Hungary in 1919 and the early 1920s were either directly involved in running one or the other of the revolutions of 1918-19, and/or were, as a consequence, threatened by the ensuing anti-Semitism that was unleashed in the wake of that disastrous political and social experiment. It is sadly ironic that most Hungarian Jews who felt endangered after 1919 were in fact more Hungarian than Jewish, representing mostly an assimilated, Hungarianized,

typically non-religious middle or upper-middle-class which had profoundly contributed to the socio-economic development, indeed, the modernization of Hungary. Their exodus was a tremendous loss for the country just as it became a welcome gain for the United States and for all the other countries they chose to settle in.

Leaving Hungary should not be viewed exclusively in terms of a proper and final *emigration* but in most cases as a temporary effort or as a link in a process of step migration. At this point, staying out of Hungary permanently was very rarely considered. To understand the nature of this step migration Berlin (and other German cities) had to be seriously studied as the single most important point(s) of transfer. Together with several other German cities, the capital of Germany was already a favorite of Hungarian intellectuals well before World War I. In turn it was logical that, prior to the takeover of Hitler, Berlin functioned as a Hungarian cultural center in exile. The German capital also gave many Hungarians a foretaste of America and modernism. The Americanization of Berlin is viewed as an important dimension of trans-Atlantic migrations and knowledge transfer, for the German period that often preceded emigration to America acted as a bridge between the two cultures.

Irrespective of their nationality, the rise of Hitler and the Nazi party forced all leftist, liberal, and Jewish intellectuals to leave Berlin and, subsequently, most of Europe. Thoroughly Germanized by that point, most Hungarians left for the U. S. as part of the huge German exile group. These German-Hungarian refugees were highly visible and superbly qualified; generally to be well received in the United States, as the people involved served important U.S. interests in technological development and modernization, later in the war effort. The relatively easy ("non-quota") admission of this group was in marked contrast to the restrictionist spirit of the Quota Laws, the National Origins provisions, as well as the social psychological impact of the great economic depression, which heightened U.S. xenophobia and anti-Semitism. By admitting the useful few, United States immigration policies adhered to the principle and practice of the Quota Laws, but also went a step further in the selection process, preferring mental over physical abilities.

Central European immigrants in the interwar period (1918-1939) transplanted some essential elements of modernism and problem solving as well as the general values of the classical European heritage. The American success of Hungarian immigrants of this period may partly be attributed to the specific intellectual qualities they brought from Budapest.

Driven away on "racial" grounds, however, the very impressive group of émigré intellectuals from post-Versailles Germany and, also, from post-Trianon Hungary were given a fairly warm welcome once they had demonstrably contributed to the educational and cultural standards of their host country. It is a paradox that the victims of racial discrimination in Hungary were often discriminated against in the U.S. as well.

The success of Hungarian intellectual immigration needs no demonstration here. Their careers and particularly their American period should be interpreted in relation to Central European modernism and, often, heuristic thinking and their reception in the United States.

It is important to note that the earlier experience of this group with assimilation in Hungary seems to have contributed to the rapid success of their Americanization. Several of the émigré professionals or their families underwent repeated assimilation in quick succession; they often became double exiles, resulting in double or multiple identities and loyalties.<sup>4</sup>

### **“The Lands Between:” The Setting**

Many nations claim to lie at the center of Europe, and Hungary is no exception. At the same time, however, it has an isolated language and culture. Its location in the Carpathian basin means it is surrounded by some of Europe’s highest mountain ranges, set around the River Danube and its many tributaries, big and small. With its large expanse of arable land and continental climate, it has become one of the bread- and fruit-baskets of Continental Europe.

Until World War I (1914-1918), Hungary included large regions, which today make up foreign states in their own right, as in the case of Slovakia and Croatia, or now form part of Romania, the Ukraine, Serbia, and Austria. Once almost the size of the state of Arizona or modern Italy, Hungary was reduced to a small (35,907 square mile), landlocked country, resembling in size Indiana or Portugal. The national coat of arms still depicts the four major rivers and three large mountains that the country once boasted. That one-time kingdom of the millennium founded in 1000 A.D. is still commemorated in the much vaunted, and often profaned, royal crown of St. Stephen, the first king of

Hungary (1000-1038), whose long and successful reign put the country on the map of Christian Europe through its alignment with the religious values of the medieval West that came with embracing of Roman Catholicism.

The Hungarians brought their isolated language—a branch of the Finno-Ugrian family of languages, which includes Finnish, Estonian and a scattering of minor, near-extinct relatives—from the Ural region of Russia. Because of the singularities of their language, they have never been able to shake off a sense of isolation throughout the 1,100 years that they have spent surrounded by Slavs, Germans, and Latins. That has endowed the nation with an aura of apartness and loneliness, which has helped foster a sense of exceptionalism and pride that are prevalent to the present day. Unrelated to any neighbor's language, the Hungarian vernacular nevertheless preserves elements of all the tongues its speakers came into contact with in the course of their long migrations to their present homeland, incorporating extensive vocabularies from Germans, northern and southern Slavs, Romanians, and Turks. Most tellingly, Hungarians continued to use Medieval Latin as a literary language up until the fifteenth century, and as the official language of administration, legislation, and schooling right up until 1844, making Hungary one of the few countries in the world where Latin survived as a living language well into the modern era. In addition, German increasingly became the *lingua franca* by which Hungary communicated with other areas of the Habsburg Empire, to which it was officially yoked as a result of a marriage contract with the Habsburg dynasty that took effect after the death, in 1526, of Lajos (Louis) II, independent medieval Hungary's last king in the battle of Mohács against the invading Ottoman army.

Isolation thus became both a destiny and a virtue, making it imperative for Hungarians to interact with other cultures, use other languages and borrow from the vernaculars of all the neighboring ethnic groups of the region. That readiness to express themselves in diverse tongues and take over, or share, alien idioms and other cultural paradigms has had a big hand in keeping them relatively open to the outside world, encouraging an engagement with other cultures and the evolution of cultural pluralism which has been a hallmark of the Hungarian tradition.

As many villages of old Hungary's far-flung border areas were ethnically mixed, multi-culturalism, cross-fertilization, and assimilatory drift have all been standard

features of Hungarian society and culture since the Middle Ages. In receiving a wide variety of immigrants over the centuries, Hungary has absorbed and been enriched by an astonishing range of influences, showing considerable ability to adapt many of the features of what constitutes ‘Hungarianness’ to the ebb and flow of those impacts.

The geography and geopolitics of the Danubian basin have obliged the Hungarians to struggle for survival during most of their national history. There have been few opportunities for them even to contemplate, let alone embark upon, expansionist adventures. An attempt was made, albeit fruitlessly, in the tenth century, and although Lajos I (Louis the Great) was more successful on behalf of the House of Anjou in the fourteenth century, and Mátyás (Matthias) Hunyadi managed to enlarge an already unwieldy realm at the expense of its neighbors in the fifteenth, the country was more often itself the target of foreign imperial encroachments. A bloody battle at Mohács in 1526 put an end to the independent kingdom of Hungary, initiating a prolonged struggle against the Ottoman and, later, the Habsburg Empire, a period that ultimately saw Hungarian sovereignty vanish altogether.

The anti-Ottoman and anti-Habsburg struggles are central to any understanding of the Hungarian mind in the early modern and the modern era, generating both a fiercely nationalistic sentiment, and a pervasive sense of victimization, threat, and fear. The dominant national mood in the late nineteenth century was still, at bottom, defensive in nature, even though Hungarian nationalism had by then turned to aggressive intolerance of neighboring ethnic groups. It is a tragic irony of history that when the long-cherished desire to regain national independence was finally met after World War I, the country lost over two-thirds of its original territory and a goodly proportion of its native speakers.

Hungary’s early modern history was so much taken up with strife that it was granted little respite, few of the sustained periods of tranquility and security that a nation needs in order to nurture and develop its non-martial talents. Yet its cultural achievements in the eighteenth and nineteenth centuries were impressive, notably in the fields of mathematics (János Bolyai), medicine (Ignác Semmelweis), mining (at Selmecbánya), theology (Péter Cardinal Pázmány), to give just a few shining examples. The renewal of the national language during the early decades of the nineteenth century stimulated the emergence of a great generation of innovative poets, novelists, essayists,

and writers in general—Mihály Vörösmarty, Sándor Petőfi, and János Arany foremost amongst them—who helped to shape the Hungarian language and its literature into a more flexible vehicle to meet the needs of a by then rapidly changing world. In parallel, the emergence on the political stage of reform-minded figures such as Count István Széchenyi, Lajos Kossuth, Ferenc Deák, Baron József Eötvös and Count Lajos Batthyány mediated a transformation to national politics in the modern sense of the word.

Under these illustrious leaders, Hungary fought a bitter fight against the Habsburgs in 1848-1849, the longest revolution and war of independence of that turbulent time in Europe. The war gave birth to a short-lived republic in 1849; more importantly, it put Hungary on the political map, thanks in no small measure to the oratorical genius of Kossuth in exile. This effort bore fruit when international political events in the 1860s forced Austria to regroup and abandon the monolithic structure of the Habsburg Empire, firmly centered on Vienna, for the Austro-Hungarian ('Dual') Monarchy. The Compromise (*Ausgleich*) of 1867 created unparalleled economic opportunities for Hungary, opening up a 'golden age' of rapid economic and social advance and Great Power status that is still looked back on with nostalgia and fondness.

Whilst Hungary continued to be the breadbasket of Central Europe, that half-century of prosperity, with no internal war, gave her a modern industrial base, up-to-date communications, and a thriving international commerce and banking sector. In 1873, the hitherto separate municipalities of Buda, Old Buda, and Pest were unified as a newly inaugurated capital city of Budapest, vying with Vienna in ambition and splendor. By the turn of the century, that metropolis was the very symbol of the era with its magnificent avenues and boulevards, its imposing public buildings, its subway (the first in continental Europe), its opera house, theaters, museums, thermal baths, hotels and great parks. However, this was also a highly productive period for the sciences, the humanities, and the arts. The University of Budapest and its prestigious faculty was blossoming, Franz Liszt had founded the Academy of Music that bears his name to this day; new medical clinics approached the highest standards in Europe; and achievements at these higher levels were sustained by the general excellence of the country's secondary schooling.

Defeat in World War I ended all pretensions Hungary had to Great Power status. The ensuing revolution of 1918, and particularly that of 1919, played a big part in the

blame for Hungary's wartime misfortune and subsequent foreign occupation being shifted onto the country's Jewish population. As in Austria and Germany, the Jews often came to be perceived as a monolithic, alien, leftist, disruptive element in society. Though this was a gross travesty of the realities of the situation, it gained credence from the fact that many of the leaders of the 1919 Commune, the 'republic of councils,' a short-lived offshoot of Lenin's 1917 Bolshevik Revolution of 1917, were of Jewish descent.

The Peace Treaty of Trianon provided a final blow in 1920 to a most promising and thriving period of cultural development. Grand Trianon, the bigger of the two small châteaux in the park of the great palace of Versailles, where Hungary signed a humiliating peace treaty with the Allies on June 4, 1920, became synonymous with defeat, disgrace, and despair—with little doubt, the single most important event in modern Hungarian history. The territorial and population concessions dictated by the treaty turned Hungary overnight into an independent, but small, landlocked and vulnerable state, and one that was equipped with a full-blown small-country complex.

In the poisonous atmosphere engendered by being on the losing side in the war and seeing the country stripped of so much of its historical lands, the new régime that installed itself under Admiral Horthy in the fall of 1919 produced the continent's first anti-Semitic legislation of that century, the 'Numerus Clausus' (Law XXV of 1920), which effectively barred most students of Jewish origin from entering higher education. Though the system largely lapsed, for a while, by the end of the decade, it was a powerful spur for many bright young Hungarian intellectuals of Jewish background to leave the country and complete their education or seek employment elsewhere, especially (prior to Hitler's rise to power) in the German-speaking parts of Europe, which then included the German universities of Germany, Austria, Switzerland, as well as Prague and Brno in Czechoslovakia. Many no doubt would have preferred to emigrate to the United States, but entry was made extremely difficult by the introduction of the quota system, starting with the emergency immigration restriction law of 1921, and finalized by the even more restrictive national origins scheme of the Reed-Johnson Act of 1924, under which a mere 869 (later only 473) persons annually were to be admitted from Hungary.

As events were to prove, Hungary thereby lost large numbers of budding natural scientists, physicians, engineers, musicians, architects, musicians, artists, film-makers,

sociologists, and authors, who would go on to make distinguished names for themselves years and sometimes decades later in the West. That was compounded by further rounds of increasingly drastic anti-Jewish legislation in 1938-41, now increasingly modeled on that introduced in Nazi Germany.

The still predominantly elitist and highly conservative school system, feudal in its politics, managed nevertheless to maintain such high academic standards that, despite the loss of some of the very brightest students, several Hungarian universities held their place, continuing to produce a stream of graduates who went on to demonstrate excellence in many fields, from mathematics and chemistry to medicine, music, and engineering, the positive effects of which were still evident after World War II.

The entire history of Hungary in the inter-war period and during World War II can best be understood as a quest to regain the lost territories. That quest led the country to support, and enter the war on the side of, Hitler's Germany, albeit as a somewhat 'unwilling satellite,'<sup>5</sup> though the support included contributing to the Holocaust by officially ordering the ghettoisation of its large Jewish population and facilitating the deportation of the great bulk of that community to perish in Hitler's gas chambers.

Hungary managed to avoid active involvement until 1941 but was then caught up on the horns of the dilemma of whether to fear the Nazis or the Soviets most. In truth, the die had been cast long before, given the long tradition of pro-German orientation, including alliance during World War I, and the adverse experience of the country's experiment with Bolshevism in 1919. Disastrously, an army corps was committed to Hitler's invasion of Russia. It is a measure of the reluctance of Hungary's support, however, that Hitler deemed it necessary to order an army of occupation into the country in March 1944 in an effort to keep her on his side. With Germany deciding to make a stand in Hungary against the advancing Red Army by the end of that year, the outcome was virtually inevitable. World War II saw the demise of a productive and rich culture. Having ousted the Germans, the Soviet Union sponsored a fledgling but aggressive local Communist Party under Mátyás Rákosi, which rapidly proceeded to seize full control over the now nominally democratic Hungary. By 1947-1948 the country had effectively lost whatever slight independence it possessed and was thence absorbed into the Soviet bloc.

One singularly important episode that made the subsequent Cold War history of Hungary very different from that of all other Soviet satellites: the Revolution of 1956. Though this failed to achieve its aim of gaining Hungary her sovereignty, it showed the world that the USSR was vulnerable, and that Hungarians were ready to die rather than accept a humiliating defeat.

This had important legacies. First, the appalling bloodshed and recriminations served as a warning to hold the post-revolutionary régime during the 32 years under János Kádár, to a more liberal and tolerable course than anywhere else in East-Central Europe. Second, it made the 1989-1990 transition to democracy, independence, and capitalism smoother, speedier, and more civilized than in most neighboring countries. Significantly, too, Hungary still retained a capacity to produce excellence in various fields, particularly in the areas of scientific endeavor that could largely escape direct contamination by political ideology, though it is unfortunate that even here slavish imitation of Soviet models resulted in a division of efforts and resources between the universities and the Hungarian Academy of Sciences that weakened the universities. Despite the pressures and adverse circumstances, the educational system managed to preserve a large measure of its high professional standards in training the intellectual and professional elite who are now set to move the country into “Europe.”

### **Hungarian Creativity: A Social History**

Hungarian creativity is embedded in a complex tradition. Two aspects have to be particularly emphasized: the almost constant entanglement with internal and international conflicts, wars, revolutions and the long coexistence with German culture and civilization. Often in a cross-fertilizing way, both left a lasting imprint on the Hungarian mind, its ways to solve problems, create new ideas, and organize thoughts.

The standard joke about Hungarians is that they are the ones who can enter a revolving door behind you in but leave ahead of you. A back-handed compliment, to be sure, but if there is such a thing as national character, then it can be taken as a sign of sneaking respect for a certain shrewdness, ingenuity, originality, and an uncommon approach to problem solving. Through the long centuries of Habsburg rule and beyond,

German philosophy, science, literature, education, music shaped and harnessed the intellectual energies and talents of subsequent Hungarian intellectual generations.

These were aptitudes bred by the vicissitudes of Hungary's history, which put a premium on Hungarian cunning, bold determination, and unexpected reactions to contend with the challenges of the day. Inventiveness was the weapon by which adversaries were deceived and outfoxed, wrong-footed and trapped, riposted and refuted. The social history of the Hungarian cast of mind—indeed the way of thinking across much of East-Central Europe—is deeply rooted in war and conflict, abetted by a foe of an entirely different nature: poverty. Naturally well-endowed as Hungary is, most of its inhabitants down the ages have faced hardship, and often outright privation, which in 1920 called for considerable resourcefulness just to survive. Survival strategies had to be developed as a matter of course to obtain a bare minimum of food, clothing, shelter, and protection. A keen sense of the unpredictability of the future engendered in many a certain cynical, ironic, flippant, devil-may-care attitude whereby they were ready, almost without a thought, to sacrifice themselves for king and country. Equally, many have been prone to feelings of pessimism, hopelessness, disillusionment, as reflected in the appallingly high suicide rates that typify the region. Lamentation over the nation's lost glory permeates Hungarian poetry, painting, opera, indeed the words of the national anthem itself, as penned by the early 19<sup>th</sup> century poet Ferenc Kölcsey (1790-1838): although there is always a sense that individual courage may count, the nation as a whole is doomed.

A *sine qua non* of this blend of national quirks has been a propensity for problem solving, which permeates all aspects of life, from the most mundane to the highly abstruse. Much of this came from the multiethnic, multicultural, multilingual nature of Hungarian and Austro-Hungarian society, which constantly provided problems to be solved—economic, social, political, and cultural. Hungarians have been ready to accept whatever solutions they could find or devise, even if that has meant flying in the face of received yardsticks or devising new, unorthodox approaches—provided, of course, that these served their purpose. One may conjecture that this call for problem solvers goes part way to explaining the country's longstanding abundance of brilliant mathematicians, to mention János Bolyai, Lipót Fejér, John von Neumann, George Pólya, and Paul Erdős as merely the best-known in a seemingly unending succession of outstanding talents

which spills over, beyond the realm of pure mathematics, into physics, chemistry, engineering, and many other fields.

A potent factor in maintaining that record of achievement lay in the manner secondary schooling was reorganized after the Compromise of 1867. In 1870-72, the educationist Mór Kármán, father of aviation pioneer Theodore von Kármán, was commissioned by the minister of education Baron József Eötvös, to undertake a first-hand study of Germany's acclaimed high-school system. This laid the ground for ensuring that the best Hungarian schools consistently had access to first-class teaching resources capable of encouraging students to standards of attainment that compare favorably with many (and not just lower-tier) colleges in the United States today. On the German model, the high school, or *Gymnasium*, placed heavy emphasis on the Classics, Hungarian language and literature, and universal culture, without neglecting mathematics and the natural sciences. These were unashamedly elitist institutions, with a student intake drawn typically from a rather narrow upper-middle section of Hungary's than still relatively conservative, even feudalistic society. However, they could attract teaching staff of a very high caliber; many of them recognized scholars in their own fields, as reflected in their subsequent membership of the Hungarian Academy of Sciences and appointment to university professorships. As a result, the country's top schools, such as the Lutheran high school in Pest or the *Mintagimnázium* (The 'Model') of the University of Budapest, succeeded for several decades in cultivating an astonishingly consistent succession of brilliant young minds, of whom John von Neumann, Eugene Wigner, Edward Teller, and Theodore von Kármán, were only a few of the more prominent.

The German influence during this era also reached more widely, with Hungary in many ways constituting itself an outpost of German culture, whose icons—from writers Goethe and Schiller or philosophers Kant and Schopenhauer, through composers Beethoven, Brahms and Wagner, or painters Kaulbach and Piloty, to scientists Gauss, Haeckel and Brehm—were held in unparalleled esteem. Even news of the wider world outside the German universe usually reached Hungarian aristocratic libraries or the coffeehouses and salons of Budapest's middle classes refracted through the medium of the German language and, inevitably, cultural paradigms.

Of course, there was also animosity to innovation: Conservatism prevailed in much of the Austro-Hungarian Monarchy. Although Hungary was in several ways an ideal creative spawning ground, many of its achievements were made in the face of official Austrian and Hungarian disapproval. For the greater part of the nineteenth century the national tradition was conservative and the mentality hostile to innovation—not least due to the obverse side of German and Austrian culture, with its authoritarian insistence on strict and often antiquated rules and standards, established patterns of thinking, and unalterable methods. The general ambiance favored preserving the *status quo* rather than supporting new ideas, and accordingly the ruling conservative forces of the pre-1867 period ignored or spurned many reform-minded Hungarians, which more often than not led to exile, the lunatic asylum or to suicide. There is of course a contradiction here between conservatism and renewal, which was seen and shown in many different occupations and life styles.

After the Austro-Hungarian Compromise of 1867, however, Franz Joseph I, Emperor of Austria (1848-1916) and Apostolic King of Hungary (1867-1916), whether he liked it or not, presided over a tide of change during the half a century of his ‘dual’ Monarchy. Innovative spirits flourished in many walks of life; big industrial firms sprang up and in their search for competitive edge founded product-oriented experimental laboratories in fields as diverse as telephony, lighting, pharmaceuticals, armaments, and electric locomotion, to name just a few. Later generations were to look back on these as the “good old days” of peace and prosperity.

At the same time, the likes of Sigmund Freud, Franz Kafka, Robert Musil, Lajos Kossuth, and Endre Ady, in their very different ways, were all highly critical of the Habsburg monarchy and exposed its troubled nature. In many ways, as the poet Endre Ady said, official Hungary was a ‘cemetery of souls,’ where new ideas were still doomed to failure. Unfortunately, the country was unable to sustain either full employment or a bare modicum of social services. Between the 1880s and World War I, one and a half to two million people left Hungary, mainly for the United States, as part of an unparalleled international migration. Their exodus, in some ways a natural and recurrent historical pattern, was essentially economic, a search for work by, in many cases, uneducated, illiterate peasants that would enable them to remit part of their pay packet to their

families back home or, having ‘made it’, return with whatever earnings they had managed to save. Indeed, the majority of these masses are more properly considered “birds of passage,” rather than as true ‘emigrants’ in the sense that many of them never intended to become American citizens and longed to return to their native land. Many were stranded there by World War I and its aftermath, however, with the collapse of the Monarchy and Hungary’s subsequent dismemberment and dire economic plight leaving nothing to which they might return.

The economic advance that occurred under the Austro-Hungarian Monarchy, however, did spur further development of the Hungarian language to furnish it with an adequate technical vocabulary to serve as a continued vehicle for professional communication and understanding—again reflecting the willingness of the culture to adapt itself to the modern world. This was particularly notable at the universities, where Hungarian gradually displaced German as the main language of tuition. Latin ceased to be a state language already after 1844.

## **II**

### **The Chemistry of Budapest**

The importance of the Hungarian genius as embodied by the internationally recognized émigré scientists, musicians, or filmmakers of the first half of the twentieth century<sup>6</sup> has stimulated several attempts to define its exact nature. Though these distinguished physicists, mathematicians, musicians and artists belonged to a special and select group, they were nonetheless the products of turn-of-the-century Hungarian society.

#### **The Making of a Capital**

In order to understand the social and cultural background of John von Neumann, we should revisit fin-de-siècle Budapest in all its splendor and squalor and give it a closer

inspection. The emergence of Budapest as the capital city of Hungary provided the setting for a rapidly growing, mixed Hungarian-German-Jewish middle class, including the von Neumann family.

Soon after the creation of the Austro-Hungarian Monarchy (1867) and the unification of Buda, Pest, and Óbuda into the representative and impressive Hungarian capital city of Budapest (1873), a new, complex and modern Hungarian intellectual elite emerged. Centered in the city of Budapest, this modernizing group came partly from the decaying landed gentry of feudal origins and partly from intellectually aspiring members of the assimilating (predominantly German and Jewish) middle-class. While creating metropolitan Budapest in the intellectual sense, they constituted themselves as a group through what proved to be a completely new and unique social and psychological experience.

Several economic and social factors contributed to the emergence of this gifted and creative professional group at the time of the rise and fall of the Austro-Hungarian Monarchy (1867-1918). In a country where the long decay of feudalism had become visible and the political and social system based on huge landed estates had come under sharp attack, the beginnings of a new, capitalist society stimulated work in science, technology, and the arts. The transformation of the Habsburg Monarchy and the creation of a “Hungarian Empire” contributed to an economic prosperity that brought about a building and transportation boom, the advancement of technology, and the appearance of a sophisticated financial system. The rise of a new urban middle-class affected the school system. Around 1900 there was a creative spirit in the air throughout Europe, permeating literature, music, the arts, and sciences. In Hungary the poet Endre Ady, the editors of the new literary journal *Nyugat* (West) (1908), the composers Béla Bartók and Zoltán Kodály, the artistic group The Eight, philosophers such as Georg Lukács and Karl Mannheim, art historians such as Charles de Tolnay, Arnold Hauser, Lajos Fülep, and Frederick Antal, offered a new and stimulating agenda for artistic and social discourse. This creative atmosphere set the tone for a generation that included the many celebrated scientists born in the early years of the new century.

From assimilated Jewish-Hungarian upper middle-class families, Theodore von Kármán, John von Neumann, Leo Szilard, Eugene Wigner, and Edward Teller were born

into this challenging intellectual atmosphere of Budapest, which bred provocative questions and pioneering answers. The approaching decline of the Austro-Hungarian Monarchy seemed to have generated unusual sensitivity and creativity.<sup>7</sup> In many ways, the political and social decline of the monarchy created a special opportunity for Hungarian Jewry, which had grown and flourished throughout the fifty years of the Monarchy. The result was a professionally defined middle-class instead of a feudally defined one in Hungary. Whereas the first generations of assimilating middle-class Hungarian Jews concentrated on building up their material wealth, subsequent generations were destined to attend the good universities of the Monarchy or of Germany and focus their activities on accumulating knowledge.<sup>8</sup> Their often-strong financial background enabled them to concentrate exclusively on their studies and eventually join the various scholarly or scientific groupings such as the *Társadalomtudományi Társaság* (Society for the Social Sciences), the *Galilei Kör* (Galileo Circle), or the journal *Huszadik Század* (Twentieth Century) where the critical social issues were often debated with a highly politicized focus. These circumstances provided good schooling for this generation of prospective émigré intellectuals.

The period that ended with World War I saw relatively peaceful cooperation and often-true friendship between Jew and Gentile in Hungary. What historian Raphael Patai described as the love affair of the Jews and Hungary often resulted in intermarriages and other forms of close social ties and networking.<sup>9</sup> For those opposing the influx of Jews into Hungary, however, Budapest seemed a special, “un-Hungarian” case, out of line with Hungarian tradition. The popular conservative author Ferenc Herczeg expressed this sentiment in a straightforward manner when he spoke about “foreign elements in [the] chemistry” of Budapest.<sup>10</sup>

Assimilation was the big word of the period: religious conversion, the dropping of German, Slavic, and particularly Jewish family names, and ennoblement were all standard practice.<sup>11</sup> The tortuous process of Jewish assimilation in Budapest was precisely (and often ironically) documented by the Hungarian novels of the period such as *Az éhes város* (The Hungry City, 1900) and *Az aruvimi erdő titka* (The Secret of the Aruvim Forest, 1917) by Ferenc Molnár, *Budapest* (1901) by Tamás Kóbor, *A nap lovagja* (The Knight of the Day, 1902) by Sándor Bródy, and *Andor és András* (Andrian

and Andrew, 1903) by Ferenc Herczeg.<sup>12</sup> Nevertheless, the full social history of Magyarization at all levels is yet to be fully researched and written. Only the war and particularly the subsequent revolutions of 1918 and 1919 as well as the “White Terror” of 1919-1920 and the treaty of Trianon (1920) put an end to this relatively comfortable period and forced some of the most gifted young professionals to study outside of Hungary and ultimately to choose exile.

The capital city of Hungary played the role of a Hungarian melting pot through the four decades preceding World War I. It attracted a vast number of migrant workers, professionals, and intellectuals from all quarters of the kingdom of Hungary and beyond. It became an energized meeting ground of a multitude of ethnic and religious groups with varying social norms, modes of behavior, and mental patterns. The mixing and clashing, fusion and friction of such diverse values and codes of behavior created an unparalleled outburst of creativity, a veritable explosion of productive energies. In this exciting and excited ambiance, a spirit of intellectual competitiveness was born which favored originality, novelty and experimentalism. Budapest expected and produced excellence and became deeply interested in the secret of genius. For so many of those who were later to be known both nationally and internationally as geniuses, Budapest seems to have been the natural place to have been born.

### **Fathers and Sons: Family Background**

This chapter is an endeavor to find out more about the chemistry of an extraordinary situation that nurtured outstanding talent. The emergence of those splendidly gifted generations in turn-of-the-century Hungary should be explained not only in terms of economic opportunity and political expediency but also in terms of social need and psychological disposition.

To understand von Neumann’s background more intimately we should look at the dominant patterns of family structure in fin-de-siècle Austria-Hungary and particularly in Hungary. Middle-class and upper middle-class Hungarian families, particularly Jewish-Hungarian ones in the late nineteenth and early twentieth centuries, were based on the dominant role of fathers, with mothers relegated to the role of preserving the German

trinity of *Kinder, Küche, Kirche* (children, kitchen, church). Most families were supported by the single income of the father who reigned supreme in his family. More often than not, fathers had the final word in serious matters such as the education of the children as well as decisions about their marriages and jobs. Indeed, fathers loomed so large in middle-class Jewish-Hungarian as well as Austrian families that one of the most significant issues to be resolved for young people was their relationship to their fathers. Apparently, Sigmund Freud's concept of the dominating father figure was experienced in most middle-class families, especially among Jews. The problem was conceptualized by Freud's notion of the 'father complex.' In his 1899 *Die Traumdeutung* [The Interpretation of Dreams], Freud observed that

even in our middle-class families, fathers are, as a rule, inclined to refuse their sons' independence and the means necessary to secure it, and thus to foster the growth of the germ of hostility which is inherent in their relation. A physician will often be in a position to notice how a son's grief at the loss of his father cannot suppress his satisfaction at having at length won his freedom. In our society today fathers are apt to cling desperately to what is left of a now sadly antiquated *potestas patris familias*; and an author who, like Ibsen, brings the immemorial struggle between fathers and sons into prominence in his writings, may be certain of producing his effect.<sup>13</sup>

As Claudio Magris added in his *The Habsburg Myth*, the source of Freud's general assumption is not only a basic rule of psychology, but it is also recognized today as an imprint of the particular Austrian social and family structure based on the dominating figure of the father. The crumbling, patriarchal institution of the family, Magris concluded, reflected the hierarchical order of the Habsburg system.<sup>14</sup>

From our own sample, a case in point might be Edward Teller, who remembered his father to have literally drummed it into him that because of the anti-Semitism of the political restoration after 1919 "he, as a Jew, had to excel just to keep abreast; that because of it he would have one day to emigrate to a country where conditions were more favorable for minorities; and that from anti-Semitism a sure escape was science, an international discipline."<sup>15</sup> Though he had shown a precocious gift for mathematics, Edward Teller studied chemical engineering and took a degree in that subject, mainly because his father, a lawyer, thought his son ought to study a practical subject.<sup>16</sup> Actually,

many fathers thought at the time that chemistry would be the appropriate subject to secure a safe future for their sons.<sup>17</sup> Similarly, noted psychologist Géza Révész was forced by his father to study law instead of psychology, in which he was interested from very early on.<sup>18</sup> Like Max Teller, Révész Sr. was convinced that his son would make a better living with a “useful” degree. It was only after completing law school in 1902 that young Révész was able to pursue his real interest and study experimental psychology with G. E. Mueller in Göttingen, Germany.

Even at a late age, Theodore von Kármán maintained regular, almost daily contact with his father, who gave his son, by then a professor at a respectable German university, instructions on all issues of life. Kármán Sr. remained a decisive influence in the life of his son until the elder’s death in 1915. Von Kármán kept his father’s letters framed in his study during his long years in Pasadena, California in the 1930s and 1940s.<sup>19</sup> Freud’s words should also be recalled when we realize that the death of Mihály Pollacsek, the father of Michael and Karl Polanyi, was such a monumental shock to his children that they exchanged letters to commemorate the event each year until the very end of their lives, over half a century later.<sup>20</sup>

### **Toward Assimilation**

In an effort to provide a broader background to the life and times of John von Neumann, trying to sketch what I consider the defining motifs behind his social and psychological history, we may need to look at some of the crucial issues of change in Hungary (and Austria-Hungary). Assimilation, and particularly Jewish assimilation, seemed one of the most important gateways to an opening of opportunity in the country. In order to strengthen a strong national identity in a rather disparate, diversified society, *Magyarization* proved to be a guiding principle of building the Hungarian nation, itself traditionally a composite mixture of ethnic, religious, and language groups of all sorts.

In a country that provided an almost unparalleled measure of religious tolerance before World War I, assimilation was often carried to the extent of language shift, name change, ennoblement, mixed marriage, and religious conversion. This was particularly the case in Budapest, a city referred to by the contemporary poet Endre Ady as “made by

Jews for us.”<sup>21</sup> The change from German or Yiddish into Hungarian, from Jewish into Hungarian families, from Judaism to Roman Catholicism or various forms of Protestantism served the purpose of integration into Hungarian society, yet these various forms of assimilation often created a sense of spiritual vacuum, an aura of lost identity, a religious no-man’s-land.

Assimilation, along with its various manifestations in name change and conversion, reflects the measure of psychological insecurity, social uneasiness, and inner unrest of generations of assimilated Jews in Budapest as well as elsewhere in the Austro-Hungarian Empire and even beyond.<sup>22</sup> There is a growing and increasingly interesting literature on Jewish insecurity that led to, and was produced by, assimilation.<sup>23</sup> The insecurity of the assimilated Jew was particularly noticeable in converted individuals and families, revealing a tradition abandoned and a set of values yet to be conquered. The price of assimilation as demonstrated by religious converts was the loss of roots, social and psychological; its reward was promotion and social recognition. In the increasingly secularizing world of fin-de-siècle Budapest, it often seemed a reasonable bargain to exchange socially undesirable traditions for the psychological and commercial benefits of a seemingly secure position in gentile Hungarian society.

Nevertheless, for the converts of the World War I era and the immediate postwar years, these benefits were short-lived. Yet, assimilation into Hungarian society provided the Jewish middle-class with a set of experiences that prepared them for successful immigration and naturalization in the United States. Their success in the U.S. was conditioned by having already experienced comparable change in Hungary and the Austro-Hungarian Empire. They represented a group that was adequately prepared for the typical problems of émigrés/immigrants, having already experienced multiple values, double identities, and a sense of living, as it were, in between different societies.

The single most remarkable symptom of assimilation in Hungary around the turn of the century (and a measure of its success) was *Magyarization*. The abandonment of the German language for Hungarian was rapid: the number of Jewish speakers of German dropped from 43 percent in 1880 to 21.8 percent to 1910, when the percentage of Magyar speakers in the country reached 75.6 percent.<sup>24</sup> To some degree, name change, which had already become a frequent phenomenon in Hungary by the 1840s, was also part of this

movement. Changes were often made in family names, first from Hebrew to German under Joseph II, then from German to Hungarian in the 19th century, and, finally, among émigrés and exiles from Hungarian to American.

Historian Peter Gay briefly noted the widespread practice of changing Jewish-sounding names in late nineteenth-century Germany. His German examples (Abramsohn to Otto Brahm, Goldmann to Max Reinhardt, Davidsohn to Jakob van Hoddis, Julius Levi into Julius Rodenberg) resemble the corresponding practice in Hungary where Magyarization of Jewish-sounding German names became increasingly customary through the nineteenth century.<sup>25</sup> By the mid-nineteenth century some foreign-sounding, German-Jewish names had already been changed into Hungarian, but the Hungarianization of names became a real movement in the 1880s and particularly the 1890s. In the two decades preceding World War I, the annual number of name changes amounted to 2,000-3,000 annually. Altogether, an estimated 66,000 people of Jewish origin chose a new, Hungarian name between 1848 and 1917.<sup>26</sup> Szilard, Polanyi, Kármán are all Hungarianized family names.

Another aspect or dimension of assimilation was mixed marriage. The politically right-wing statistician Alajos Kovács estimated the number of Jewish-gentile intermarriages between the mid-nineteenth century and World War II was around 50,000.<sup>27</sup>

The boldest and least likely step toward gentile Hungarian society was ennoblement. The late William O. McCagg provided a detailed survey of Jewish nobles around the turn of the century.<sup>28</sup> Ennoblement gave the Jewish upper middle-class a chance to integrate into Hungarian high society, i.e. into the rank-and-file nobility or, eventually, the higher echelons of aristocracy. Von Kármán and von Neumann were born into such families.

### **Religious Conversion**

More than perhaps any other change, religious conversion from Judaism to Christianity marked the deepest level of assimilation. Assimilation into Hungarian society in a way documented and predicted the capacity to integrate successfully into

German or later, American society. Religious conversion seems a particularly relevant dimension of this process, an indication of a certain type of mental pattern that enabled and prepared some of the émigré intellectuals and professionals to adapt quickly to emerging new challenges of life outside Hungary.

It would be misleading to suggest that conversions in the Jewish upper class started at the turn of the century only. The history of apostasy goes back to biblical times, and it was known as emancipation or, later, assimilation in some European countries where it had become a movement. The nineteenth century produced a long list of significant individuals who converted, including the French actress Sarah Bernhardt, the British statesman Benjamin Disraeli, the German poet Heinrich Heine, the Hungarian-German violinist Joseph Joachim, the father of the political economist Karl Marx, and the composer Felix Mendelssohn Bartholdy.<sup>29</sup> Because of its importance as a social phenomenon, conversion was discussed in this period in a number of novels, short stories, and dramas, both in Europe and the United States, including *Die Jüdinnen* and *Arnold Beer* by Max Brod; *Israël, Après moi, L'Assaut*, and *Le Secret* by Henry Bernstein; *Der Weg ins Freie* by Arthur Schnitzler; *Dr Kohn* by Max Nordau; *Az új keresztény* [The New Christian] and *A túlsó parton* [On the Other Bank] by Péter Ujvári, *Quelques Juifs* by André Spiré, just to mention a few European novels and plays on the subject.<sup>30</sup>

Conversion to Christianity was a familiar form of assimilation in Germany, where Jews played a strong role in what was called the free professions. “The exodus was not massive,” historian Peter Gay noted: one source estimated the number of converts in the nineteenth century at around 22,000. Anti-Semitism, however, produced repeated waves of conversion. Half of Germany’s Jewish academics and most of the Jewish journalists and editors were, in fact, converts. Conversion was the “one way to ease ascent on the academic ladder:”<sup>31</sup> when the Jewish medievalist Harry Bresslau complained to Leopold von Ranke that his religion blocked his career, he was advised to be baptized. Until the 1870s, conversion was practically the only way to leave Judaism. It was only after 1876 that Prussian legislation made it possible for Jews to leave their faith without adopting another one, a turning point that facilitated escape from Jewish identity.<sup>32</sup> It was not enough, however, to convert and baptize one’s children:

Normally it took several generations, several intermarriages, possibly a change of name and of residence before the past of the new Christian faded into invisibility. Jews generally despised their baptized brethren as renegades, Christians despised them as opportunists. Convert, seeking to win by moving from one camp to another, lost in both. . . .<sup>33</sup>

Everyone understood—everyone, philo-Semite and anti-Semite alike—that even those former Jews who had repudiated Judaism by religious conversion to Christianity, or legal disaffiliation from the Jewish community, were still somehow Jews: it never occurred to treat radicals like Karl Marx or the conservative legal theoretician Friedrich Julius Stahl as non-Jews. Berlin was full of Jewish agnostics, Jewish atheists, Jewish Catholics, and Jewish Lutherans. Indeed, these non-Jewish Jews were, if anything, more conspicuous than those who held, no matter how tepidly, to their ancient label, for they labored under the added reproach of cowardice, social climbing, secret service in a world-wide conspiracy—in a word, self-seeking mimicry. By the nature of things, these non-Jewish Jews were among the most prominent figures on the Berlin intellectual landscape: Maximilian Harden and Kurt Tucholsky were only among the best known of these converts. Thus, the presence of the Jew in Berlin was even more of an emotional than a physical reality.<sup>34</sup>

The number of conversions in Hungary was relatively small before 1910: in the twenty years between 1890 and 1910, 5,046 chose religious conversion. The tendency was thus relatively new and very limited before World War I, although contemporary urban authors such as Ferenc Molnár referred to it as a typical Budapest phenomenon and used it as a major theme as early as 1900.<sup>35</sup> It took great political upheavals such as the revolutions following the war to make religious conversion into a mass movement.<sup>36</sup>

Historian William O. McCagg Jr. observed that “in 1919 and 1920 there was a massive wave of conversions out of Judaism among wealthy families. Contingent on this was a great deal of name changing and deliberate expunging of the past . . .”<sup>37</sup> Between 1919 and 1924, 11,288 Jewish persons (6,624 men and 5,064 women) were baptized. In 1919 alone the number went up to 7,146. In Budapest, between 1910 and 1920, 6,915 Jews converted.<sup>38</sup>

From our own sample, Leo Szilard for unspecified reasons made the decision to get himself baptized in the Calvinist church of Hungary on July 24, 1919, at the age of twenty-one.<sup>39</sup> Michael Polanyi was baptized into the Catholic Church on October 18, 1919, but it is unclear whether this represented his faith or was a practical step to

facilitate his employment in Karlsruhe, Germany, where he was to emigrate shortly.<sup>40</sup> The choice of the date during the last days of 1919 is noteworthy and follows the pattern suggested by McCagg. In Hungary, members of the Jewish intellectual elite could claim substantial rewards in terms of career opportunities and advancement for converting. Thus, some had already started converting earlier in the nineteenth century or at least had had their children baptized. George Pólya was baptized a Roman Catholic weeks after his birth in January 1888, in Budapest, and the baptismal records show his parents as Roman Catholics as well.<sup>41</sup>

Mass conversion became a serious proposition only as late as 1917: in a book on Jewish-Hungarian social problems law professor Péter Ágoston suggested that total assimilation and mass conversion should be the correct attitude to solve the problems of growing anti-Semitism in Hungary.<sup>42</sup> As a reaction to Ágoston's proposition, the social science journal *Huszadik Század* (Twentieth Century) addressed some 150 leading intellectuals and public figures in spring 1917, focusing public attention on the Jewish question in Hungary.<sup>43</sup> But the Jewish leader Ferenc Mezey considered conversion cowardice; for such people would be looked upon as opportunists and conversion would not exempt them from racism.<sup>44</sup> Conversion from Judaism seems to have been a major step toward modernizing the Jewish community and introducing a Neology section in addition to the Orthodox majority. Psychologically, it was easier to convert from Judaism to Christianity for those whose families had already changed from Orthodox to Neological theology before.<sup>45</sup>

Conversions continued during the interwar period, even among immigrant Jewish-Hungarian-Americans. An interesting case was that of John von Neumann, who converted to Catholicism after his father's death in 1929, "for the sake of convenience, not conviction," as his brother Nicholas remembered in 1987.<sup>46</sup> Von Neumann was baptized again in Trenton, New Jersey, in April 1935, at the age of thirty-two, in my reading as an added effort to provide security for his family. In his last illness, while being attended by a Benedictine monk, various legends spread about yet another conversion and baptism.

## Hungary and the German Cultural Tradition

The influence of German culture and Germany as a civilization was so strong in Hungarian history that we must address it in a variety of contexts. Germany also made a huge impact on John von Neumann through his early decades. Both as a language and as a culture, German was a natural for Hungarians in the immediate post-World War I era. The *lingua franca* of the Habsburg Empire and of the Austro-Hungarian monarchy, German was used at home, taught at school, spoken on the street, needed in the army.<sup>47</sup> This was more than a century-old tradition: the links between Hungary and both the Austrian and the German culture went back to the seventeenth and the eighteenth centuries. For a considerable time in the 18th and 19th centuries, Hungary (or large parts of it) in many ways used to be on the fringes of the greater realm of German culture. We should emphasize again that the average middle-class "Hungarian" was typically German ("Schwab") or Jewish by origin and for him it was German culture and civilization that connected Hungary and the Austro-Hungarian Monarchy with Europe and the rest of the World. Middle-class sitting rooms in Austria, Hungary, Bohemia, Galicia, and Croatia typically boasted of the complete works of Goethe and Schiller, the poetry of Heine and Lenau, the plays of Grillparzer and Schnitzler.<sup>48</sup>

Not only was German literature and German translations read throughout the Empire: German was the language of the entire culture. When Baron József Eötvös, a reputable man of letters and minister of education, visited his daughter in a castle in eastern Hungary, he noted: "What contrasts! I cross Szeged and Makó, then visit my daughter to find Kaulbach on the wall, Goethe on the bookshelf and Beethoven on the piano"<sup>49</sup> Scores of *Das wohltemperierte Klavier* by Johann Sebastian Bach, *Gigues* and *Sarabandes* by Georg Friedrich Händel, the sonatas of Joseph Haydn, Wolfgang Amadeus Mozart, and Ludwig van Beethoven, the *Variations Sérieuses* by Felix Mendelssohn, the popular songs of Franz Schubert or Robert Schumann, the piano quartets of Johannes Brahms, and the brilliant transcriptions of Franz Liszt—these were the works that adorned the salon, or, in higher places, the music room.

Throughout the entire Austro-Hungarian Monarchy and beyond, Hungarians looked to Germany to import modern theories and establish modern practices. The study

of the German school system had a great tradition throughout the nineteenth century. For generations of Hungarian lawmakers, the German school provided the finest example in Europe. Two widely spaced examples are characteristic. When young Bertalan Szemere, a future Prime Minister of Hungary, went in 1836 to Berlin to study “what was best in each country, [he] tried to consider schools in Germany, the public life in France, and prisons in Britain . . .”<sup>50</sup> A generation later, the ideas and know-how of modern teacher training were studied in, and imported from, Germany by Mór Kármán in the early 1870s, at the instigation of Education Minister Baron József Eötvös.

As late as December 1918 Cecilia Polányi, the mother of Michael and Karl Polanyi and grandmother of Nobel laureate John C. Polanyi, intended to study the curricula and methods of German institutions in the field of "practical social work" and for this planned visits to Berlin, Frankfurt am Main, Mannheim, Hannover, Düsseldorf, Cologne, Augsburg, Munich, Heidelberg, Königsberg, and a host of other places where the various *Soziale Frauenschulen*, *Frauenakademie*, *Frauenseminare* were the very best in Europe.<sup>51</sup>

Efforts to study and imitate what was German were also natural because German was then the international language of science and literature: in the first eighteen years of the Nobel Prize, between 1901 and 1918, there were seven German Nobel laureates in chemistry, six in physics, four (and one Austro-Hungarian) in medicine, and four in literature.<sup>52</sup> Scholars and scientists read the *Beiträge*, the *Mitteilungen*, or the *Jahrbücher* of their special field of research or practice, published at some respectable German university town such as Giessen, Jena, or Greifswald. The grand tour of a young intellectual, artist, or professional would unmistakably lead the budding scholar to Göttingen, Heidelberg, and increasingly Berlin. Artists typically went to Munich to study with Munich art professor Karl von Piloty.<sup>53</sup>

The illustrious faculty of the newly founded Music Academy of Budapest, in most cases personally invited to Hungary by Franz Liszt himself, taught young Hungarians such as Béla Bartók or Zoltán Kodály, mostly in German.<sup>54</sup>

When German composer Johannes Brahms performed his works in Pest (later Budapest), he soon saw that the best music critics wrote in the German papers, that the head of the leading chamber group was the German-Hungarian Jenő Huber (Hubay), the

cellist of the quartet was the Prague-born David Popper, that the second violinist was the Viennese Victor Ritter von Herzfeld, and that the viola player was an Austrian of peasant origin, József Waldbauer. It was not only in the opera and in philharmonic orchestra that the German language reigned supreme: German was the language in which János [Hans] Koessler taught composition and Xavér Ferenc Szabó orchestration in the country's top music institution. When Brahms went into Rózsavölgyi and Company's music shop in downtown Budapest, he was received by the German-speaking Herr Siebreich, who gave him the Hungarian folk pieces that had just been published. These formed the basis of Brahms's fourhanded *Ungarische Tänze* (Hungarian Dances). There was no reason for the strongly *Gesamtdeutsch* (All-German)-oriented Brahms to doubt the “deep German embeddedness” of Hungarian culture. This is why his Hungarian pieces were composed as though they represented a particular, eastern branch of German music. They jump about, as it were, in a pair of German trousers, the “mádjárosch Hopsassa“ (Hungarianish gee-up) to which musicology professor Antal Molnár ironically referred in remembering the Budapest of his early years around the mid-1970s.<sup>55</sup>

Yet, the generation of professors who were teaching in German at the Budapest Academy of Music around the turn of the century—Robert Volkmann, Hans Koessler, Victor Ritter von Herzfeld, David Popper, or Ferenc Xavér Szabó—in most cases did so in the German musical tradition, whereas their students—the young and modernist generation of Hungarian composers and performing artists, such as Béla Bartók, Zoltán Kodály, Ernő (Ernst von) Dohnányi, and Leo Weiner—were gripped by the Hungarian national idea and went on to create exclusively Hungarian music and taught in Hungarian. In what amounted to a genuine change in musical patterns, Bartók and Kodály set out to collect the Hungarian and East-Central European folk music heritage and in the process rediscovered an ancient musical paradigm which they incorporated into mainstream European classical music—a radically bold move at the time, though one validated by the important place their works still occupy in the concert repertory of the present day.

Ironically, it was the Moravian-Jewish Gustav Mahler who (as director of the Royal Hungarian Opera in Budapest between 1888 and 1891) was one of the first to demand that singers use the Hungarian language instead of the generally accepted

German.<sup>56</sup> Not only Mahler, however, but also several other celebrated leading conductors in Budapest such as Hans Richter or Arthur Nikisch spoke German only. The Hungarian middle-classes often read local papers published in German, which were available everywhere in the monarchy until its dissolution and even beyond. Founded in 1854, the authoritative *Pester Lloyd* of Budapest, for example, continued as one of the most appreciated and well-read papers of the Budapest middle-class until almost the end of World War II (1944). German in language but committed to Hungarian culture,<sup>57</sup> this part of the press helped bridge the gap between the two cultures. In much of the eighteenth and nineteenth centuries, German novels and poetry written and published in Hungary were just as integral a part of the Greater German [*Gesamtdeutsch*] literature as anything written in Königsberg or Prague.<sup>58</sup> The Jewish population of the Empire/Monarchy, particularly its educated urban middle-class, embraced German primarily as a new, common language and contributed to making the Austrian realm a part and not just an outskirts of German civilization.<sup>59</sup> For socially aspiring Jewish families, German was the language of education and upward mobility.

With all this infusion of German blood into Hungarian musical life and education, Budapest in the early 1900s still was not comparable to Berlin. Young and gifted pianist and composer Ernő Dohnányi considered the Hochschule für Musik in Berlin a much greater challenge. "To choose Budapest instead of Berlin would have been such a sacrifice on my part which, considering my youth, the fatherland cannot demand and, considering my art, I cannot make," he wrote to the director of the Budapest Music Academy around 1905. "Berlin is unquestionably the center of the musical world today. Budapest, we must admit, does not play even a small role in the world of music. Even if it is true that the Hochschule of Berlin is simply the center of a clique, that clique is enormous and has played a role for decades whereas the musical world doesn't even notice whether or not I take a dominant position in Budapest."<sup>60</sup> Dohnányi stayed in Berlin until World War I and, as *Ernst von Dohnányi*, became one of the internationally most distinguished professors of the Hochschule für Musik. Promising pianists from Hungary such as Ervin Nyiregyházi, Imre Stefániai, and Marianne Adler of Budapest and international students such as Swedish composer Franz Berwald's granddaughter Astrid Berwald of Stockholm, came all the way to study with him in prewar Berlin.<sup>61</sup>

A center for Hungarian culture in Berlin, the Collegium Hungaricum was founded in 1916. Robert Gragger went to teach Hungarian studies at the University of Berlin and became director of the Collegium. He also published the *Ungarische Jahrbücher*, a quality journal presenting Hungarian scholarship. Gragger's Collegium particularly attracted young Hungarians at the beginning of their careers.

Berlin in the early prewar era proved to be an irresistible magnet for the new Hungarian intellectual and professional classes. Many of the young Hungarians who frequented Berlin around the turn of the century were Jewish. The Jewish-Hungarian middle-class felt at home in imperial Germany and sent their sons and daughters there to study. After completing their courses in Budapest before World War I, Hungary's up-and-coming mathematicians saw Göttingen and Berlin as the most important places to study. As a very young man, the celebrated mathematician Lipót Fejér spent the academic year 1899-1900 in Berlin where he attended the famous seminar of Hermann Amandus Schwarz. In 1902-1903 he studied in Göttingen and in subsequent years returned to both universities.<sup>62</sup> A gifted student of Fejér, Gábor Szegő, also followed his path and went to study in prewar Berlin, Göttingen, and Vienna, and later became professor of mathematics at Stanford.<sup>63</sup>

Men of letters also followed in numbers. The gifted Hungarian poet and future film theoretician Béla Balázs went to Berlin to study with Georg Simmel in 1906 and dedicated his doctoral dissertation *Az öntudatról* (“On Self Consciousness,” later renamed *Halálesztétika*, “The Aesthetics of Death”) to his German master.<sup>64</sup> The heroin of Balázs's first literary opus, *Doktor Szélpál Margit*, spent three years in Berlin as a student, a typical pattern in prewar German-Hungarian relations.<sup>65</sup> Critic, author, and art patron Baron Lajos Hatvany studied classics with the prestigious Ulrich von Wilamowitz-Moellendorff in Berlin—an experience he came to denounce in his sarcastic *Die Wissenschaft des nicht Wissenswerten* (1908), first published in Leipzig, Germany.<sup>66</sup> His second book, *Ich und die Bücher*, was published simultaneously in German in Berlin and in Hungarian in Budapest, in 1910.<sup>67</sup> Others who left Hungary for Berlin included important businessmen such as stock exchange wizard Alfred Manovill, who well before the war joined the Berlin bank Mendelssohn and Company at the age of twenty-four and

acted as the honorary president of the Berliner Ungarn-Vereins through the advent of Hitler.<sup>68</sup>

### **The Act of Creation**

One of the best examples of the chemistry of Budapest, the contribution of immigrants (predominantly Austrians, Germans, and Jews) to the success of Hungarian culture comes from the field of music. Here we see how the Hungarian version of the melting pot worked, especially in Budapest. Here is a fascinating example of the German impact in Hungary. Moreover, the example shows the imprint of great German masters on their sometimes even greater Hungarian students, the transformation of cosmopolitan, European taste into the Hungarian vernacular, and the merging of the European traditions of musical high culture with the ancient folk legacy of Hungary. Music, to boot, performed in the concert halls or often home made, played an important social and psychological role in the life of the middle class in an era when there was no gramophone, tape recorder or CD-player to produce it. Home produced music contributed to and helped sustain several layers of urban society, and the home of the von Neumanns was certainly no exception.

Most Hungarian musicians received their musical education at the Music Academy of Budapest, founded by Franz Liszt in 1875. A few remarks on the history of the academy may help provide a better understanding of the musical and intellectual background of the innovative generation we may call the “musical grandchildren” of Franz Liszt—the great musicians who were educated in the early decades of the century in Budapest. Many of them left Hungary between the wars, and ended up in the United States.

Liszt made a concerted effort to link his native Hungary with the more civilized, western part of Europe. He is remembered today as a composer and a piano virtuoso and less for his organizational achievements in the international field of music, from which Hungary benefited perhaps most of all. Right after the Austro-Hungarian Compromise of 1867, Liszt, more at home in Weimar, Germany, and Rome, Italy, than anywhere in his native Hungary, settled down in what was Pest, then a small, German-speaking provincial

city with a single bridge connecting it with Buda. He stayed there from 1868 through the mid-1870s and his presence contributed to the spiritual growth of the city into Budapest. He handpicked the first professors of musicology, violin, and cello, among others, and founded a musical tradition equal to the very best in Europe. He had both the reputation and the authority to attract the best people, both Hungarians and foreigners, who came to the new Music Academy at his invitation. Professor Jenő Hubay gave up a promising career in Brussels, where he worked with the great violinist Eugene Ysaÿe, to return to Budapest and found his great school of violin at the academy, where he remained for the rest of his life. Professor David Popper, originally from Prague and arguably the greatest cellist before Pablo Casals, came from a distinguished position as concertmaster in Vienna to teach and perform in Budapest. With Hubay, he formed a unique string quartet to present classical and contemporary chamber music by Johannes Brahms, Antonín Dvořák, Josef Suk, Karl Goldmark, and others. Professor Hans Koessler came from his native Bavaria and became the teacher of subsequent generations of Hungarian composers. Though he was conservative in his own music and a follower of Brahms, he allowed his students a great measure of freedom to write their own, modern music. They included Béla Bartók, Zoltán Kodály, Ernő (Ernst von) Dohnányi, Leo Weiner, Imre (Emerich) Kálmán, Gershwin-editor Albert Szirmai, and several other well-known composers.<sup>69</sup>

None of these examples of late-nineteenth-century "modernism" should cause us to believe, however, that Budapest was a center of modern music. Liszt himself was modern, the academy much less so. His lesser known and certainly less popular late music foreshadowed in some ways the early Bartók, who felt "that Liszt's importance from the viewpoint of the further development of music is greater than that of Wagner." As Bartók added in his inaugural address at the Hungarian Academy in 1936, "The compositions of Liszt exerted a greater fertilizing effect on the next generation than those of Wagner."<sup>70</sup> Liszt's Music Academy, however, set out to preserve classical values and nurtured conservative and cosmopolitan tastes. The ideal was the late romanticism of Johannes Brahms, who often came to the Hungarian capital from nearby Vienna and some of his work was first performed by the Hubay-Popper Quartet and local pianists like Vilma Adler-Goldstein. Really modern music was not appreciated; Gustav Mahler, for

example, was applauded as a conductor and director of the Budapest Opera (1888-1891), yet his first Symphony, written and performed during the same Budapest years, was treated with almost unanimous indifference.<sup>71</sup> Some of the moderns, however, were also invited to Budapest, including Claude Debussy and Giacomo Puccini, so it is difficult to argue that the musical public of the Hungarian capital was not at all responsive to the new voice of the twentieth century.

It was in the decade immediately preceding World War I that, in a delicate interplay with music, most modernist trends swept across the country in literature, the arts, philosophy, and the social and physical sciences. This incentive produced a renaissance of Hungarian national culture and the birth of modernism in the country. It symbolically started with the poetry of Endre Ady (1877-1919), whose *Új versek* (New Poems) made a veritable literary revolution in 1906, and with the poetry anthology *A holnap* (Tomorrow) (1908-1909), with Ady, Mihály Babits, Béla Balázs, and Gyula Juhász among the most prominent names represented. The movement came into full speed with the launching of the (mainly) literary periodical *Nyugat* (West) in 1908, which was to become the dominating organ of the modernists through World War II and which published vintage modern poetry and prose by authors like Endre Ady, Mihály Babits, Margit Kaffka, Frigyes Karinthy, Dezső Kosztolányi, Zsigmond Móricz, Árpád Tóth, and a host of others.

The literary pioneers had their counterparts in almost every other field. The art group *Nyolcak* (The Eight) with Károly Kernstok, Róbert Berény, Béla Czóbel, and other excellent artists, was as important to this new generation as Béla Bartók and Zoltán Kodály were in music. Hungarian modernism was present in almost every field, and usually ahead of many European countries. The very best left Hungary early, most either during or right after the revolutions of 1918-1919. It is also true, however, that many future émigrés kept returning to Hungary for visits before their decision to leave became final.

The immediate pre-World War I period nurtured a gifted and ambitious generation with politically liberal and sometimes leftist views intent on changing the outdated social and political system of the country.<sup>72</sup> Most of the people who left Hungary after World War I were members, students, or followers of this generation. In

music, they invariably came from the Academy of Music in Budapest. The best known names have already been mentioned before.

The lists are impressive by themselves and speak highly of the ability of many of the professors in Budapest to give not only a thorough musical training but also a good sense of how to understand the contemporary world. For the post-World War I generation of Hungarian musicians, Béla Bartók and Zoltán Kodály were the great examples to admire and emulate. As Eugene Ormandy pointed out in a 1937 article for *The Hungarian Quarterly*, it was because of those two “that Hungary has emerged as a musical entity. This Hungarian music of the twentieth century is intensely nationalistic and, while nationalistic art is of necessity limited and destined to a comparatively short life, paradoxically enough the worlds of these two composers in the very intensity of their nationalism transcend[ed] nationalistic bounds.”<sup>73</sup> Ormandy added, “In the dramatic inevitability of Bartók, we have a composer who might be compared to Beethoven. . . . Breaking away from the over-refined, essentially cerebral and decadent music of the post-Romantic period, Bartók has injected new life blood into his music. It has a savagery and yet withal a youthful vitality that makes it of universal importance. . . .”<sup>74</sup> Bartók and Kodály revived “the racial idiom of Magyar music,” Ormandy acknowledged, “to portray the distinct individuality of Hungarian music.”<sup>75</sup>

The modernism of the music and ideas of Bartók and Kodály, their philosophy and lifestyle, their integrity and puritanism, served in many ways as a model for their students at the Music Academy, the next generation of musicians. Ormandy, along with Fritz Reiner and George Szell, was the very first to present the music of Bartók to audiences outside Hungary. These conductors remained deeply committed to modern music throughout their career. Though mainly performing a classical repertoire, Eugene Ormandy had a real interest in contemporary music, such as that of Sergei Rachmaninov, whose work he frequently introduced with the Philadelphia Orchestra.<sup>76</sup> He recorded other Russian composers such as Dimitri Shostakovich (Concerto for Cello and Orchestra, Op. 107, No. 1), and Dimitri Kabalevsky (Concerto No. 1 for Cello and Orchestra, Op. 49) and regularly added works by Richard Strauss (*Heldenleben*, *Death and Transfiguration*, *Metamorphosen for 23 Strings*). Gustav Mahler was a natural choice for his program. Antal Dorati, besides being a composer himself, performed the

work of many of his contemporaries including in particular Paul Hindemith.<sup>77</sup> Both Fritz Reiner and George Szell took an active interest in their contemporaries. Reiner played Stravinsky<sup>78</sup> and Bartók as well as pieces by William Schuman, Zoltán Kodály, and Leo Weiner. Szell shared Reiner's enthusiasm for Bartók, recording his music as well as that of Gustav Mahler, Leoš Janáček, and Zoltán Kodály, and he performed Jean Sibelius, Sergei Prokofiev, Igor Stravinsky, Paul Hindemith, Sir William Walton, and lesser-known American contemporaries such as the young composer Lukas Foss.<sup>79</sup>

### **III Schooling**

#### **Importing the *Gymnasium***

The outstanding success of education, and mathematics education in particular, underlines the significance of the Hungarian school system from the turn of the century until World War II. The excellent education provided by Hungary's best schools served as the foundation for Hungarian successes in their various manifestations. The secret of Hungary's émigré geniuses is partly the secret of Hungarian high schools before World War II and the result of a systematic effort in Hungary to develop an educational system along German lines. The Hungarian *gimnázium* was modeled upon the German *Gymnasium* and this was a studied effort on behalf of the new Hungarian government established after the Austro-Hungarian Compromise of 1867.<sup>80</sup> Experimenting with the new school system became a natural in fin-de-siècle Budapest.

The architect of this admirable knowledge transfer was Mór Kármán (1843-1915), one of Hungary's most renowned educational experts, a pedagogical reformer and the father of Theodore von Kármán. The educator Kármán, Sr., came from a distinguished Jewish-Hungarian background, studied philosophy and classical philology at the University of Vienna and received his Ph.D. in Budapest in 1866. In 1869, the able young educational philosopher was commissioned by Minister of Religion and Education Baron József Eötvös (1813-1871) to Leipzig, Saxony (in Germany), to study pedagogy and the modern theory and methods of training high school teachers, under the philosopher Professor Tuiscon Ziller (1817-1882), founder of the pedagogical seminar at Leipzig.<sup>81</sup>

Upon returning from Germany in 1872, Eötvös's immediate successor Tivadar Pauler helped him introduce the German system in Hungary and found the Institute for Teacher Training at the University of [Buda]pest, as well as the "Practicing High School," or Model*gimnázium*, for prospective teachers, thus profoundly influencing Hungarian education in a German spirit and tradition.<sup>82</sup> Mór Kármán himself became director of the school, which all four of his sons, including Theodore, attended in Budapest.

Becoming Hungary's foremost expert on education, Mór Kármán was elevated to the Hungarian nobility in 1907,<sup>83</sup> and became a full professor at Budapest University in 1909. He belonged to the assimilated Jewish upper-middle class of Hungary, and married into a well-connected family through which he was distantly related to the titled Jewish aristocracy of Hungary.<sup>84</sup> Mór Kármán felt himself close to Hungarian culture, which he also served by studying pieces of Hungarian literature that were part of the national literary canon.<sup>85</sup>

Some of the high schools developed under Kármán's oversight were connected in various ways with the University of Budapest. Graduating university students were expected to do their practice teaching in "model" high schools. High school teachers themselves were expected to do original research and be published regularly both in and out of Hungary. The most eminent teachers were invited to give university courses; some even became professors and were elected members of the Hungarian Academy. The faculty of the best high schools in Budapest enjoyed a privileged position and high social prestige.

Most high school students came from the sheltered and privileged social background of a narrowly defined middle-class. For many years, these schools were all-male domains: the first *gimnázium* for girls was not opened in Austria until in 1892 and 1896 in Hungary. For socially aspiring Jewish students in particular, these schools acted as social equalizers, a much sought after opportunity to integrate, emancipate, and assimilate into the emerging Hungarian 'gentlemanly' middle class. Upon reaching the age of eighteen, the state-controlled, uniform system of Hungarian final examinations brought high school studies to a demanding, challenging conclusion, and catapulted young men into the Hungarian elite.<sup>86</sup>

The choice by many Jewish students (or their parents) to attend various Christian denomination high schools in the early twentieth century was related to the phenomenon of religious conversion. Though these schools were of exceptionally high quality,<sup>87</sup> sending children of Jewish origin to them expressed a willingness to assimilate. The Lutheran high school at Városligeti Fásor in Pest was a case in point, with dozens of extremely capable Jewish boys among the students every year. Notable examples were John von Neumann and prospective Nobel laureate Eugene P. Wigner. Teachers in these schools excelled in their field as well as in the art of teaching, and several were recognized members of the scientific and scholarly community of Hungary.<sup>88</sup>

Defined by the act 1924:XI high schools in Hungary were of three kind: the *gimnázium*, the *reálgimnázium*, and the *reáliskola*. The *gimnázium* provided an all-round humanistic education, based primarily on studies in Latin and Greek language and literature. The *reálgimnázium* added modern languages and literatures to Latin, while the *reáliskola* gave a careful introduction to arithmetic and natural sciences and focused on modern languages alone.

### **The *Mintagimnázium***

The *Mintagimnázium* [model high school] founded and first directed by Mór Kármán, was best described by his son Theodore von Kármán, himself a student of this school.

The Minta, or Model Gymnasium, was the gem of my father's educational theories. It was designed to be directed by a professor at the University but to maintain an independent status. It became the model for all Hungarian high schools and today is quite famous in Hungary, though little known in the West. Recently, however, its high standing over the years was noted by a writer for the London *Observer*, who called the Minta a 'nursery for the elite,' and compared it with such schools as Eton for Conservative M.P.'s and [the Institut] Le Rosey [in Switzerland] for ex-kings and socialites. The Minta graduated two of Britain's top economists, Dr. Thomas Balogh of Balliol College (a son of one of my cousins) and Nicholas Kaldor of King's, Cambridge. ...<sup>89</sup>

As in all the *gimnázium* throughout Hungary, Latin was of paramount importance. This came from the time, as mentioned before, when Latin, up until the end of 1844, was

the state language of Hungary and educated people were all expected to read and write classical Latin. The study of Latin was also supposed to be useful in training the mind, strengthening the memory, and introducing the student to a complex system: Latin grammar.

For me the Minta was a great educational experience. My father was a great believer in teaching everything—Latin, math, and history—by showing its connection with everyday living. In our beginning Latin class, for instance, I remember that we did not start with rules of grammar. Instead we were told to walk around the city and copy the Latin inscriptions on statues, churches, and museums. There were many of these to be found, since Latin was the official language in Hungary until 1848.<sup>90</sup> When we had collected the phrases and brought them to class, the teacher asked us which words we already knew. We usually could recognize a few words among the phrases. If we didn't, we looked them up. Then he asked us if we recognized the same word in different forms. Why were the forms different? Because they showed different relationships to other words in the inscription. We continued in this way until we understood each phrase and why it was placed on the monument. As a result of this practice, we all accumulated a Latin vocabulary which we retained and we deduced some fundamental rules for inflection of the Latin word. We also learned something of Hungary's past.<sup>91</sup>

Theodore von Kármán remembered fondly his mathematics classes which were also based on inductive methods and related to practical life. (Another future celebrity from Budapest, Edward Teller profited from these same classes.) Von Kármán drew an important parallel between his classes in Latin and in Mathematics, the two cornerstones of Hungarian education in the *gimnázium*.

Mathematics, which I now studied eagerly, was taught in terms of everyday statistics and it had a fascination for me all over again. For instance, we looked up the figures on the production of wheat in Hungary for several years. We set up tables and then drew graphs, so we could observe the changes and locate the maximum and the minimum wheat production. In the diagrams we searched for correlations, and we learned about 'the rate of change,' which brought us to the edge of the calculus. We thus learned in a practical way that there was a relationship between quantities that varied, and, as with Latin, we learned at the same time something of the changing social and economic forces in the country.

At no time did we memorize rules from the book. Instead we sought to develop them ourselves. I think this is a good system of education, for in my opinion how one learns the elements of reasoning in primary school will determine his later capacity for intellectual pursuits. In my case the Minta gave me a thorough

grounding in inductive reasoning, that is, deriving general rules from specific examples—an approach that remained with me throughout my life.<sup>92</sup>

Mór Kármán was also a pioneer in initiating 'practice teaching' in his school, regularly inviting graduating university students from various disciplines to acquire practical experiences for their future careers as high school teachers.

In addition to introducing what were then novel methods of teaching, my father also started at the Minta the system of practice teaching by university graduate students. Some educators opposed this plan: it would expose us to inexperienced teachers, the *koca* (sows) as we high school students ungraciously called them. My father, on the other hand, firmly maintained that students would find it an advantage to learn as early as possible to distinguish between good and bad teaching.

The *Minta* school also provided a more democratic model especially regarding teacher—student relations, which were traditionally rigidly formal and impersonal throughout most Hungarian and Austrian schools.

The Minta was the first school in Hungary to put an end to the stiff relationship between the teacher and the pupil which existed in the Empire [the Austro-Hungarian Monarchy] at the time. In the corridors of the Minta the teachers moved constantly among the pupils. Contrary to the practice in other high schools, students could talk to the teachers outside of classes and could discuss matters not strictly concerning school. The charter of the Minta declared in writing for the first time in Hungary that a teacher might go so far as to shake hands with a pupil in the event of their meeting outside class.<sup>93</sup>

Theodore von Kármán benefited not only from the school he attended but also from the life-long, private instruction he received from his father. In one of his later notes to his son, Mór Kármán warned Theodore in Germany that

not only new problems deserve deeper consideration, but the renewed rethinking of the connections among earlier truths may shed new light on science as a whole. There is no greater enemy of teaching than the boring following of a once accepted pattern; on the other hand, every class, even during repetition, may serve as a new source of learning, provided that we think through the subject again.<sup>94</sup>

## The Lutheran *Gimnázium*

As is well known, John von Neumann and Nobel Laureate Eugene Wigner attended the Lutheran *Gymnasium* in Budapest, became two of its top students and in turn made it internationally recognized.<sup>95</sup>

The origins of the Lutheran *gimnázium* of Pest go back to the late 18<sup>th</sup> century.<sup>96</sup> The earliest motor behind the school was Lajos Schedius (1768-1847), the enlightened, Göttingen-educated professor of philosophy at the University of Pest whose anonymously published *Die Schule der evangelischen Gemeinde A. C. in Pesth* (1816) emphasized the public nature of schools, the importance of the quality training of teachers, and spoke against the practice of mere recitation, calling instead for the emotional development of students. Much of the philosophy behind Lutheran education in Hungary came from the Swiss educator Johann Heinrich Pestalozzi (1746–1827).<sup>97</sup>

Lutheran schools mushroomed in the country; there were some twenty of them outside the city of Pest. The Pest school was so popular that it had to move to a new building in 1864 and then again in 1904. Erected in the *Városligeti fasor*, an elegant and fashionable street that runs parallel to Budapest's most prominent avenue, Andrásy út, the new building was one of the most up-to-date schools in contemporary Hungary. Designed by architecture professor Samu Pecz, the building was fully equipped with electricity and steam heating, 18 large class rooms, 14 cabinets for teachers and classroom demonstration material, dark rooms for experiments with light, for film projection and for photography, a 6-room-library, a 5-room apartment for the director, a specially paved gym, and a huge community room for celebrations. By the beginning of the century, there were 12,000 volumes in the library, which subscribed to some 20-30 foreign journals, half of them in German and English. As of 1901-1902, the supervisor of the library was no less a person than Sándor Mikola, the celebrated teacher of physics and prospective director of the school.<sup>98</sup>

The Lutheran Church of Hungary was convinced, however, that it was not the material equipment but the quality of the faculty that defined education. "Good teacher = good school" as the almost mathematical equation suggested in the schools' 1922-1923 yearbook. Members of the faculty were very near to the level of university professors,

and fourteen had graduated from the Eötvös Collegium, a Budapest version of the *École Normale Supérieure* in Paris, founded by Loránd Eötvös in 1895 to commemorate his father.<sup>99</sup>

Many of the best teachers also studied in Germany (Károly Böhm, Gedeon Pecz, János Loisch, Aurél Bászel, Sándor Dietze, Rudolf Weber, and Róbert Fröhlich who studied with Theodor Mommsen). Several of the teachers went on to become university professors such as Dezső Kerecsényi who came to teach Hungarian literature in the University of Debrecen, the botanist Sándor Sárkány who was invited to the University of Budapest, the mathematician Ágoston Schultz who later taught at the Technical University of Budapest; and the mathematician and physicist János Renner who became the director of the Institute of Geophysics in Budapest. About two-thirds of the teachers in the *Fasor* regularly published in the most important (typically Hungarian) journals of their own field.<sup>100</sup>

Two of the important members of the faculty who had a major impact on John von Neumann were the mathematician László Rátz and the physicist Sándor Mikola. It is enlightening to assess the source of their impact.

A member of the *Fasor* faculty for 35 years, László Rátz (1863-1930) studied in the Lutheran *lycée* of Sopron, and the universities of Budapest, Berlin, and Strassbourg. He treated all of his students equally and made them love his subject by demonstrating how best they can approach it at their own, very different level. This highly individualized treatment brought this difficult subject closer to students, irrespective of the nature of their own individual talent. He documented the practical aspects of mathematics and made its usefulness come alive for students. As editor of *Középiskolai Matematikai Lapok* [High School Papers in Mathematics], he turned the school into a national center of mathematics teaching and made problem solving into a national mathematics education program. He published the material of the first ten volumes in his *Matematikai gyakorlókönyv* [Problem Book for Mathematics] in two parts (algebra and geometry), which became one of the basic textbooks of mathematical problem solving worldwide. Many outstanding Hungarian mathematicians and scientists received their basic training in mathematics, and particularly mathematical problem solving, through the work of László Rátz. As an acknowledgment of his role in modernizing mathematics

education in 1909, he became the Hungarian member of the international committee for mathematics education and attended the congresses of Milan, Cambridge and Paris. He was at his best when discovering, acknowledging, and nurturing talent and making his difficult subject generally well liked and appreciated.<sup>101</sup>

As a teacher of mathematics, Rátz was a pioneer in introducing the elements of infinitesimal calculus and made the concept of the function a central aspect of his teaching. He published his new educational ideas along with colleague Sándor Mikola in 1910 under the title *Az infinitezimális számítások elemei a középiskolában* [Elements of infinitesimal calculus in the high school]<sup>102</sup> which they later published in a new, improved edition as *A függvények és az infinitezimális számítások elemei* [Elements of function and infinitesimal calculus]<sup>103</sup>

Like his friend László Rátz, Sándor Mikola (1871-1945) was also a student of the Lutheran *lycée* of Sopron and of the University of Budapest where he studied with the Eötvös-student János Renner and met Loránd Eötvös himself. He became a teacher at the Lutheran *gimnázium* in 1897 and remained a member of the faculty until his retirement in 1935. He was director of the school between 1928 and 1935, and co-editor, with Lipót Fejér, of *Mathematikai és Fizikai Lapok* [Papers in Mathematics and Physics].<sup>104</sup> Mikola was an active experimental physicist whose studies on electricity were rewarded with a membership of the Hungarian Academy of Sciences in 1923. He was an enthusiastic teacher and educator who loved his work as well as his students. He thrived when free to choose his working methods and put into application exact scientific terms such as the notion of development, the use of analogies, and the creation of models.<sup>105</sup> For him, the notions of physics come to be born and developed rather than merely existing in a physical form: physical reality is the result of a process and not an existing set of facts. The teaching of physics started with either qualitative or virtual experiments, which helped students to develop their notions of physics. Mikola was enthusiastic about the inductive and heuristic method. The latter he thought was especially created for physics.<sup>106</sup>

By applying appropriate questions the teacher tries to direct the thinking of his students to the subject, to help the subconscious experiences and making their instinctive mechanical notions conscious, to turn the direction of their thinking

toward selecting the important, to develop their ability to observe and analyze, to enlighten the development of abstract physical notions and keep their interest in the subject by inspiring the necessary stimuli constantly awake...<sup>107</sup>

He developed his principles of physics over the writing of several books such as *A fizikai alapfogalmak kialakulása* [The development of the basic terms of physics] (1911), *A fizika gondolatvilága* [The mind of physics] (1933) and *A fizikai megismerés alapjai* [The basics of physical cognition] (1941), which brought him full membership of the Academy by 1942.<sup>108</sup>

### ***Markó utca***

Hungary, and particularly Budapest, offered a variety of different high schools to the growing student body of the late nineteenth and early twentieth centuries. A good example was at *Markó utca* [Markó Street] in Pest, where there were originally two high schools demonstrating some of the differences in educational philosophy. George Pólya, for example, attended the *főgimnázium* [eight-year *gimnázium*] in the Markó utca in Budapest.

We had eight years of mathematics, but this so-called mathematics brought me very little pleasure – apart from the few classes for which I am still grateful to Director Alajos Wágner. It was not difficult, generally I got fairly good grades almost without any learning, but it was dull, grey, uninteresting. Yet—and this I state without reproach, just melancholically—high school mathematics could have been interesting, colorful, funny in the *gimnázium* and it could have raised our youthful ambition.

Yes, mathematics classes can be interesting and useful and even more, as Descartes so beautifully put it: „it can make our eyes used to see [sic] the truth purely and clearly.”<sup>109</sup>

Across the street, there also was a *főreáliskola* [eight year *reáliskola*], that dropped Greek as a subject and was somewhat more practical in its purposes. After the death of József Eötvös, his friend and brother-in-law Ágoston Trefort (1817-1888) took over as Minister of Religion and Education in 1872. Trefort continued many of Eötvös's initiatives and was instrumental in fine-tuning the high school system. He created the eight-year version of the *reáliskola* [practical school] along the lines of the eight-year *gimnázium*. One of the products of his early years was the *főreáliskola* in the Markó

Street [*Markó-utcai főreáliskola*], founded in 1872. The *reáliskola* was not at all inferior to the *gimnázium*, just different in scope and somewhat more practical than the ‘gentlemanly’ *gimnázium*. The best *főreáliskola* also attracted some of the best teachers, such as Ferenc Mendlik (1838-1902) who went to teach mathematics in the Markó utca *főreál* and József Müller (1844-1931) who taught physics.<sup>110</sup> The first students to graduate included prospective university professors Manó Beke (1862-1946) and Gusztáv Rados (1862-1942), later to play an important role in the *Mathematikai és Fizikai Társulat* [Society of Mathematics and Physics]. The son of József Müller would also become a teacher of physics who in turn would teach his subject to outstanding physicists Pál Selényi (1884-1954) and István Rybár (1886-1971). It is important to remember that *főreáliskolák*, and not just the few outstanding *gimnáziums*, boasted extraordinary students in mathematics and the sciences such as Lipót Fejér (1880-1959) at Pécs, Leo Szilard (1898-1964) and Dennis Gabor (1900-1979) in Budapest.

### **The Formative Years of Mathematics Education**

When asked about the reasons for the development of so many excellent mathematicians in Hungary emerging at the turn of the century and after, George Pólya answered, “A general reason is that mathematics is the cheapest science” and this was important in a relatively underdeveloped country. As to specific reasons, Pólya listed the *Középiskolai Matematikai Lapok* [High School Papers in Mathematics], the Eötvös Competition, and the personality of the mathematician Lipót Fejér.<sup>111</sup>

The key personality in late 19<sup>th</sup> century Hungarian science and mathematics was Baron Loránd Eötvös (1848-1919). Son of the author, philosopher, and statesman Baron József Eötvös, young Loránd was not only a major physicist in his own right, but also one of the truly great organizers of Hungarian science. Two subsequent ministers of education, his father József Eötvös as well as his uncle, Ágoston Trefort who continued József Eötvös’s work as Minister of Religion and Education, naturally influenced him. It is important to notice, though for a very limited time, that Loránd Eötvös himself became Minister of Education (1894), in addition to his distinguished service as President of the Hungarian Academy of Sciences (1889-1905).

With his German (Heidelberg, Königsberg) educational background and inspiration, Eötvös created a small, private Mathematics Circle in Budapest, in the fall of 1885, to build an informal network among university professors and high school teachers and their best students.<sup>112</sup> As of 1891, this circle continued as the *Mathematikai és Fizikai Társulat* [Society of Mathematics and Physics] with some 300 members (including three women). Loránd Eötvös served as the first president of the *Társulat*, which launched *Mathematikai és Fizikai Lapok* [Mathematical and Physical Papers]. In his inaugural address, Eötvös expressed his hope that “we will do great service to the general cultural development of the country, because undoubtedly, the success of teaching in both higher and secondary schools depends above all on the scientific preparation of the teachers.”<sup>113</sup> The special emphasis on the training of mathematics and physics teachers and on the achievement of the secondary school student in Hungary can thus be traced back to Loránd Eötvös. Peter Lax remembered Eötvös as a professor of his parents who were joined by a host of students in “the lecture room just to be able to hear him lecture.”<sup>114</sup>

When Loránd Eötvös became Minister of Education in 1894, this event was looked upon as a beginning of great scientific opportunity in Hungary. The time was ripe to launch a new, practical, and successful Hungary also in the realm of sciences. With the *millennium* of Hungary’s birth, the great celebration of 1896 to commemorate the 1000 years of the state of Hungary in the making, these were the times to impress the world with Hungary’s achievements. Accordingly, Continental Europe’s first subway system and largest Parliament were built in Budapest, along with a host of public buildings, theaters, museums, universities, all as tributes to Hungary’s architectural and building skills, innovative spirit in engineering, and entrepreneurial excellence.

As students were expected to compete in regular national interschool competitions in mathematics and science, the *Mathematikai és Fizikai Társulat* honored Eötvös by launching an annual mathematics and physics competition “in order to discover those who are exceptional in these fields.”<sup>115</sup> Appropriately named the Eötvös Competition, a first and a second prize (the Eötvös Prize) were awarded to the best secondary school graduates. As only secondary school material was included in the test, no additional study was necessary for the exam. Results were reported directly to the Ministry of Education,

along with the names of the teachers of the winners, and were published in the *Mathematikai és Fizikai Lapok*.

To support preparations for future competitions, the same year, 1894, also saw the inauguration of *Középiskolai Matematikai Lapok* [High School Papers in Mathematics], edited by Dániel Arany, an outstanding high school mathematics teacher from the West Hungarian city of Győr. László Rátz (1863-1930), the future teacher of mathematics of John von Neumann and Eugene Wigner, continued Arany's editorial work, between 1896 and 1914. The problems to be solved included a wide variety of fields such as algebra, calculus, combinatorics, geometry, number theory, and trigonometry, and the problems always required creative thinking. Pride, rather than money was the reward of the best students.

The organizational structure of these competitions, along with the related new publications, provided a well-structured and carefully regulated framework of preparation for future professional challenges these students would face.

The idea of founding awards and competitions was not restricted to Budapest and the Eötvös Prize alone. For example, upon the death of the reputable high school mathematics teacher Adolf Prilisauer (1859-1913), his city of Kaposvár in Western Hungary along with his former teaching colleagues, established a prize for the best student (or, later, students) in mathematics.<sup>116</sup>

The *Középiskolai Matematikai és Fizikai Lapok* [Highschool Papers in Mathematics and Physics], the *Eötvös Loránd fizikai verseny* [Eötvös Loránd Competition in Physics] and the *Arany Dániel országos matematika verseny* [Arany Dániel National Competition in Mathematics] have survived until today and maintain the living tradition of an excellent mathematics education based on early training, competitive spirit, and the recognition of talent.

## **The University of Hungary**

In the 18th and 19th centuries, Central European universities were strongly influenced by the Prussian/German model, and particularly by the ideas and activities of Wilhelm von Humboldt (1767-1835). Von Humboldt persuasively argued for a university that would

become part of the State of Prussia and his vision of a state-run university had a wide impact not only in the various states of Germany but also throughout Central/East-Central Europe. „The Prussian State,” he declared when lobbying for the University of Berlin in 1810, „has no other means, and no state may possess a nobler one to distinguish and honor itself than through the loving support of the sciences and arts.”<sup>117</sup> Culturally speaking, East-Central Europe has always been on the fringes of Germany, heavily influenced by German ideas, German art, German science and German scholarship. Thus, the Central European university cannot be understood without the proper study of, and a comparison with, its German opposite numbers’ characteristic high quality, competitive edge, strict hierarchical nature and authoritarian philosophy. Particular forms of teaching, such as the seminar as we know it even today, spread largely from Germany, particularly from the University of Berlin where famous scholars like the historian Leopold von Ranke (1795-1886) introduced and developed it for an intellectually elitist consumption.

The most important university in Hungary has been for a long time Eötvös Loránd (earlier Pázmány Péter) University of Budapest.<sup>118</sup> One of the top fifteen universities of the world at the end of the 19th century, this university awarded John von Neumann his doctorate in mathematics in 1926. The oldest Hungarian university currently in service, this college was founded as a Jesuit institution by Péter Cardinal Pázmány (1570-1637) in 1635 in Nagyszombat (today Trnava in Slovakia). At a time when much of Hungary was still under Ottoman occupation, Pázmány expressed his desire to move his University of Hungary (*Universitas Hungariae*), sometime after the liberation of the country, from the small city of Nagyszombat to a more suitable location. In the meantime, he entrusted the university to the Jesuits of Nagyszombat and designed it as a center of the entire educational system of Hungary. International in its ideological foundations, Pázmány’s work was instrumental in preserving Hungarian national culture at a time when Hungary was dominated by a major foreign power. This indeed signaled the recurring double function of higher education not only in Hungary but also in many different areas of Europe: it served both cosmopolitan and national functions and interests.

When the Jesuit order was dissolved by Pope Clement XIV in 1773 („*Dominus ac Redemptor noster*”) it was the Empress Maria Theresa (1740-1780) who moved the university to Buda (much later, in 1873, to become a part of Budapest) in 1777, and

attempted to include it (as well as the other universities of her Empire) into a Habsburg system. The Empress made every effort to make them resemble the University of Vienna: „*Universitati Vindobonensi per totum conformentur*”. In the history of the University, this was one of the many subsequent steps towards centralization. Her son, the Emperor Joseph II, went even further when making the University one of his many government offices, which ultimately denied the university faculty and academic leadership any interference in university matters: „*nec decanis facultatum, nec magistratui academico aliquis influxus in res litterarias concedendus est*”<sup>119</sup>. These ideas and efforts started a long tradition of state intervention in the entire area that came gradually to replace church governance and have lasted until today. Practically no subsequent government in Hungary tolerated the autonomy, let alone sovereignty, of the universities and worked to place them under the auspices of the state. This ideology was made into a compact philosophy by the German philosopher Georg Wilhelm Friedrich Hegel (1770-1831), and by his vision of the state as an absolute (in the words of Thomas Mann, „*Staats-Verabsolutierung*”<sup>120</sup>). Not even the ministry of the democratic revolution of 1848 restored the autonomy of the university, ordering it under the direct control of the minister of education. One must add that even the language of tuition was Latin until the very end of 1844 when Hungarian belatedly replaced it.

During the nineteenth century the faculty had boasted scientists such as the physicist Loránd Eötvös and scholars such as the orientalist Ignác Goldziher who were full equals to (and indeed became accepted as such by) their colleagues in the West. Hierarchical though the system may have been, the intellectual training it provided was rigorous and laid the foundation for solid future research—just as in the case of German universities which served as its model. The chemical laboratories of Professors Béla Lengyel and Géza Zemplén, the medical clinics of Professors Baron Sándor Korányi and János Bókay, Jr., the history seminars of Professors Henrik Marczali, Gyula Szekfű and Elemér Mályusz were just some of the high spots of Hungarian higher education in the otherwise dour decades of the interwar period.

Without trying to present the complete history of this one university as a case study, it is imperative to note that all these strictures were enforced upon the University of Hungary centuries before Communism: almost all subsequent (and very different)

political regimes took a nearly absolute control over this institution of higher learning. Yet the foundations of centralization, anti-democratic leadership, ideological control, and the direct interference of the state were all there in the early history of this great institution.

This once luminous and famous institution suffered the most painful consequences of merciless state interventions under the Communist regime, particularly between 1949 and 1956. A school that at the end of the 19th century belonged to the top fifteen universities of the world is today in the 301-400 range of the Shanghai academic ranking of the top 500 world universities (provided by the Jiao Tong University), was Nos. 376-377 on the list of *The Times Higher-QS World University Rankings 2006*, and No. 351 on the *Webometrics* list in January 2007.<sup>121</sup> Hungary, however, succeeded in producing mathematicians and scientists out of proportion to its size, its economy, and its general significance.

### **Fascination with Genius**

In and out of the school system, mental processes, the concept and structure of cognition received increasingly special attention in fin-de-siècle Central Europe. Hungary's new generation was intrigued by the phenomena of scientific discovery and problem solving. Contemporary Europe was fascinated, indeed, thrilled by genius, and the subject seemed particularly relevant in Germany and the Austro-Hungarian monarchy, well before World War I. Italian psychiatrist Cesare Lombroso's landmark study on genius and insanity (*Genio e follia*, 1864) was translated into German in 1887, his *L'uomo di genio in rapporto alla psichiatria* (1889) in 1890. Hermann Türck published a highly successful study on genius in 1896 in Berlin, Albert Reibmayer described talent and genius in Munich in 1908 in two volumes, and Wilhelm Ostwald studied the biology of genius in Leipzig in 1910. Ernst Kretschmer published his 1919 Marburg university lectures on genius in 1929, shortly after the appearance of W. Lange-Eichbaum's volume on genius and madness.<sup>122</sup> Research in Germany obviously influenced, or at least coincided with, Lewis M. Terman's Stanford studies on genius. Actually, both the German and the American studies on intelligence were based largely

on the French Binet-Simon intelligence test, which was adapted for the needs of several countries (for example, the Stanford-Binet Scale developed by Terman in the United States, as well as the tests by Bobertag in Germany, Jaederholm in Sweden, and Mátyás Éltes in Hungary). Considerable interest was shown in the subject in contemporary Hungary, as indicated by Henriette von Szirmay-Pulszky's study of genius and insanity among Hungarian intellectuals<sup>123</sup> as well as József Somogyi's book on talent and eugenics.<sup>124</sup> Psychologist Géza Révész studied talent and genius throughout his career, culminating in his 1952 book *Talent und Genie*.<sup>125</sup>

To be sure, Central Europe was dazzled and perplexed by the secrets of the mind and its workings, and the processes of understanding/knowing, intuition/perception, intelligence/intellect came to be recognized as central issues in the sciences and humanities of German-speaking Europe. In 1935 Karl Duncker of the University of Berlin provided a summary of the psychology of productive thinking.<sup>126</sup> To those trained by the German literature on the subject, including several generations of Hungarian scientists and scholars, the plethora of work done on productive thinking in German provided copious introductions to the theory of knowledge, the biology of talent, and the philosophy of problem solving. Much of the interest in the theory of knowledge and of knowing was generated in Vienna, where philosophers such as Professors Ernst Mach and Ludwig Boltzmann contributed significantly to the development of a scientific interpretation of the workings of the mind. Mach's main concern was the relationship between everyday thinking and scientific reasoning.<sup>127</sup> Franz Brentano and his students Kasimir Twardowski and Christian von Ehrenfels were active in the field of phenomenology and knowledge and played an important role in the philosophical study of language.<sup>128</sup> From Vienna these new ideas and trends spread quickly to Budapest.

Mach's work had considerable influence on contemporary European philosophers and scientists such as the English Sir Oliver Lodge and Karl Pearson, the Russian A. Bogdanov, and the Austrian Friedrich Adler, the assassin of Austrian Prime Minister Count Karl von Stürgkh. These works became a target of vicious critical attack by V. I. Lenin in his defense of Marxism in 1908 for "the old absurdity of philosophical subjective idealism."<sup>129</sup> It is remarkable how anti-Marxist, non-Marxist, pseudo-Marxist scholarship, and particularly Ernst Mach's work, influenced the philosophical tradition in

central Europe, including Germany, Austria, and Hungary.<sup>130</sup> Apart from the actual content of Mach's studies, their philosophical and political implications were also relevant in the region, making a lasting impact on liberal thinkers who endeavored to maintain an anti-totalitarian stance in an age of political and doctrinal dictatorships. Albert Einstein extensively used Mach's epistemology and physics, including "Mach's Principle," in his theory of general relativity.<sup>131</sup>

The anti-Marxian roots of liberal thought contributed to the estrangement of Hungarian émigré scholars and scientists such as Michael Polanyi and Oscar Jászi after the Soviet takeover of 1945 and contributed in turn to their anti-Soviet attitudes. Apart from directly political reasons, this framework may be helpful in understanding the seemingly unconditional support given to the U.S. military and to NATO during the cold war period by scientists such as John von Neumann, Theodore von Kármán, Karl Mannheim, and most notably Edward Teller. The philosophical underpinnings of the anti-totalitarian politics of Hungary's émigré professional can thus be traced to the traditional idealistic approach to science in central Europe and the corresponding *Weltanschauung*, a legacy emanating from the philosopher George Berkeley through Albert Einstein.

## **IV Berlin Junction**

### **The Human Geography of Interwar Migrations**

After the political changes of 1918-20, small groups of intellectually gifted Hungarians, started to migrate toward a variety of European countries and the United States. Young John von Neumann was one of them. The influences on his early life can be best studied and interpreted if we follow him into Germany where his education came to be completed and his career started.

As mentioned before, for émigré Hungarians in the post-war era a natural choice was to go to one of the German-speaking countries.<sup>132</sup> After what often proved to be the first step in a chain- or step migration, most of the Hungarian émigrés found they had to leave the German-speaking countries upon the rise of Hitler as chancellor of Germany

and they continued on their way, in most cases to the United States. This pattern was certainly not the only one, though it was by far the most typical.

Professional migration as a European phenomenon after World War I was certainly not restricted to Hungary alone. The immense social convulsions that followed the war drove astonishing numbers of people in all directions. Russian and Ukrainian refugees fled Bolshevism, Poles were relocated in reemerging Poland, Hungarians escaped from newly established Czechoslovakia, Romania and Yugoslavia.<sup>133</sup> Outward movements from Hungary in the 1920s were parts of this emerging general pattern and cannot be clearly defined as *emigrations* proper. Most people simply went on substantial and extended study tours of varied length, just as others did before World War I. Contrary to general belief, migrations were not limited to Jews only, suffering from the political and educational consequences of the White Terror in Hungary, a reaction to the revolutions of 1918-1919. Jewish migrations, of course, were clearly a definitive pattern of the 1920s when the *numerus clausus* law kept many of them out of university.

Émigrés of this era were of course not just of Jewish origin but, for different reasons, included the likes of authors Gyula Illyés, Lajos Kassák, and Sándor Márai, visual artists Aurél Bernáth, Sándor Bortnyik, Béni and Noémi Ferenczy, Károly Kernstok, singers Anne Roselle (Anna Gyenge), Rosette (Piroska) Andai, Koloman von Pataky, actresses Lya de Putti, organist/composer Dezső Antalffy-Zsiros and, later and most notably, composer Béla Bartók, and Nobel laureate Albert Szent-Györgyi. Motivated by politics, poverty, or curiosity, people of gentile origin and dramatically opposed convictions hit the road and tried their luck in Paris, Berlin, or Hollywood.

Many Hungarians left the successor states of the former Austro-Hungarian Empire, labeled as “Romanians”, “Czechoslovaks”, or “Yugoslavs”. Because of the Quota Laws, however, very few Hungarians headed toward the United States: migrations were directed toward European centers, in the first place to Germany. Weimar Germany and in part German-speaking Czechoslovakia were liberal and democratic in spirit and politics. In addition, like the former Austro-Hungarian monarchy, Germany and to some extent Czechoslovakia represented a multicentered world: each of the "gracious capitals of Germany's lesser princes"<sup>134</sup> could boast of an opera, a symphony, a university, a theater, a museum, a library, with an appreciative and inspiring public that invited and

welcomed international talent. Young musicians graduating from the *Hochschule für Musik* in Berlin could be reasonably sure that their diploma concerts would be attended by the music directors or conductors of practically all the German operas across the country eventually ready to offer them a job in one of the many cultural centers of the Reich.<sup>135</sup> Berlin and other cities of Weimar Germany shared many of the cultural values and traditions that young Hungarian scholars, scientists, musicians, visual artists, filmmakers, and authors were accustomed to, providing an attractive setting and an intellectual environment comparable to the one that perished with prewar Austria-Hungary or was left behind, particularly in Budapest.<sup>136</sup> The vibrant, yet tolerant spirit of pre-Nazi Germany, particularly the atmosphere of an increasingly "Americanized" Berlin, reminded them of the "good old days" in Budapest.

### **From Budapest to Berlin**

Most Hungarians who made their way toward Germany did not easily find ideal places for their studies or for their ambitions. It was somewhat easier to succeed before the War, though when Theodore von Kármán completed his *Habilitation* in Germany in 1908 he "was emphatically warned that no one could guarantee that he would ever get a [university] chair. But I received a call after a waiting time which would have been considered short even for Germans."<sup>137</sup> Prospective Berlin professors expected introductions for students. Typically, mathematics student Gábor Szegő in 1914 asked for a letter for Professor E. Landau from his Budapest colleague Lipót Fejér, who had spent years in Germany.<sup>138</sup> The search for education or academic posts in Germany became a lot more difficult during the war. When in 1916 Michael Polanyi inquired about his own prospects for a *Habilitation* under Professor G. Bredig at the Institute for Physical Chemistry and Electrical Chemistry of the University of Karlsruhe, he was politely turned down.

We are compelled, now after the War [had started] more than ever before, to take into account the public opinion which urges us to fill in the available places for Dozenten by citizens of the Reich as much as possible. Even though we like to treat the citizens of our Allies the same way as our own, you must have seen in my Institute that the situation was pushed so strongly in favor of them, that as of

now, and more than ever before, I must see to attracting more Imperial Germans.<sup>139</sup>

After World War I ended, the prospects for Hungarians in beaten Germany naturally were even worse. Well established in Germany since receiving his Ph.D. in Göttingen in 1908, Theodore von Kármán, professor at the University of Aachen, described the 1920 situation in chilling terms to Michael Polanyi, who was still trying to decide about his future as a scientist and get his *Habilitation* or a job. An assistant to Georg de Hevesy during the Hungarian commune, Polanyi left Budapest at the end of 1919 and went to Karlsruhe where he had already studied chemistry from 1913-1914.<sup>140</sup> Initially, the prospects seemed discouraging. "The mood in the universities vis-à-vis foreigners is momentarily very bad but it may change in a few years . . . The inflation conditions are very unpleasant today and it is much more difficult to wait for a job."<sup>141</sup> From 1920 on, von Kármán himself helped a number of Hungarians start their careers in Germany, readily sponsoring friends of his family, often under the most adverse circumstances.<sup>142</sup> Several years later, in 1923, American visiting scholar Eric R. Jette described the German university scene in remarkably similar terms: "Conditions in the universities were very bad, of course, in all places. The same story was heard everywhere, no money, no new professors or docents but laboratories filled with students who had almost nothing to live on. Yet the research goes on and the students still keep at their books."<sup>143</sup> In little over a year, however, Jette received better news from Werner Heisenberg, who "said that while the university people were not as well off as before the war, they were infinitely better situated than a year ago."<sup>144</sup>

Hungarians were difficult to turn down. Networking, using available contacts and relying on people already established in Germany, was one of the most natural methods used to secure a place somewhere in Germany. Michael Polanyi had to turn to von Kármán for help. In turn, the future engineering professor Mihály Freund asked for Polanyi's assistance for a young relative, Tibor Bányai, who had just finished high school in Budapest and wanted to become an engineer at the University of Karlsruhe, where Polanyi had been active for some time. More important, in 1922 Polanyi paved the way for Leo Szilard who tried to get an assistant's job at the Institute of Physical Chemistry at the University of Frankfurt am Main. Szilard, of course, was well on his way to becoming

a scientist in his own right. The degree he had just received in Berlin under Max von Laue was the best letter of recommendation he could possibly present. Yet under the circumstances he did need Polanyi's letter to Frankfurt professor B. Lorenz which called him a "wonderfully smart man."<sup>145</sup> Of all the Hungarian scientists, however, von Kármán proved to be the most active and successful contact person. His German and subsequent American correspondence provides a wealth of information on half a century of Hungarian networking. A typical letter from his German period was sent in 1924, by a Hungarian friend in Vienna, asking for his assistance for Hungarian chemical engineering student Pál Acél to continue his studies "in Germany, preferably under you."<sup>146</sup> Correspondence on these matters sometimes had to be clandestine: in dangerous years such as 1920, such mail was better sent to Vienna, rather than Budapest, and picked up there personally.<sup>147</sup>

Students continued to try to get to Germany for several reasons, one of them being the commitment of the German professors to their gifted students and the great deal of time and interest they allotted to young people. Results of even a shorter stay in Berlin promised to be significant, as in the case of young John von Neumann. From Budapest, Professor Lipót Fejér asked fellow mathematician Gábor Szegő in Berlin in early 1922: "What does little Johnny Neumann do? Please let me know what impact you notice so far of his Berlin stay."<sup>148</sup> In a 1929 interview Michael Polanyi, since early 1923 a *habilitierter* Berlin professor himself,<sup>149</sup> proudly yet sadly described the essential difference between the contemporary Hungarian and German educational scenes declaring that "professors in Germany grab with avid interest the hand of any student considered to be gifted. They are like the art-collector whose utmost passion is to discover talent. This is part of the profession of a university professor."<sup>150</sup> It is important to note that his generation shared essentially the same experience later in U.S. universities: for *émigré* scholars and scientists, the welcoming atmosphere of German universities was happily rediscovered in the United States.

One of the outstanding qualities of the post-World War I German environment was tolerance—political, religious, professional, and artistic. People, professions, ideas, and artistic products persecuted at home in Hungary were welcome in the open atmosphere of Weimar Germany. Béla Bartók's pioneering ballet *Miraculous Mandarin*,

unaccepted and persecuted in Hungary, found a sympathetic audience in Cologne where Hungarian-born Eugen Szenkár performed it for the first time in 1926.<sup>151</sup> Moving to Germany was not only a question of survival in terms of studies, jobs, and promotions: it also meant an opportunity to gradually resume one's original professional activities or intellectual direction. It was not merely the acquisition of a new address: it led to the reconstruction of spiritual (and often bodily) health, the realization of the self, a restoration of the mind.

A case in point is psychoanalyst Michael Balint, who decided to leave Budapest for what was then a typical combination of political and professional reasons. "It was very difficult—it was 1920 then—and it was the worst period of the Horthy Régime, very anti-Semitic and anti-liberal and so on," he declared in a Columbia University oral history interview toward the end of his life.<sup>152</sup> "So it was with my interests in analysis . . . It was almost impossible to get any [position] at the university, so I started to work as a biochemist and bacteriologist. . . . However, I did not think that anything could be done in Budapest. So I decided to leave Budapest and try something in Germany."<sup>153</sup> Balint went to Berlin as a chemist. He used the introduction of his friend and former colleague Michael Polanyi to get a job at the AGFA laboratories there.<sup>154</sup> "So we departed to Berlin, where I got a small job as a research chemist, with permission that I work for a Ph.D. degree."<sup>155</sup>

Physicist Imre Brody also complained of the political situation in Hungary when trying to get to Germany. "You know very well," he wrote to Michael Polanyi in Berlin, "as you did what you did for that very reason, what it means to me to be able to get out of here, so that I could work, getting out of here, where scientific work, at least for me, is both physically and psychologically equally impossible. Your encouragement and active support, I believe, made successful work possible."<sup>156</sup> Derailed in his scientific activities in physical chemistry, Brody intended to devote his energies to the theory of relativity.<sup>157</sup> "For the moment I find Berlin the most appropriate place to go to," he added, though scientists Max Born and James Franck had helped him to get a job at the University of Göttingen which he accepted.<sup>158</sup> Brody was one of the few notable émigré scientists to return to Hungary and fall victim to Nazism there.

Joining prewar Hungarian groups and friends in Germany, new Hungarians came by the hundreds to Berlin in the 1920s. They came to study, to find a job, to start their career. They found what increasingly amounted to a Hungarian community, with bass Oszkár Kálmán singing in the Staatsoper and tenor Pál Fehér in the Städtische Oper, and a host of Hungarian singers including Gitta Alpár, Rózsi Bársony, Oszkár Dénes, and Tibor Halmai featuring in Paul Abraham's popular operetta *Ball im Savoy*. Even after the Nazi takeover, Maestro Fritz Busch presented Verdi's *Ballo in maschera* in the Städtische Oper with the Hungarian stars soprano Mária Németh and tenor Koloman von Pataky. The accompanist Árpád Sándor was an organic part of the musical life of the city.<sup>159</sup> Hungarians assembled in four different circles that alternately organized the annual Hungarian ball, helped introduce the new Berlitz method for studying German, and socialized around the Collegium Hungaricum of Berlin, which attracted influential people like the Prussian minister of culture Karl Heinrich Becker, physicists such as Max Planck and Albert Einstein, or the linguist Willy Bang-Kaup.<sup>160</sup>

Berlin was certainly not the only destination. Mathematician Gábor Szegő was happy to accept a full professorship at Königsberg in 1926, chemist Ferenc Kőrösy went to study at Karlsruhe in 1923, philosopher Karl Mannheim settled in Heidelberg, where he had studied before World War I,<sup>161</sup> and mathematician Otto Szász gave up a position at the University of Frankfurt am Main in 1933 to leave for the U.S., where he taught mostly in Cincinnati.<sup>162</sup>

Hungarian filmmakers formed an integral part of the German film industry right after World War I. German film established its independence from foreign influence at the same time and film production was supported by massive government aid: the UFA (Universum-Film Aktien Gesellschaft) was founded in 1917 and remained the dominant force of the film industry until the end of World War II. The 1920s was known as the golden age of the German cinema. A large number of Hungarians served their film apprenticeship at the UFA studios in Berlin-Babelsberg. As they did not all work there continuously until Hitler emerged, they did not all leave Germany as a group after 1933. Director Michael Curtiz (Mihály Kertész), director (Sir) Alexander Korda, actor Bela Lugosi, Paul Lukas (Pál Lukács), director Charles Vidor, screenwriter Ladislaus (László)

Vajda, and actor Victor Varconi left Germany for the United States well before the Nazis came to power as they had found Hollywood's offers more attractive.<sup>163</sup>

At one point toward the end of the 1920s, the Hungarian government began to realize the significance to Hungarian culture of the continuous outward flow of émigré professionals. Count Kuno Klebelsberg, minister of religion and public education between 1922 and 1931, visited some of the key German universities, trying to invite the promising Hungarian scientists back to Hungary. "When Klebi [Klebelsberg] celebrated some time ago in Göttingen, the mathematician Courant who sat next to him at the dinner table tried to impress him by listing a number of Hungarian though non-Aryan scientists (such as [Lipót] Fejér, [George] Polya, Misi [Michael Polanyi], [John von] Neumann, [Theodore von] Kármán, Gábor [Szegő])" who did well in Germany. "[Max] Born seconded. Klebi said that Misi had received an invitation to return to Budapest. . . . Tammann [also at the table that night] remarked that he doubted whether Misi would accept the invitation, and give up his position in Germany. Klebi responded with the by now classical adage: *Wenn Vaterland ruft, kommt Ungar!* [When the Fatherland calls, the Hungarian comes!]" in addition, adding with a measure of cynicism, "*Si non è vero, è ben trovato.* [If it's not true, it's well invented]."<sup>164</sup>

Returning to Budapest, the minister published a prominent article on the first page of the popular daily *Pesti Napló*. In the title of his article, Count Klebelsberg used a reference to the poet Endre Ady's famous line from 1906, which referred to modernization in Hungary. For the minister, the great national problem in 1929 was to "preserve the genuine features of the nation while at the same time raising [Hungary up] to a completely European level and learning from the nations that surround us."<sup>165</sup> He suggested the importance of maintaining the strong Hungarian national character in literature and the humanities but argued differently in regard to the field of medicine, economics and the technical and natural sciences: "Chauvinism and particularism would take a cruel revenge there," he said, "for them we must open the gates widely . . . May a lot of people come in, a great many of them, as many as possibly can, with the new inventions of new times, new methods of production, and, first and foremost, with new energies."<sup>166</sup> The minister wrote the article as an open invitation to all Hungarian professionals currently in other countries in an effort to induce a return migration in the

key professions. For him this was not a novel idea: as a young associate to then Prime Minister Kálmán Széll, Klebelsberg was instrumental in 1902-1903 in establishing the guidelines of the “American project” of the Hungarian government, which endeavored to take care of, and eventually bring back home, ethnic Hungarians who left for the United States.<sup>167</sup>

Klebelsberg’s article stirred the Hungarian émigré community in Germany. At one point or another, many of them had difficulties finding jobs and the call of the Hungarian government sounded good. Michael Polanyi showed his copy of *Pesti Napló* to his Berlin friends. Later Nobel laureate Eugene Wigner and Leo Szilard actually signed it as if acknowledging the message—but they decided to stay in Germany. A day after the article appeared, the minister was interviewed about the actual intentions of the government. Klebelsberg apparently became suddenly cautious and backpedaled when confronted with questions about returning professors, suggesting that this was in fact up to the Hungarian universities. Some scientists did return, however, and the most notable among them, later Nobel laureate Albert Szent-Györgyi, concluded a successful period of research in Groningen (Holland), Cambridge (England), and the Mayo Clinic at Rochester, Minnesota, and returned to Hungary in 1928, apparently at the instigation of Klebelsberg.<sup>168</sup> Others, such as the celebrated Hungarian-American conductor Fritz Reiner of Cincinnati, also toyed with the plan of returning to Hungary, where he was apparently invited to become music director of the Budapest Opera. Reiner’s conditions, however, were so demanding that the appointment never materialized.<sup>169</sup>

### **The Amerikanisierung of Berlin**

While visiting Berlin the young Henry Adams found very little of interest in 1858-1859 and noted that "the German university and German law were failures; German society, in an American sense, did not exist, or if it existed, never showed itself to an American." Adams also spoke about the "total failure of German education."<sup>170</sup> But for German cultural critics such as Julius Langbehn, Paul de Lagarde, and Moeller van den Bruck, Berlin a mere couple of decades later had taken on an American flavor that seemed to be evil itself. "Spiritually and politically, the provinces should be maneuvered

and marshaled against the capital," exclaimed Julius Langbehn in his diatribe against Berlin.<sup>171</sup> It was he who thought that the ancient spirit of the Prussian garrison town had been corrupted by the poison of commerce and materialism, which he identified with the *Amerikanisierung* (Americanization) of Germany. Langbehn bitterly resented "the crude cult of money which," he insisted, "was also a North American trait, which takes over more and more in today's Berlin; a German and honorable spirit should definitely stand up against it. Coins of money are mostly dirty. For the Germans of today, they should be the tool and not the purpose."<sup>172</sup> Langbehn's was a typical voice crying out against the big new cities across the continent of Europe as well as in the United States. His tract appeared approximately at the same time as the Rev. Josiah Strong's *Our Country*, which described the American city as one of the great perils of his day.<sup>173</sup> In time, however, Langbehn identified "the crude cult of money" not only with North America but also as "a Jewish trait," an assertion he added to subsequent editions of his phenomenally popular book.<sup>174</sup>

Berlin underwent remarkable changes in the late nineteenth century. "The long lines of brilliant electric light globes, the rows of the brilliant shop windows, the omnibuses, the carriages, the streams of pedestrians—all this made me exult. 'Hurrah!' I cried to myself, 'This is what you are preparing for. You will be one of similar streams of humanity in the cities of the Great Republic . . . You shall be in the tide. Work and wait and watch.'"<sup>175</sup> For the young American sociologist Edward A. Ross, Berlin was the big city, a glittering summary of all possibilities that could lie ahead.

Conservatives in imperial Germany were particularly concerned with the Americanization of their country, the coming of a mass society with its materialism, mechanization, and idolized riches. The first to use the term in a speech in 1877 was Emil Du Bois-Reymond, who warned of "*Amerikanisierung* in terms of the growing overweight of technology."<sup>176</sup> Du Bois-Reymond made frequent references to the threat of Americanization for Europe, her intellectual life as well as for her economy. By the turn of the century the term was so widely used and considered such a pernicious threat in Germany that Paul Dehn spoke of the potential dangers of an "Americanization of the Earth" in a paper published in 1904: "What is Americanization? In the economic sense Americanization means the modernization of the methods of industry, commerce, and

agriculture as well as in all areas of practical life. In a broader sense, socially and politically considered, Americanization means the [uncontrolled], exclusive, and [inconsiderate] drive for possession, riches and influence . . ."177 The term *Amerikanismus* was also widely used and adversely interpreted in the postwar years. *Deutsche Rundschau*, one of Germany's most respectable periodicals, discussed its history and meaning in two articles in 1930.<sup>178</sup>

For contemporaries with knowledge of both German and American culture, post-World War I Berlin was the city most thoroughly Americanized. The *Diary* of Lord D'Abernon, British ambassador to Berlin in the early 1920s, is full of references to the American features of Berlin and Germany and to the affinity of Germans to American style and methods. "The similarity of Berlin to an American city has impressed many travelers," the ambassador noted in an "Introductory Survey" to his *Diary*.<sup>179</sup> He noted a mutual impact: "The methods of American trade and finance are derived from Germany rather than from England, being based in the main on the traditions of Frankfurt and Hamburg,"<sup>180</sup> concluding "the close sympathy and instinctive understanding between Americans and Germans is difficult to analyze and explain. The German accepts an American argument far more readily than that of a European. . . . The American he at once finds practical and convincing."<sup>181</sup> Many contemporaries agreed with the British diplomat, who considered Berlin not really German at all but an American city planted in Germany and temporarily dominating it. For them, Berlin was perceived as essentially non-German and foreign. In D'Abernon's view, "Berlin, with its broad regular streets and squares at fixed intervals, with an entire absence both of the picturesque and the squalid, is much more like an American than a European city."<sup>182</sup> Toward the end of his term in Berlin, the British diplomat drew a comparison between American and German ambitions and success in 1926:

A parallel is sometimes drawn in this respect between America and Germany. Both appear to me animated with similar ambitions and to measure success almost exclusively by wealth. . . . The Germans will adapt themselves to American industrial methods much more easily than the English will. In business, there is a temperamental affinity between them.<sup>183</sup>

The American industrialist Henry Ford was very popular in Germany and his 1922 *My Life and Work* was published almost instantly in a German translation that sold 200,000 copies. F. W. Taylor's book *Scientific Management* was equally popular, both as a slogan and as a practical way to deal with the economy. Moreover, there were all the American-type high rises, jazz bands, Black American musicians, and the entire American entertainment industry to dazzle the German mind and mold the German way of life according to American patterns. Josephine Baker, Fred Astaire, Greta Garbo, Jeanette MacDonald and Nelson Eddy were just as popular with the German audience as they were in the U.S.<sup>184</sup>

Berlin's open-mindedness to contemporary music was also to some extent an American feature: in the mid-1920s the various opera companies of the city presented Alban Berg's *Wozzeck*, Igor Stravinsky's *Oedipus Rex*, Paul Hindemith's *Cardillac*, Kurt Weill's *The Threepenny Opera*, Arnold Schoenberg's *Die Glückliche Hand*, and several of the new operas by Richard Strauss under the baton of some of the most celebrated conductors of operatic history such as Wilhelm Furtwängler, Erich Kleiber, Otto Klemperer, Bruno Walter. It was in the Gesellschaft der Musikfreunde zu Berlin that Swiss-American composer Ernest Bloch's *Amerika* was first performed in the 1930-1931 season, almost exactly at the same time when Dr. Charlotte Weidler lectured on *Amerikanische Kunst* in the Lessing-Hochschule in a Berlin series on modern art.<sup>185</sup> Berlin's attraction to anything new and, often, American, became one of the fundamental experiences of this émigré generation of Europeans which a few years later would flee the rise of Nazism and leave Hitler's Germany for the United States. German author Thomas Mann pointedly commented on the Americanization of Europe in 1929, but also suggested that it went hand in hand with “the cultural and artistic Europeanization of America.”<sup>186</sup>

### ***The Babel of the World***

That "American" meant "modern" and Berlin was "American" in that sense became most evident in Weimar Germany after World War I. With most German cities turning conservative, Berlin became progressive, its attractions making it truly the

cultural capital of Germany.<sup>187</sup> "Berlin harbored those who elsewhere might have been subjected to ridicule or prosecution," wrote historian István Deák, and added:

Comintern agents, Dadaist poets, expressionist painters, anarchist philosophers, *Sexualwissenschaftler*, vegetarian and Esperantist prophets of a new humanity, *Schnorrer* ("freeloaders"-artists of coffeehouse indolence), courtesans, homosexuals, drug addicts, naked dancers and apostles of nudist self-liberation, black marketeers, embezzlers, and professional criminals flourished in a city which was hungry for the new, the sensational, and the extreme. Moreover, Berlin became the cultural center of Central and Eastern Europe as well. Those who now dictated public taste and morals, who enlightened, entertained, or corrupted their customers were not only Germans but [also] Russian refugees from the Red and Hungarian refugees from the White terror, voluntary exiles from what was now a withering and poverty-stricken Vienna, Balkan revolutionaries, and Jewish victims of Ukrainian pogroms.<sup>188</sup>

Deák noted some of these famous "Berliners:" "the Hungarian Marxist philosopher György [Georg] Lukács, the Austrian theater director Max Reinhardt, the Prague journalist Egon Erwin Kisch, the phenomenal operetta singer from Budapest Gitta Alpár, and the Polish embezzlers Leo and Willy Sklarek."<sup>189</sup>

Henry Adams remembered Berlin in 1858 as "a poor, keen-witted, provincial town, simple, dirty, uncivilized, and in most respects disgusting. Life was primitive beyond what an American boy could have imagined. Overridden by military methods and bureaucratic pettiness, Prussia was only beginning to free her hands from internal bonds. Apart from discipline, activity scarcely existed."<sup>190</sup> Changes quickly occurred when, after the unification of Germany, the nation needed a large national political capital city to govern the new Reich. Just like Budapest after the Austro-Hungarian Compromise or St. Petersburg under Peter the Great, the new, cosmopolitan and culturally important Berlin was created largely by political exigencies. The big newspaper concerns and the many new theaters helped the city to become preeminent by invigorating its cultural life and making it by the beginning of the new century "an important gathering place for artists who casually defied Imperial and bourgeois cultural standards, and cultivated everything that was artistically modern."<sup>191</sup> Though Berlin was not charming and easy-going like Vienna, it was also less traditional, conceited, and welcomed experimental art and artists, science and scientists. Richard Strauss made his reputation there, and even Italian pianist-composer Ferruccio Busoni moved from Italy to Berlin.<sup>192</sup> The city had the ill

fame of being a crazy place and the *Berliner* made fun of themselves, citing a little verse in the local dialect:

Du bist verrückt, mein Kind,	You are crazy, my child,
Du mußt nach Berlin,	You must go to Berlin,
Wo die Verrückten sind,	That's where the crazy are,
Da jehörst de hin. <sup>193</sup>	That's where you belong.

In the 1920s, in what turned out to be a brief but shining moment, a splendid cultural life emerged in the city. Berlin became the European center for film and theater, photography and literature, opera and the performing arts, architecture and the social sciences. German conductor Bruno Walter remembered this creative splendor, suggesting that it seemed "as if all the eminent artistic forces were shining forth once more, imparting to the last festive symposium of the minds a many-hued brilliance before the night of barbarism closed in."<sup>194</sup> "Berlin aroused powerful emotions in everyone—'delighted most, terrified some, but left no one indifferent,'" commented the biographer of piano virtuoso Vladimir Horowitz.<sup>195</sup> Berlin was the center of Germany's cultural upheaval, "a magnet for every aspiring composer, writer, actor, and performing musician."<sup>196</sup> The playwright Carl Zuckmeyer remembered it as a city that "gobbled up talents and human energies with unexampled appetite." He added, "One spoke of Berlin as one speaks of a highly desirable woman whose coldness, coquettishness is widely known. She was called arrogant, snobbish, parvenu, uncultivated, common, but she was the center of everyone's fantasies."<sup>197</sup> Cosmopolitan Berlin supported nearly 120 newspapers, while 40 theaters, some 200 chamber groups, and more than 600 choruses gave performances in 20 concert halls and innumerable churches. "Ten or fifteen years earlier, Paris had been the undisputed queen of Europe . . . But Berlin with its sensitive restlessness and unerring instinct for quality, had emerged after the First World War as Paris' rival . . ."<sup>198</sup> Such was the attractiveness of life in Berlin, that housing was in great demand and hard to obtain. Michael Polanyi and mathematician Gábor Szegő each had to wait for several years to get a decent apartment.<sup>199</sup>

All this modernism and obsession with innovation produced a lot of trouble. "Material problems, lodging miseries, an introduction to life's sad chapter called 'wie man

Professor wird,' etc. would easily explain, even in your young age, your passing depression," said Lipót Fejér, trying to cheer up his student Gábor Szegő, who was on his way to becoming a professor of mathematics in Berlin.<sup>200</sup> Michael Polanyi in 1920 complained about the joylessness (*Unerfreulichkeit*) of the city, which his Karlsruhe friend Alfred Reis described to him as a "serious jungle."<sup>201</sup> Berlin also changed in terms of social behavior, sexual ethics, and the moral code. Austro-German author Stefan Zweig, one of the most significant and popular figures of modern German literature, was shocked to remember the Berlin of the 1920s, which for him became a crazy, highly eroticized whirlwind, "the Babylon of the world."

In the collapse of all values a kind of madness gained hold, particularly in the bourgeois circles which until then had been unshakeable in their probity. . . . Bars, amusement parks, honky-tonks sprang up like mushrooms. . . . Along the entire Kurfürstendamm powdered and rouged young men sauntered . . . in the dimly lit bars one might see government officials and men of the world of finance tenderly courting drunken sailors without any shame. . . . Hundreds of men costumed as women and hundreds of women as men danced under the benevolent eyes of the police. Young girls bragged proudly of their perversion, to be sixteen and still under suspicion of virginity would have been considered a disgrace in any school of Berlin at that time . . . At bottom the orgiastic period which broke out in Germany simultaneously with the inflation was nothing more than a feverish imitation . . . the whole nation, tired of war, actually only longed for order, quiet, and a little security and bourgeois life. And, secretly it hated the republic, not because it suppressed this wild freedom, but on the contrary, because it held the reins too loosely. . . . Whoever lived through these apocalyptic months, these years, disgusted and embittered, sensed the coming of a counterblow, a horrible reaction.<sup>202</sup>

## V

### **Transferring the Heuristic Tradition: George Pólya**

Hungarian-born mathematician George Pólya (1887-1985) was one of those who channeled the Hungarian and, more broadly speaking, European school tradition into American education in a series of books and articles, starting with his 1945 book *How to Solve It*.<sup>203</sup> Pólya's career offers an insight into culture transfer insofar as it related to Hungarian mathematics, the relocation of specific Hungarian elements of mathematics

education into the United States, and an example of how eminent, émigré Hungarian scholars were given a welcome in American academe. In a paper on the social and intellectual history of the international impact of Hungarian mathematics, George Pólya deserves center stage.

The notion of a new type of learning, utilizing problem solving and the heuristic method came to be proposed by European immigrant scientists and mathematicians, several of them Hungarians. By the end of World War I, young Karl Mannheim had already written his doctoral dissertation in Budapest on the structural analysis of the theory of knowledge. The dissertation became well known after being published in German in 1922 as *Die Strukturanalyse der Erkenntnistheorie*. Mannheim drew heavily on the work of the Hungarian philosopher Béla Zalai, who, though largely forgotten today, was instrumental in presenting the question of systematization as a central issue in Hungarian philosophy. In 1918, Mannheim referred to a 1911 article by Zalai on the problem of philosophical systematization.<sup>204</sup>

In a related field, heuristics was described as a “tactics of problem solving,” “an interdisciplinary no man’s land which could be claimed by scientists and philosophers, logicians and psychologists, educationalists and computer experts.”<sup>205</sup> Fascination with the subject among émigré Hungarians is probably best demonstrated by three important books by the writer Arthur Koestler. Sharing the background of many of the Hungarian scientists in exile, Koestler was intrigued by the “act of creation” for a long time after World War II (*Insight and Outlook, 1949; The Sleepwalkers, 1959; The Act of Creation, 1964*). While working on these books, Koestler regularly consulted some of his illustrious Hungarian friends in England such as Nobel laureate Dennis Gabor or Michael Polanyi and Koestler once went to Stanford specifically to discuss the matter with mathematician George Pólya.<sup>206</sup> The tradition of heuristics is deeply European, with roots in antiquity (Euclid, Pappus, and Proclus) and with forerunners such as Descartes and Leibniz. Heuristic thinking reached the Habsburg Empire relatively early in the nineteenth century when it became part of Bernard Bolzano’s philosophy: his *Wissenschaftslehre* (1837) already contained an extensive chapter on *Erfindungskunst*, meaning heuristics. Through the questionable services of his disciple Robert Zimmermann, who possibly plagiarized much of Bolzano’s original book and published many of his master’s ideas under his own

name in a popular and widespread textbook called *Philosophische Propädeutik* (1853). These ideas reached a wide audience, and *Erfindungskunst* became an integral part of the philosophical canon of the Habsburg monarchy just before the great generation of scientists and scholars was about to be born.<sup>207</sup>

George Pólya's career was deeply rooted in the Central European culture, particularly in an assimilationist Jewish and cosmopolitan Budapest culture, where he and his family were fertilized by a strong German influence, in and through education. In 1944 Pólya remembered the time when, at the turn of the century in Hungary,

he was a student himself, a somewhat ambitious student, eager to understand a little mathematics and physics. He listened to lectures, read books, tried to take in the solutions and facts presented, but there was a question that disturbed him again and again: 'Yes, the solution seems to work, it appears to be correct; but how is it possible to invent such a solution? Yes, this experiment seems to work, this appears to be a fact; but how can people discover such facts? And how could I invent or discover such things by myself?'<sup>208</sup>

### **The Rise of the Jewish Middle Class: Culture, Prestige, Mathematics**

Pólya came from a distinguished family of academics and professionals. His father, Jakab, an eminent lawyer and economist provided the best education for his children. They included George's brother, Jenő Pólya, the internationally recognized professor of surgery and honorary member of the American College of Surgeons.<sup>209</sup> George Pólya first studied law, later changing to languages and literature, then philosophy and physics, to settle finally on mathematics, in which he received his Ph.D. in 1912. He was a student of Lipót Fejér, whom Pólya considered one of the key people who influenced Hungarian mathematics in a definitive way.

For emancipated Jews in Hungary, who received full rights as citizens in 1867, it was the Hungarian Law 1867:XII that made it possible, among other things, to become teachers in high schools and even professors at universities. This is one of the reasons that lead to the explosion of mathematical talent in Hungary, just as happened in Prussia after the emancipation of Jews in 1812.<sup>210</sup> John Horvath of the University of Maryland was one who pointed out the overwhelming majority of Jewish mathematicians in Hungary in the early part of the 20th century.

Culture in the second half of the nineteenth century became a matter of very high prestige in Hungary, where the tradition to respect scientific work started to loom large after the Austro-Hungarian *Ausgleich*. For sons of aspiring Jewish families, a professorship at a Budapest university or membership in the Hungarian Academy of Sciences promised entry into the Hungarian elite and eventual social acceptance in Hungarian high society, an acknowledged way to respectability. Pursuing scientific professions, particularly mathematics, secured a much-desired social position for sons of Jewish-Hungarian families, who longed not only for emancipation, but also for full equality in terms of social status and psychological comfort. Thus, in many middle class Jewish families, at least one of the sons was directed into pursuing a career in academe.

Distinguished scientists such as Manó Beke, Lipót Fejér, Mihály Fekete, Alfréd Haar, Gyula and Dénes König, Gusztáv Rados, Mór Réthy, Frigyes Riesz, and Lajos Schlesinger belonged to a remarkable group of Jewish-Hungarian mathematical talents, who, after studying at major German universities, typically Göttingen or Heidelberg, became professors in Hungary's growing number of universities before World War I. Several of them, like Gyula König and Gusztáv Rados, even became university presidents at the Technical University of Budapest. There were several other renowned scientists active in related fields, such as physicist Ferenc Wittmann, engineer Donát Bánki and several others. Mathematicians were also needed outside the academic world: just before the outbreak of World War I George Pólya was about to join one of Hungary's big banks, at the age of 26, with a Ph.D. in mathematics and a working knowledge of four foreign languages in which he had already published important articles.<sup>211</sup>

Despite what we know about the social conditions, which nurtured and even forced out the talent of these many extraordinary scientists, how this occurred still remains somewhat mysterious. Stanislaw Ulam recorded an interesting quote from John von Neumann when describing their 1938 journey to Hungary in his *Adventures of a Mathematician*.

I returned to Poland by train from Lillafüred, traveling through the Carpathian foothills. . . This whole region on both sides of the Carpathian Mountains, which was part of Hungary, Czechoslovakia, and Poland, was the home of many Jews. Johnny [von Neumann] used to say that all the famous Jewish scientists, artists, and writers who emigrated from Hungary around the time of the first World War

came, either directly or indirectly, from these little Carpathian communities, moving up to Budapest as their material conditions improved. The [Nobel Laureate] physicist I[sidor] I[saac] Rabi<sup>212</sup> was born in that region and brought to America as an infant. Johnny used to say that it was a coincidence of some cultural factors which he could not make precise: an external pressure on the whole society of this part of Central Europe, a feeling of extreme insecurity in the individuals, and the necessity to produce the unusual or else face extinction.<sup>213</sup>

An interesting fact about several of the Jewish-Hungarian geniuses at the turn of the century was that several of them could multiply huge numbers in their head. This was true of von Kármán, von Neumann and Edward Teller. Von Neumann, in particular commanded extraordinary mathematical abilities. Nevertheless, there is no means available to prove that this prodigious biological potential was more present in Hungary at the turn of the century than elsewhere in Europe.<sup>214</sup>

Similarly, heuristic thinking was also a common tradition that many other Hungarian mathematicians and scientists shared. John Von Neumann's brother remembered the mathematician's "heuristic insights" as a specific feature that evolved during his Hungarian childhood and appeared explicitly in the work of the mature scientist.<sup>215</sup> Von Neumann's famous high school director, physics professor Sándor Mikola, made a special effort to introduce heuristic thinking in the elementary school curriculum in Hungary already in the 1900s.<sup>216</sup>

Fejér drew a number of gifted students to his circle, such as Mihály Fekete, Ottó Szász, Gábor Szegő and, later, Paul Erdős. His students remembered Fejér's lectures and seminars as "the center of their formative circle, its ideal and focal point, its very soul." "There was hardly an intelligent, let alone a gifted, student who could exempt himself from the magic of his lectures. They could not resist imitating his stress patterns and gestures, such was his personal impact upon them."<sup>217</sup> George Pólya remembered Fejér's personal charm and personal drive to have been responsible for his great impact: "F[ejér] influenced more than any other single person the development of math[ematic]s in Hungary. . ."<sup>218</sup>

In Budapest, Pólya was one of the founders, along with Károly Polányi, of the student society called Galilei Kör [Galileo Circle], where he lectured on Ernst Mach. The

Galileo Circle (1908-1918) was the meeting place of radical intellectuals, mostly Jewish college students from the up and coming Budapest families of a new bourgeoisie. Members of the circle became increasingly radical and politicized. Oddly enough, the Communists of 1919 found it far too liberal, while the extremist right-wing régime of Admiral Horthy considered it simply Jewish. In a Hungary of varied totalitarian systems, the radical-liberal tradition remained unwanted.<sup>219</sup> Soon however, Pólya went to Vienna where he served the academic year of 1911, after receiving his doctorate in mathematics in Budapest. In 1912-1913 he went to Göttingen, and later to Paris and Zurich, where he took an appointment at the Eidgenössische Technische Hochschule (Swiss Federal Institute of Technology). He became full professor at the ETH in 1928.

A distinguished mathematician, Pólya drew on several decades of teaching mathematics based on new approaches to problem solving, first as a professor in Zurich, Switzerland, and later in his life at Stanford, California. It was in Zurich that Pólya and fellow Hungarian Gábor Szegő started their long collaboration by signing a contract in 1923 to publish their much acclaimed joint collection of *Aufgaben und Lehrsätze aus der Analysis* [Problems and Theorems in Analysis].<sup>220</sup> Considered a mathematical masterpiece even today, *Aufgaben und Lehrsätze* took several years to complete, and it continues to impress mathematicians not only with the range and depth of the problems contained in it, but also with its organization: to group the problems not by subject but by solution method was a novelty.<sup>221</sup> His primary concern had always been to provide and maintain “an independence of reasoning during problem solving,”<sup>222</sup> an educational goal he declared to be of paramount importance when addressing the Swiss Association of Professors of Mathematics in 1931. Several of his articles on the subject preceded this lecture, probably the earliest being published in 1919.<sup>223</sup> Pólya had provided a model for problem solving by the time he was in Berne, Switzerland, suggesting “a systematic collection of rules and methodological advices,” which he considered “heuristics modernized.”<sup>224</sup>

Pólya was active in a number of important fields of mathematics, such as theory probability, complex analysis, combinatorics, analytic number theory, geometry, and mathematical physics. In the United States after 1940, and at Stanford as of 1942, Pólya became the highest authority on the teaching of problem solving in mathematics.

## Problem Solving in Mathematics

With his arrival at the United States, Pólya started a new career based on his newfound interest in teaching and in heuristics.<sup>225</sup> He developed several new courses such as his “Mathematical Methods in Science,” which he first offered in the Fall 1945 Quarter at Stanford, introducing general and mathematical methods, deduction and induction, the relationship between mathematics and science, as well as the “use of physical intuition in the solution of mathematical problems.”<sup>226</sup> In his popular and often repeated Mathematics 129 course on “How to Solve the Problem?” Pólya taught mathematical invention and mathematical teaching, quoting Samuel Butler:

All the inventions that the world contains  
Were not by reason first found out, nor brains  
But pass for theirs, who had the luck to light  
Upon them by mistake or oversight.<sup>227</sup>

He surveyed all aspects of a problem, general and specific, restating it in every possible way and pursued various courses that might lead to solving it. He studied several ways to prove a hypothesis or modify the plan, always focusing on finding the solution. He compiled a characteristic list of “typical questions for this course,” which indeed contained his most important learning from a long European schooling.<sup>228</sup>

In a course on heuristics, he focused on problems and solutions, using methods from classical logic to heuristic logic. Offering the course alternately as Mathematics 110 and Physical Sciences 115, he sought to attract a variety of students, including those in education, psychology and philosophy.<sup>229</sup> The courses were based on Pólya’s widely used textbook *How to Solve It*.

In due course, Pólya published several other books on problem solving in mathematics such as the two-volume *Mathematics and Plausible Reasoning* (1954), and *Mathematical Discovery*, in 1965. Both became translated into many languages.<sup>230</sup> Towards the end of his career, his “profound influence of mathematical education” was internationally recognized.<sup>231</sup>

Pólya's significance in general methodology seems to have been his proposition to interpret heuristics as problem solving, more specifically, the search for those elements in a given problem that may help us find the right solution.<sup>232</sup> For Pólya, heuristics equaled "*Erfindungskunst*," a way of inventive or imaginative power, the ability to invent new stratagems of learning, and bordered not only on mathematics and philosophy but also psychology and logic. In this way a centuries-old European tradition was renewed and transplanted into the United States where Pólya had tremendous influence on subsequent generations of teachers of mathematics well into the 1970s. In 1971 the aged mathematician received an honorary degree at the University of Waterloo where he addressed the Convocation, appropriately calling for the use of "heuristic proofs": "In a class for future mathematicians you can do something more sophisticated: You may present first a heuristic proof, and after that a strict proof, the main idea of which was foreshadowed by the heuristic proof. You may so do something important for your students: You may teach them to do research."<sup>233</sup> "Heuristics should be given a new goal," Pólya argued, "that should in no way belong to the realm of the fantastic and the utopian."<sup>234</sup>

Problem solving for Pólya was seen as "one third mathematics and two thirds common sense."<sup>235</sup> This was a tactic, which he emphatically suggested for teachers of mathematics in American high schools. If the teaching of mathematics neglects this tactic, he commented, it misses two important goals: "It fails to give the right attitude to future users of mathematics, and it fails to offer an essential ingredient of general education to future non-users of mathematics."<sup>236</sup>

Throughout his career as a teacher, he strongly opposed believing in what authorities profess. Teachers and principals, he argued, "should use their own experience and their own judgment."<sup>237</sup> His matter-of-fact, experience-based reasoning has been repeatedly described in books and articles. He even made two films on the teaching of mathematics ("Let Us Teach Guessing," a prize winner at the American Film Festival in 1968; "Guessing and Proving," based on an Open University Lecture, Reading, 1962)<sup>238</sup> The most simple and straightforward summary of his ideas on teaching was presented in the preface of a course that he gave at Stanford and subsequently published in 1967. Pólya's description is the best introduction to heuristic thinking:

Start from something that is familiar or useful or challenging: From some connection with the world around us, from the prospect of some application, from an intuitive idea.

Don't be afraid of using colloquial language when it is more suggestive than the conventional, precise terminology. In fact, do not introduce technical terms before the student can see the need for them.

Do not enter too early or too far into the heavy details of a proof. Give first a general idea or just the intuitive germ of the proof.

More generally, realize that the natural way to learn is to learn by stages: First, we want to see an outline of the subject, to perceive some concrete source or some possible use. Then, gradually, as soon as we can see more use and connections and interest, we take more willingly the trouble to fill in the details.<sup>239</sup>

Pólya had a lasting influence on a variety of thinkers in and beyond mathematics. The first curriculum recommendation of the National Council of the Teachers of Mathematics suggested that, “problem solving be the focus of school mathematics in the 1980s [in the U. S.]. The 1980 NCTM Yearbook, published as *Problem Solving in School Mathematics*, the Mathematical Association of America's Compendia of Applied Problems and the new editor of the *American Mathematical Monthly*, P. R. Halmos, all called for more use of problems in teaching in 1980.<sup>240</sup> Pólya was part of the “problem solving movement” that cut a wide swath in the 1980s.<sup>241</sup> Philosopher Imre Lakatos, who described mathematical heuristics as his main field of interest in 1957, acknowledging his debt to Pólya's influence, and particularly to *How to Solve It*, which he translated into Hungarian.<sup>242</sup>

Critics, however, like mathematician Alan H. Schoenfeld, pointed out that while Pólya's influence extended “far beyond the mathematics education community,” “the scientific status of Pólya's work on problem solving strategies has been more problematic.”<sup>243</sup> Students and instructors often felt that the heuristics-based approach rarely improved the actual problem solving performance itself. Researchers in artificial intelligence claimed that they were unable to write problem solving programs using Pólya's heuristics. “We suspect the strategies he describes epiphenomenal rather than real.”<sup>244</sup> Recent work in cognitive science, however, has provided methods for making Pólya's strategies more accessible for problem solving instruction. New studies have provided clear evidence that students can significantly improve their problem solving

performance through heuristics.<sup>245</sup> “It may be possible to program computer knowledge structures capable of supporting heuristic problem-solving strategies of the type Pólya described.”<sup>246</sup>

### **The Stanford Mathematics Competition**

Initiated jointly by Professors George Pólya and Gábor Szegő, one of the most significant Hungarian contributions to the teaching of mathematics was the introduction of the Stanford Mathematics Competition for high school students. Modeled after the Eötvös Competition organized in Hungary from 1894 on, the main purpose of the competition was to discover talent, and to revive the competitive spirit of the Eötvös Competition, which Szegő himself won in 1912.<sup>247</sup> This contest was held annually for over 30 years until it was terminated in 1928. Stress was laid on inherent cognitive ability and insight rather than upon memorization and speed. Those who were able to go beyond the question posed were given additional credit. Those who were cognizant of the preponderance of Hungarian mathematicians were tempted to speculate upon the relationship between the Eötvös Prize and “the mathematical fertility of Hungary.”<sup>248</sup> Winners of the Eötvös Prize have included Lipót Fejér, Theodore von Kármán, Alfréd Haar, George Pólya, Frigyes Riesz, Gábor Szegő, and Tibor Radó.

The Stanford competition was started in 1946 and discontinued in 1965 when the Stanford Department of Mathematics turned more towards graduate training.<sup>249</sup> When first started, the Stanford Examination was administered to 322 participants in 60 California high schools. The last examination, in 1965, was administered to about 1200 participants in over 150 larger schools in seven states from Nevada to Montana. The Stanford University Competitive Examination in Mathematics emphasized “originality and insight rather than routine competence.” Even a typical question required a high degree of ingenuity and the winning student was asked “to demonstrate research ability.”<sup>250</sup>

Organizers of the competition thought of mathematics “not necessarily as an end in itself, but as an adjunct necessary to the study of any scientific subject.”<sup>251</sup> It was

suggested that ability in mathematical reasoning correlated with success in higher education in any field. In addition, the discovery of singularly gifted students helped identify the originality of mind displayed by grappling with difficult problems: mathematical ability was regarded as an index of general capacity.<sup>252</sup> Those responsible for the competition were firmly convinced that “an early manifestation of mathematical ability is a definite indication of exceptional intelligence and suitability for intellectual leadership.”<sup>253</sup> Several of the winners of the Stanford competition did not go into mathematics but went on to specialize in electrical engineering (1946), physics (1947), biology (1948) and geology (1956).<sup>254</sup>

It is interesting to note that by introducing Pólya’s article about the 1953 Stanford Competitive Examination, the California Mathematics Council Bulletin found it important to make a connection between “the best interests of democracy” and the need “that our superior students be challenged by courses of appropriate content, encouraged to progress in accordance with their capacities.”<sup>255</sup> It seems as if the Competitive Examination was viewed by some as reflecting the dangerously mounting international tensions, somewhat forecasting the era of the Sputnik fears yet to come. Speaking at the National Council of Teachers of Mathematics in 1956, Gábor Szegő articulated this opinion when declaring, “much is said in these days about the pressing need for science and engineering graduates. Our view is that the nation needs just as well good humanists, lawyers, economists, and political scientists in its present struggle. This is a view which can be defended, I think, in very strong terms.”<sup>256</sup> (This ominous reference was dropped from a similar introduction by 1957.<sup>257</sup>)

Through its long and distinguished tenure, the Stanford examination proved to be a pioneering effort in the discovery of mathematical talent in not only California and the West Coast, but nationally.<sup>258</sup> Theodore von Kármán aptly observed that

more than half of all the famous expatriate Hungarian scientists, and almost all the well-known ones in the United States, such as Edward Teller, Leo Szilard, George Polya of Stanford, and the late John von Neumann, have won this prize. Between von Neumann and me there is a twenty-year difference in age, so one sees the continuity started by this competition. I myself think that this kind of contest is vital to our education system and I would like to see more such contests encouraged here in the United States and in other countries.<sup>259</sup>

## Conclusion

This paper is an effort to answer two major questions that may illuminate important strategies for current practices:

- 1) What were the “secrets” of fin-de-siècle Budapest that produced so many outstanding scholars and scientists within the timeframe of one or two generations?
- 2) Are the conditions that nurture extraordinary talent repeatable and transferable to today’s educational practices?

Focusing on mathematics, the paper sheds some light on knowledge transfer and teachability. In an era of unprecedented and unrepeated economic expansion and social change, Hungary in the newly established political framework of the Austro-Hungarian Monarchy (1867) witnessed unparalleled social transformation and cultural upsurge. After the unification of Pest, Buda and Óbuda in 1873, the newly established capital city of Budapest became a thriving metropolis by World War I. Migrations in and out of the multiethnic, multicultural, and multilingual Habsburg Empire produced a vivid, lively, and flourishing cultural climate in which Germans and Jews made significant contributions to a blossoming urban lifestyle. The rapidly changing social structure, the appearance of daring social ambitions and emergence of new classes all contributed to a need for a modern school system, which became largely imported from Germany.

The *gimnázium* was an elitist institution for the burgeoning middle class. It offered academic studies and approaches that were recognized as appropriate tools to train the mind and nurture talent. Teaching typically was based upon providing factual knowledge with the intention of using inductive reasoning methods. Most of the best high schools were under the direct control of the Roman Catholic, the Calvinist or the Lutheran Church, and thus represented a higher level of discipline, stricter moral expectations, and a faculty that included highly educated and very demanding priests. The *Minta* was a state school, experimental in nature, and different from the average *gimnázium* in many ways – in fact, a forerunner of modern educational principles.

Mathematics education was particularly emphasized and promoted by professional organizations, journals, and competitions. Competition was strongly supported and advocated. Outstanding students of mathematics enjoyed both acknowledgment and appreciation.

Much of the foundations of this innovative Hungarian school system came from Germany. This knowledge transfer showed how valuable one culture's experiences could be when serving comparable purposes in another. German influence had a long tradition in Hungary: many of the Hungarian professors and teachers went to study in German universities and German was the language of culture in general. With German serving as a *lingua franca* in the Austro-Hungarian Monarchy, it functioned as a bridge between Germany and the Monarchy.

A subsequent step in transferring German educational expertise was the export of Hungarian expertise after 1919-1920. Émigré scholars and scientists took the fruits of their outstanding Hungarian education with them as they left, mostly, for Germany and then on to the United States.

It would be tempting to think that the careful analysis of the nurturing of talent in fin-de-siècle Budapest would lead us to a reliable method for the creation of genius. When discussing the achievement of John von Neumann, a cautious distinction has to be made: Talent is teachable, genius is born. Furthermore, formal education, whatever its innovative and exemplary methods, exists within the larger social context of the culture and all its many influences on the student mind.

In a pioneering inquiry into the nature of problems and the solution of a problem, Michael Polanyi defined one of the most crucial questions of his generation: "To recognize a problem which can be solved and is worth solving is in fact a discovery in its own right." Declaring this as the creed of his generation in an 1957 article for *The British Journal the Philosophy of Science*,<sup>260</sup> Polanyi spoke for, and spoke of his generation when discussing originality and invention, discovery and heuristic act, investigation and problem solving. "The interpretative frame of the educated mind", he continued, "is ever ready to meet somewhat novel experiences and to deal with them in a somewhat novel manner." Polanyi had his own views of genius, which he described as making contact with reality "on an exceptionally wide range: by seeing problems and reaching out to

hidden possibilities for solving them, far beyond the anticipatory powers of current conceptions. Moreover, by deploying such powers in an exceptional measure—far surpassing our own as onlookers—the work of genius offers us a massive demonstration of a creativity which can never be explained in other terms nor taken unquestioningly for granted.”<sup>261</sup>

The extraordinary intellects nurtured by the *Minta*, the *Fasor*, and other German-influenced schools of fin-de-siècle Hungary cannot be attributed simply to the unique social and cultural characteristics of the period, to the innovative educational approaches, nor to the characteristics of innate genius, but to an unusual convocation of these three powerful factors, none of which exists in isolation from the other. We should certainly try to discover talent at an early age and continue to cultivate it by providing personal attention and acknowledgement, creating a competitive spirit, and train their minds through problem solving. However, just by instituting more of these outstanding educational practices into today’s pedagogy we would not be able to recreate the Hungarian geniuses of the past. We should not fail to stimulate all other economic, social, political, and cultural factors that helped create Hungary’s legendary minds.

## Notes

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\*\*\*Professor Katherine Newman (Princeton University) and Dr. Mark Saul (Senior Scholar, John Templeton Foundation) have read the first draft of this paper which benefited of their comments. I am grateful for their time and advice.

<sup>1</sup> Film director George Cukor was born in the US.

<sup>2</sup> S. A. Mansbach, "Revolutionary Engagements: The Hungarian Avant-Garde," in: S. A. Mansbach, ed., *Standing in the Tempest. Painters of the Hungarian Avant-Garde, 1908-1930* (Santa Barbara, CA: Santa Barbara Museum of Art—Cambridge, MA-London: MIT Press, 1991), pp. 74-83, 90-91, see esp. the impressive list of repatriating artists and critics on p. 75.

<sup>3</sup> Laura Fermi, *Illustrious Immigrants. The Intellectual Migration from Europe 1930-41* (Chicago—London: The University of Chicago Press, 1968), pp. 53-59; Stefan L. Wolff, "Das ungarische Phänomen—ein Fallbeispiel zur Emigrationsforschung," *Deutsches Museum Wissenschaftliches Jahrbuch 1991* (München: Deutsches Museum, 1992), pp. 228-245.

<sup>4</sup> See the upcoming new book of the author, *Double Exile: Hungarian Intellectual Migrations through Germany to the United States, 1919-1941* (New York: Peter Lang, 2007).

<sup>5</sup> The term was borrowed from U. S. Minister John F. Montgomery's memoir on *Hungary: The Unwilling Satellite*, published in 1947. For many Hungarians, Hungary always seemed like an 'unwilling satellite,' whether coerced by the Ottoman Turks, the Habsburgs, the Nazis, or the Soviets.

<sup>6</sup> Laura Fermi, *Illustrious Immigrants, op. cit.*, pp. 53-59; Paul Ignatus, "The Hungary of Michael Polanyi," in *The Logic of Personal Knowledge. Essays Presented to Michael Polanyi on His Seventieth Birthday 11 March 1961* (Glencoe, Ill.: The Free Press, 1961), pp. 3-12; Mario D. Fenyó, *Literature and Political Change: Budapest, 1908-1918*, Transactions of the American Philosophical Society, Vol. 77, Part 6, 1987; John Lukacs, *Budapest 1900. A Historical Portrait of a City and Its Culture* (New York: Weidenfeld & Nicolson, 1988); Lee Congdon, *Exile and Social Thought. Hungarian Intellectuals in Germany and Austria 1919-1933* (Princeton, N. J.: Princeton University Press, 1991); William O. McCagg, Jr., *Jewish Nobles and Geniuses in Modern Hungary* (Boulder CO: East European Monographs, 1972, repr. 1986).

<sup>7</sup> László Mátrai, *Alapját vesztett felépítmény* [Superstructure Without Base] (Budapest: Magvető, 1976); Kristóf Nyíri, *A Monarchia szellemi életéről* [The Intellectual Life of the (Austro-Hungarian) Monarchy] (Budapest: Gondolat, 1980); J. C. Nyíri, *Am Rande Europas. Studien zur österreichisch-ungarischen Philosophiegeschichte* (Wien: Böhlau, 1988); Péter Hanák, *The Garden and the Workshop. Essays on the Cultural History of Vienna and Budapest*. Princeton, NJ: Princeton University Press, 1998); Károly Vörös, ed., *Budapest története* [The History of Budapest], Vol. IV (Budapest: Akadémiai Kiadó, 1978), pp. 321-723; John Lukacs, *Budapest 1900, op. cit.*; Mary Gluck, *Georg Lukács and his Generation 1900-1918* (Cambridge, Mass. and London: Harvard UP, 1985); István Hargittai, *The Martians of Science: Five Physicists Who Changed the Twentieth Century* (New York: Oxford University Press, 2006), pp. 3-31.

<sup>8</sup> William O. McCagg, Jr., *op. cit.*

<sup>9</sup> Raphael Patai, *The Vanished Worlds of Jewry* (New York: Macmillan, 1980), p. 68; cp. the recent contribution by Nobuaki Terao, "Oscar Jászi and the Magyar-Jewish Alliance" (1997).

<sup>10</sup> Zoltán Horváth, *Magyar századforduló. A második reformnemzedék története 1896-1914* [Hungarian fin-de-siècle. A history of the second reform generation]. (Budapest: 1961, 2<sup>nd</sup> ed. Budapest: Gondolat, 1974), pp. 205-6; quoted by John Lukács, *op. cit.*, p. 202.

<sup>11</sup> Cf. József Gerő, ed., *A királyi könyvek. Az I. Ferenc József és IV. Károly által 1867-től 1918-ig adományozott nemességek, főnemességek, előnevek és címerek jegyzéke* [Royal Books. A List of Persons

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Who Received Noble and Aristocratic Ranks, Titles, and Coats of Arms by Kings Ferenc József I and Károly IV between 1867 and 1918] (Budapest, 1940).

<sup>12</sup> Cf. Marianna Birnbaum, "Budapest in the Literature of the Fin-de-Siècle," in György Ránki and Attila Pók, eds., *Hungary and European Civilization*, Indiana Studies on Hungary, 3 (Budapest: Akadémiai Kiadó, 1989), pp. 331-342.

<sup>13</sup> Sigmund Freud, *The Interpretation of Dreams* (Translated by James Strachey) (New York: Avon Books, 1965), p. 290. One could easily add several other literary examples to Freud's reference to Ibsen, from German, Austrian, and Hungarian literature.

<sup>14</sup> Claudio Magris, *Il mito asburgico nella letteratura austriaca moderna* (Torino: Einaudi, 1963), *A Habsburg-mítosz az osztrák irodalomban* (Budapest: Európa, 1988), p. 91.

<sup>15</sup> Edward Teller and Alan Brown, *The Legacy of Hiroshima* (Garden City: Doubleday, 1961); *Life*, Dec. 13, 1963. p. 89. Cf. William O. McCagg, Jr., *Jewish Nobles*, *op. cit.*, p. 164.

<sup>16</sup> C. P., "Edward Teller" (Bio-bibliography), Archive for the History of Quantum Physics, American Philosophical Society Library, Philadelphia, PA; J. R. Shetley and Clay Blair Jr., *The Hydrogene Bomb* (New York, 1954), p. 41.

<sup>17</sup> Cp. Gábor Palló, *Zsenialitás és korszellem. Világhírű magyar tudósok* [Genius and *Zeitgeist*. World Famous Hungarian Scientists] (Budapest: Áron, 2004), pp. 161-166.

<sup>18</sup> Judit Gál Csillag, "Bevezető tanulmány" [Introduction], in Géza Révész, *Tanulmányok* [Studies] (Budapest: Gondolat, 1985), p. 9.

<sup>19</sup> Tibor Frank, "Kármán Mór levelei Kármán Tóдорhoz," [Mór Kármán to Theodore von Kármán: Correspondence], *Pedagógiai Szemle*, in press; Mór Kármán to Theodore von Kármán, Correspondence 1912-14., Theodore von Kármán Papers, 141.10, 141.11, 141.12, 141.14, 142.1, California Institute of Technology Archives, Pasadena, CA.

<sup>20</sup> Ilona Duczynska, "Polányi Károly (1886-1964)," [Karl Polanyi, 1886-1964], *Századok*, Vol. 105, No. 1, 1971, p. 91.

<sup>21</sup> Endre Ady, "Korrobori," in Ady Endre *publicisztikai írásai* [The Journalism of Endre Ady] Vol. III (Budapest: Szépirodalmi Könyvkiadó, 1977), p. 520.

<sup>22</sup> William O. McCagg Jr., *A History of Habsburg Jews, 1670-1918* (Bloomington and Indianapolis: Indiana University Press, 1989). Cf. Elzbieta Ettinger, *Hannah Arendt/Martin Heidegger* (New Haven, CT: Yale UP, 1995), quoted by Alan Ryan, "Dangerous Liaison," *The New York Review of Books*, January 11, 1996, p. 24.

<sup>23</sup> Sander L. Gilman, *Jewish Self-Hatred: Anti-Semitism and the Hidden Language of the Jews* (Baltimore—London: The Johns Hopkins University Press, 1986), pp. 22-67, 139-308; Viktor Karády, *Zsidóság Európában a modern korban* [Jewry in Modern Europe] (Budapest: Új Mandátum, 2000), pp. 125-284; William O. McCagg Jr., *A History of Habsburg Jews, 1670-1918*, *op. cit.*, pp. 47-158; Raphael Patai, *The Jews of Hungary: History, Culture, Psychology* (Detroit: Wayne State University Press, 1996), pp. 230-441; Jacob Katz, *From Prejudice to Destruction: Anti-Semitism, 1700-1933* (Cambridge, Mass.-London, England: Harvard University Press, 1980), pp. 203-209, 221-242.

<sup>24</sup> William O. McCagg Jr., *A History of Habsburg Jews, 1670-1918*, *op. cit.*, p. 190.

<sup>25</sup> Peter Gay, *Freud, Jews and Other Germans. Masters and Victims in Modernist Culture* (Oxford: Oxford University Press, 1979), p. 98, n.12.

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<sup>26</sup> Alajos Kovács quoted by Miklós Mester, “Magyar nevet minden magyarnak!” [Hungarian Name for Every Hungarian] Parts I-II, *Nemzeti Figyelő*, December 31, 1939, p. 3. and January 6, 1940, p. 3.

<sup>27</sup> Kovács considered this a fairly small number, altogether some 0.7% of the Jewish population in the territory of partitioned Hungary. Cf. Alajos Kovács, “Adatok a zsidók bevándorlására és kikeresztelkedésére vonatkozólag” [Facts Concerning the Immigration and Religious Conversion of Jews], MS, For Count Pál Teleki, April 24, 1939, Központi Statisztikai Hivatal Könyvtára, V B 935. Cf. the theoretical considerations of Victor Karády, “Vers une théorie des mariages inter-confessionnels, le cas de la nuptialité hongroise sous l’Ancien régime,” *Actes de la Recherche en Sciences Sociales*, nr. 57-58, 1985.

<sup>28</sup> William O. McCagg, *Jewish Nobles and Geniuses*, *op. cit.*

<sup>29</sup> R[ezső] S[eltmann], “Aposztázia és kitérés a zsidóságból [Apostasy and Jewish Conversion],” in *Magyar Zsidó Lexikon* (Budapest: Magyar Zsidó Lexikon, 1929), p. 54-57.

<sup>30</sup> R[ezső] S[eltmann], “Asszimiláció [Assimilation],” in *Magyar Zsidó Lexikon* (Budapest: Magyar Zsidó Lexikon, 1929), p. 63-65.

<sup>31</sup> Peter Gay, *Freud, Jews and Other Germans. Masters and Victims in Modernist Culture* (Oxford: Oxford University Press, 1979), p. 116.

<sup>32</sup> Peter Gay, *Freud, Jews and Other Germans*, *op. cit.*, pp. 96-98, quote p. 97, cf. Carl Cohen, “The Road to Conversion,” *LBI Year Book*, Vol. VI, 1961, pp. 259-269.

<sup>33</sup> Peter Gay, *Freud, Jews and Other Germans*, *op. cit.*, p. 98.

<sup>34</sup> Peter Gay, *Freud, Jews and Other Germans*, *op. cit.*, pp. 174-175.

<sup>35</sup> Ferenc Molnár, *Az éhes város* [The Hungry City] (1st ed. 1900; Budapest: Pesti Szalon, 1993; ed. György Bodnár), pp. 6-7, 13-14, 165-166.

<sup>36</sup> P[éter] U[jvári], “Áttérés” [Conversion], in *Magyar Zsidó Lexikon* (Budapest: Magyar Zsidó Lexikon, 1929), p. 65.

<sup>37</sup> William O. McCagg, Jr., *Jewish Nobles*, *op. cit.*, p. 240.

<sup>38</sup> Zs[igmond] T[ieder], “Magyarországi zsidóság statisztikája” [The Statistics of Hungarian Jewry], in *Magyar Zsidó Lexikon* (Budapest: Magyar Zsidó Lexikon, 1929), p. 554. Cf. Alajos Kovács, *A zsidóság térfoglalása Magyarországon* (Budapest, 1922).

<sup>39</sup> Kivonat a budapesti VI-VII. ker. fasori református egyház keresztelési anyakönyvéből [Extract from the Baptismal Registry of the Calvinist Church at the Fásor, Budapest, VI-VII District] II. kötet, 14. lap, Budapest, July 24, 1919. Leo Szilard Papers, Box 1, Folder 11, Mandeville Special Collections Library, University of California, San Diego, La Jolla, CA.

<sup>40</sup> [Author Not Indicated], “Polanyi Biography,” Draft of Chapter One, Summer 1979, MS, George Polya Papers, SC 337, 86-036, Box 1, Folder 1, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>41</sup> Kereszt-levél [Baptismal Record], Kivonat a budapest-terézvárosi római katolikus plébánia, Kereszteltek Anyakönyvéből, Vol. XXXIV, p. 6, January 9, 1888. I am grateful to Professor Gerald Alexanderson of the University of Santa Clara for showing me this document as well as his collection of Pólya documents that were to be transferred to the George Polya Papers, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA. —It is interesting to note that the

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godfather of George Pólya was Count Mihály Károlyi's uncle, Count Sándor Károlyi, one of the great feudal landowners of Hungary.

<sup>42</sup> Péter Ágoston, *A zsidók útja* [The Way of the Jews] (Nagyvárad: 1917).

<sup>43</sup> Partially republished by Péter Hanák, ed., *Zsidókérdés, asszimiláció, antiszemitizmus. Tanulmányok a zsidókérdésről a huszadik századi Magyarországon* [Jewish Question, Assimilation, Anti-Semitism. Studies on the Jewish Question in Twentieth Century Hungary] (Budapest: Gondolat, 1984), pp. 13-115.

<sup>44</sup> Péter Hanák, ed., *Zsidókérdés, op. cit.*, pp. 32-33.

<sup>45</sup> William O. McCagg, Jr., "Jewish Conversion in Hungary," in Todd Endelmann, ed., *Jewish Apostasy in the Modern World* (New York: Holmes and Meier, 1987), pp. 142-164; George Barany, "Magyar Jew or Jewish Magyar?" Reflections on the Question of Assimilation" in Bela Vago and George L. Mosse, eds., *Jews and Non-Jews in Eastern Europe 1918-1945* (Jerusalem: Keter, 1974), pp. 51-98; Péter Hanák, "Problems of Jewish Assimilation in Austria-Hungary in the Nineteenth and Twentieth Centuries," in P. Thane et al., eds., *The Power of the Past* (Cambridge: Cambridge University Press, 1984), pp. 235-250; Péter Hanák, "Stages and Types of National Assimilation in Hungary in the 19th Century" (MS, Budapest, 1983); Péter Hanák, "Polgárosodás és asszimiláció Magyarországon a XIX. században," [Embourgeoisement and Assimilation in 19th Century Hungary] *Történelmi Szemle*, Vol. XVII, 1974, pp. 513-536; Lajos Venetianer, *A magyar zsidóság története. Különös tekintettel gazdasági és művelődési fejlődésére a XIX. században* (Budapest: Fővárosi Nyomda Rt, 1922, new ed. Budapest: Könyvértékesítő Vállalat, 1986) pp. 147-173. Cf. Marsha L. Rozenblit, *The Jews of Vienna: Assimilation and Identity, 1867-1914* (Albany: SUNY, 1983); Gyula Farkas, *Az asszimiláció kora a magyar irodalomban* [The Age of Assimilation in Hungarian Literature] (Budapest: Franklin, n.d.). For a stimulating contribution to this discussion see Nobuaki Terao, "Oscar Jászi and the Magyar-Jewish Alliance" (offprint, 1997).

<sup>46</sup> Certificate of Baptism, Saint Mary's Cathedral, Trenton, NJ, April 11, 1935. John von Neumann Papers, Box 7, "Birth, Divorce, Other official documents," The Library of Congress, Washington, D.C., Rare Books and Special Collections; Nicholas A. Vonneumann, *John von Neumann as Seen by his Brother* (Meadowbrook, PA, 1987), p. 17.

<sup>47</sup> István Deák, *Beyond Nationalism: A Social and Political History of the Habsburg Officer Corps, 1848-1918* (New York-Oxford: Oxford University Press, 1990), pp. 83, 89, 99-102.

<sup>48</sup> Cf. Gyula Illyés, *Magyarok. Naplójegyzetek*, 3rd ed. (Budapest: Nyugat, n.d. [1938]), Vol. II, p. 239.

<sup>49</sup> István Sötér, *Eötvös József* [József Eötvös] 2nd rev. ed. (Budapest: Akadémiai Kiadó, 1967), p. 314.

<sup>50</sup> Journal entry from Berlin, October 31, 1836. Cf. Bertalan Szemere, *Utazás külföldön* [Traveling Abroad] (Budapest: Helikon, 1983), p. 59.

<sup>51</sup> Cecilia Polányi to the Minister of Religion and Public Education, Budapest, December 11, 1918 and enclosures. (Hungarian and German) Michael Polanyi Papers, Box 20, Folder 1, Department of Special Collections, University of Chicago Library, Chicago, Ill.

<sup>52</sup> *The World Almanac and Book of Facts 1994* (Mahwah, N.J.: Funk & Wagnalls, 1993), pp. 300-302.

<sup>53</sup> Károly Lyka, *Magyar művészetlet Münchenben* [Hungarian Artist-Life in Munich] (2nd ed., Budapest: Corvina, 1982), László Balogh, *Die ungarische Facette der Münchner Schule* (Mainburg: Pinsker-Verlag, 1988).

<sup>54</sup> Tibor Frank, "Liszt, Brahms, Mahler: Music in Late 19th Century Budapest," in György Ránki, ed., *Hungary and European Civilization*, Indiana University Studies on Hungary, Vol. 3 (Budapest: Akadémiai Kiadó, 1989), *op. cit.*, pp. 346.

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- <sup>55</sup> Antal Molnár, *Eretnek gondolatok a muzsikáról* [Heretic Thoughts on Music] (Budapest: Gondolat, 1976), pp. 27-28; quoted by Tibor Frank, "Liszt, Brahms, Mahler," p. 351. Cf. Károly Goldmark, *Emlékek életemből* [Memories of My Life] (Budapest: Zeneműkiadó, 1980), pp. 74-83.
- <sup>56</sup> Tibor Gedeon-Miklós Máthé, *Gustav Mahler* (Budapest: Zeneműkiadó, 1965), pp. 103-105; Gustav Mahler, *Briefe, 1879-1911* (Berlin-Wien-Leipzig: Zsolnay, 1924), pp. 115-116.
- <sup>57</sup> József Kiss, "Petőfi in der deutschsprachigen Presse Ungarns vor der Märzrevolution," in *Studien zur Geschichte der deutsch-ungarischen literarischen Beziehungen* (Berlin, 1969), pp. 275-297.
- <sup>58</sup> László Tarnói, *Parallelen, Kontakte und Kontraste. Die deutsche Lyrik um 1800 und ihre Beziehungen zur ungarischen Dichtung in den ersten Jahrzehnten des 19. Jahrhunderts* (Budapest: ELTE Germanisztikai Intézet, 1998), pp. 203-322; Ulrik R. Monsberger, *A hazai német naptárirodalom története 18 21-ig* [A History of German Calendar Literature in Hungary to 1821] (Budapest, 1931).
- <sup>59</sup> György Szalai, "A hazai zsidóság magyarosodása 1849-ig," [The Magyarization of the Hungarian Jewry to 1849], *Világosság* 15 (1974), pp. 216-223; Róza Osztern, *Zsidó újságírók és szépírók a magyarországi német nyelvű időszaki sajtóban, a 'Pester Lloyd' megalapításáig, 1854-ig* [Jewish Journalists and Authors in the German Periodical Press of Hungary, up to the Foundation of the Pester Lloyd in 1854] (Budapest, 1930).
- <sup>60</sup> Bálint Vázsonyi, *Dohnányi Ernő* (Budapest: Zeneműkiadó, 1971), pp. 67-68.
- <sup>61</sup> Bálint Vázsonyi, *Dohnányi Ernő, op. cit.*, p. 83, and personal information of the present author from Marianne Flesch (1890-1966).
- <sup>62</sup> Gábor Szegő, "Leopold Fejér: In Memoriam, 1880-1959," *Bulletin of the American Mathematical Society*, Vol. 66, No. 5 (September 1960), pp. 346-347.
- <sup>63</sup> [Gábor Szegő] "Lebenslauf." Gábor Szegő Papers, SC 323, Boxes 85-036. Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.
- <sup>64</sup> Herbert Bauer, *Az öntudatról* [=Béla Balázs, *Halálesztétika*] (Budapest: Deutsch Zsigmond, n.d.).
- <sup>65</sup> Béla Balázs, *Doktor Szélpál Margit* [Dr. Margaret Szélpál] (Budapest: Nyugat, 1909), p. 10.
- <sup>66</sup> Ludwig Hatvany, *Die Wissenschaft des nicht Wissenswerten* (Leipzig: Julius Zeitler, 1908; 2. Auflage, München: Georg Müller: 1914 ); in Hungarian: *A tudni-nem-érdemes dolgok tudománya*, transl. by Klára Szöllősy (Budapest: Gondolat Kiadó, 1968).
- <sup>67</sup> Ludwig Hatvany, *Ich und die Bücher* (Selbstvorwürfe des Kritikers) (Berlin: Paul Cassirer, 1910); in Hungarian: Lajos Hatvany, *Én és a könyvek* (Budapest: Nyugat, 1910).
- <sup>68</sup> "Alfred Manovill 50 Jahre." (German) Manuscript of a newspaper article in the Michael Polanyi Papers, Box 20, Folder 2, Department of Special Collections, University of Chicago Library, Chicago, Ill.
- <sup>69</sup> Tibor Frank, "Liszt, Brahms, Mahler," in György Ránki and Attila Pók, eds., *Hungary and European Civilization*, Indiana Studies on Hungary, 3 (Budapest: Akadémiai Kiadó, 1989), pp. 346-347.
- <sup>70</sup> Béla Bartók, "Liszt-problémák," [Liszt-Problems] *Nyugat* 29/3 (March 1936), pp. 24-28, quoted by Andor C. Klay, "Bartók on Liszt," *Journal of the American Liszt Society*, 1987, pp. 26-30.
- <sup>71</sup> Tibor Frank, *op. cit.*, pp. 356-357.

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<sup>72</sup> John Lukacs, *op. cit.*, pp. 140-141.

<sup>73</sup> Eugene Ormándy, "Modern Hungarian Music," *The Hungarian Quarterly* III, No. I, Spring 1937, p. 165.

<sup>74</sup> *Ibid.*, pp. 165-167.

<sup>75</sup> *Ibid.*, p. 167.

<sup>76</sup> See Ormándy's correspondence with Princess Irina Sergeevna Volkonskaia, the daughter of Sergei Rachmaninov, 1955-1968; Columbia University, Butler Library, Rare Book and Manuscript Library.

<sup>77</sup> Interview with Antal Dorati in the Paul Hindemith Project, Yale University, Yale School of Music, Oral History Collection.

<sup>78</sup> Interview with Fritz Reiner, Columbia University, Butler Library, Oral History Collection, Hungarian Project. Cf. Ferenc Bónis, "Frigyes Reiner," in Bence Szabolcsi—Aladár Tóth, eds., *Zenei Lexikon*, Vol. 3 (Budapest: Zeneműkiadó, 1965), p. 203.

<sup>79</sup> Program for March 15-16, 1945, The Philharmonic-Symphony Society of New York, Boston University, Mugar Memorial Library, Joseph Szigeti Papers, Box 6, Folder 4; Harvey Sachs, "Boss," *Opera News*, December 5, 1992, pp. 26-30; SONY 1992 Catalog for Szell CDs.

<sup>80</sup> There were three types of *gimnázium* in Hungary: the regular *gimnázium* [high school] spanned over 6 years, the *algimnázium* [lower high school] 4 years, the *főgimnázium* [main or full high school] 8 years.

<sup>81</sup> B. József Eötvös, Minister of Religion and Education to Mór Kleinmann, Buda, July 20, 1869. No. 12039, Theodore von Kármán Papers, 142.10, California Institute of Technology Archives, Pasadena, CA.

<sup>82</sup> Baron József Eötvös to Mór Kleinmann, Buda, July 20, 1869, #12039, Theodore von Kármán Papers, California Institute of Technology Archives, File 142.10, Pasadena, CA; Untitled memoirs of Theodore von Kármán of his File 141.6, pp. 1-2. Cf. István Sötér, *Eötvös József* [József Eötvös] (2. ed., Budapest: Akadémiai Kiadó, 1967); Miklós Mann, *Trefort Ágoston élete és működése* [The Life and Work of Ágoston Trefort] (Budapest: Akadémiai Kiadó, 1982).

<sup>83</sup> Mór Kármán had some responsibility for planning the education of one of the Habsburg Archdukes and he received his title partly for this reason. Cf. William O. McCagg Jr., *Jewish Nobles and Geniuses in Modern Hungary*, Boulder, CO., East European Monographs, 1972, repr. 1986. s, p. 209, note 46—it was this title that Theodore von Kármán used in a Germanized form.

<sup>84</sup> Theodore von Kármán, Untitled note on Mór Kármán, Theodore von Kármán Papers, 141.6, California Institute of Technology Archives, Pasadena, CA. Dr József Gerő, ed., *A Királyi Könyvek* [Royal Books] (Budapest, 1940), p. 100, William O. McCagg Jr., *Jewish Nobles, op. cit.*, pp. 209. Péter Újváry, ed., *Magyar Zsidó Lexikon* (Budapest, 1929), pp. 453-454.

<sup>85</sup> Mór Kármán, "Az Ember Tragédiája. Elemző tanulmány," (*Budapesti Szemle*, No. 346, 1905).—It is interesting to note that the Tragedy of Man was also a source of inspiration for other émigrée scientists, such as Leo Szilárd.

<sup>86</sup> Viktor Karády, "A középiskolai elitképzés első történelmi funkcióváltása (1867-1910)," In: Viktor Karády, *Iskolarendszer és felekezeti egyenlőtlenségek Magyarországon (1867-1945). Történeti-szociológiai tanulmányok* [School system and denominational inequalities in Hungary 1867-1945. Historical-sociological studies] (Budapest: Replika Kör, 1997), pp. 169-194.

<sup>87</sup> John Lukács, *op. cit.*, pp. 142-146.

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- <sup>88</sup> László Kovács, *Mikola Sándor* [Sándor Mikola] (2nd ed., Budapest: Országos Pedagógiai Könyvtár és Múzeum, 1995).
- <sup>89</sup> Theodore von Kármán with Lee Edson, *The Wind and Beyond: Theodore von Kármán, Pioneer in Aviation and Pathfinder in Space* (Boston—Toronto: Little, Brown and Co., 1967), pp. 20-21.
- <sup>90</sup> Until the end of 1844 only. TF
- <sup>91</sup> Theodore von Kármán with Lee Edson, *The Wind and Beyond*, *op. cit.*, p. 20.
- <sup>92</sup> Theodore von Kármán with Lee Edson, *The Wind and Beyond*, *op. cit.* pp. 21-22.
- <sup>93</sup> Theodore von Kármán with Lee Edson, *The Wind and Beyond*, *op. cit.*, pp. 20-22.
- <sup>94</sup> Mór Kármán to Theodore von Kármán, Budapest, January 27, 1914. Theodore von Kármán Papers, 142.1, California Institute of Technology Archives, Pasadena, Ca.
- <sup>95</sup> Krisztina Dobos, István Gazda, László Kovács, *A fasori csoda* [The Miracle in the Fasor] (Budapest: Országos Pedagógiai Könyvtár és Múzeum, 2002), pp. 66-109; Norman Macrae, John von Neumann (New York: Pantheon Books, 1992), pp. 61-84.
- <sup>96</sup> Victor Karády, „Juifs et luthériens dans le système scolaire hongrois.” *Actes de la recherche en science sociales*, Vol. 69, 1987, pp. 95-110.
- <sup>97</sup> Krisztina Dobos, István Gazda, László Kovács, *A fasori csoda*, *op. cit.*, pp. 8-9.
- <sup>98</sup> Krisztina Dobos, István Gazda, László Kovács, *A fasori csoda*, *op. cit.*, pp. 10-13.
- <sup>99</sup> The case of the Collegium clearly demonstrated that Hungary’s new intellectual élite was rooted not only in the middle- and uppermiddle-class of Budapest but also in the provinces, thus producing at least two, often competing factions. The Collegium provided a framework for the training of an élite, with its pool of young people coming mainly from the Hungarian countryside. Cf. Victor Karády, “Le Collège Eötvös et l’École Normale Supérieure vers 1900. Note comparatiste sur la formation d’intellectuels professionnels.” In: Béla Köpeczi, Jacques Le Goff, eds., *Intellectuels français, intellectuels hongrois – XIIIe-XXe siècles*. Paris-Budapest, 1986.
- <sup>100</sup> Krisztina Dobos, István Gazda, László Kovács, *A fasori csoda*, *op. cit.*, pp. 13-18.
- <sup>101</sup> For Rácz’ biography see Krisztina Dobos, István Gazda, László Kovács, *A fasori csoda*, *op. cit.*, pp. 27-45.
- <sup>102</sup> Budapest: Franklin, 1910.
- <sup>103</sup> 2nd ed. Budapest: Franklin, 1914.
- <sup>104</sup> For a biography of Mikola see László Kovács, *Mikola Sándor*, *op. cit.*, especially pp. 5-7; Krisztina Dobos, István Gazda, László Kovács, *A fasori csoda*, *op. cit.*, pp. 46-65.
- <sup>105</sup> László Kovács, *Mikola Sándor*, *op. cit.*, p. 21.
- <sup>106</sup> László Kovács, *Mikola Sándor*, *op. cit.*, pp. 22-24.
- <sup>107</sup> Quoted by László Kovács, *Mikola Sándor*, *op. cit.*, p. 25.

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<sup>108</sup> László Kovács, *Mikola Sándor, op. cit.*, p. 57.

<sup>109</sup> George Pólya, Introduction to the Hungarian edition of his *Mathematical Discovery: On understanding, learning, and teaching problem solving* (New York: John Wiley & Sons, Inc., 1962), Vol. I. Hungarian edition: *A problémamegoldás iskolája*, “Előszó a magyar kiadáshoz” (Budapest: Tankönyvkiadó, 1967), Vol. I, p. 14. Original manuscript: George Pólya Papers, SC 337, 87-034, Box 2, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>110</sup> On József Müller and Loránd Eötvös see Gyula Radnai, „Az Eötvös-korszak.” [The Eötvös-era]. *Fizikai Szemle*, Vol. XLI, No. 10, 1991, pp. 351-352.

<sup>111</sup> G. Pólya, “Leopold Fejér,” *Journal of the London Mathematical Society*, Vol. 36., 1961, p. 501; Ágnes Árvai Wieschenberg, “Identification and Development of the Mathematically Talented – The Hungarian Experience.” Ph.D. Dissertation, The Graduate School of Arts and Sciences, Columbia University, 1984, pp. 86-87.

<sup>112</sup> Eötvös also surrounded himself with a circle of fellow Hungarian physicists in Heidelberg, see Gyula Radnai, *op. cit.*, p. 349.

<sup>113</sup> Loránd Eötvös, „Szaktársainkhoz” [To our colleagues], *Mathematikai és Fizikai Lapok*, Vol. 1, 1892, p. 1. Quoted by Ágnes Árvai Wischenberg, *op. cit.*, p. 23.

<sup>114</sup> Interview with Peter Lax, May 3, 1983, quoted by Ágnes Árvai Wischenberg, *op. cit.*, p. 56.

<sup>115</sup> Értésítő a Matematikai és Fizikai Társulat választmányának f. é. Június hó 22-ikén tartott üléséről.” [Minutes of the June 22 meeting of the Mathematical and Physical Society], *Mathematikai és Fizikai Lapok* 3, 1894, 197-198, quoted by Ágnes Árvai Wischenberg, *op. cit.*, p. 26.

<sup>116</sup> Gyula Kovács-Sebestény and Károly Pongrácz, „Felhívás.” [Appeal] Kaposvár, June 1913. *A kaposvári Magyar Királyi Állami Főgimnázium Emlékkönyve 1812-1912* [Centenary Memorial of the Hungarian Royal State High School at Kaposvár] (Kaposvár: Szabó Lipót Könyvsajtója, 1913), pp. 177-178.

<sup>117</sup> „...der preußische Staat kein anderes Mittel mehr hat, und kein Staat ein edleres haben kann, sich auszuzeichnen und hervorzutun, als liebevolle Beförderung der Wissenschaft und Kunst...” Wilhelm von Humboldt, Denkschrift an den Minister des Innern Alexander Graf zu Dohna-Schlobitten, 9.5.1810, in: Wilhelm Weischedel, Hrsg., *Idee und Wirklichkeit einer Universität: Dokumente zur Geschichte der Friedrich-Wilhelms-Universität zu Berlin* (Berlin: Walter de Gruyter & Co., 1960), 215-218, quote 218.

<sup>118</sup> Kornis Gyula, szerk., *A kir. Magyar Pázmány Péter Tudományegyetem alapítása 300 éves évfordulójának jubileumi évkönyve* [Yearbook of the Royal Hungarian Pázmány Péter University on the 300-years-jubilee of its foundation] Budapest: Kir. M. Egyetemi Nyomda, 1936), pp. 54-57; Pázmány személyisége [The personality of Pázmány], in: Kornis Gyula, szerk., *op. cit.*, pp. 121-180.

<sup>119</sup> Neither the dean of the faculty nor the academic magistrates should be allowed to have an influence in academic matters.

<sup>120</sup> Thomas Mann, *Schopenhauer* (Stockholm: Bermann-Fischer, 1938), p. 60.

<sup>121</sup> [ed.sjtu.edu.cn/ranking.htm](http://ed.sjtu.edu.cn/ranking.htm); [www.answers.com/topic/college-and-university-rankings](http://www.answers.com/topic/college-and-university-rankings); [www.webometrics.info](http://www.webometrics.info)

<sup>122</sup> Cesare Lombroso, *Genie und Irrsin* (Übersetzt von A. Courth; Leipzig: Reclam, 1887), Hermann Türck, *Der geniale Mensch* (7. Aufl., Berlin: Dümmlers, 1910), Dr. Albert Reibmayr, *Die Entwicklungsgeschichte des Talentes und Genies*, Vols. I-II (München: J. F. Lehmanns, 1908), Wilhelm Ostwald, *Grosse Männer* (Leipzig: Akademische Verlagsgesellschaft m.b.H., 1910), W. Lange-Eichbaum, *Genie, Irrsinn und Ruhm*

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(München: Ernst Reinhardt, 1928), Ernst Kretschmer, *Geniale Menschen* (2. Aufl. Berlin: Julius Springer, 1931), W. Lange-Eichbaum, *Genie, Irrsinn und Ruhm* (München: Ernst Reinhardt, 1928); W. Lange-Eichbaum, *Das Genie-Problem* (München: Ernst Reinhardt, 1931).

<sup>123</sup> H. Von Szirmay-Pulszky, *Genie und Irrsinn im Ungarischen Geistesleben* (München: Ernst Reinhardt, 1935).

<sup>124</sup> Dr. József Somogyi, *Tehetség és eugenika. A tehetség biológiai, pszichológiai és szociológiai vizsgálata* [Talent and Eugenics. The Biological, Psychological, and Sociological Study of Talent] (Budapest: Eggenberger, 1934).

<sup>125</sup> Géza Révész, “Das frühzeitige Auftreten der Begabung und ihre Erkennung,” *Zeitschrift für angewandte Psychologie*, Band 15 (Leipzig: Lippert & Co., 1921); *The Psychology of a Musical Prodigy* (London: Kegan, 1925); *Das Schöpferisch-persönliche und das Kollektive in ihrem kulturhistorischen Zusammenhang* (Tübingen: Mohr, 1933); *Talent und Genie. Grundzüge einer Begabungspsychologie* (Bern: Francke, 1952).

<sup>126</sup> Dr. Karl Duncker, *Zur Psychologie des produktiven Denkens* (Berlin: Julius Springer, 1935)

<sup>127</sup> Ernst Mach, *Erkenntnis und Irrtum. Skizzen zur Psychologie der Forschung* (2nd ed. Leipzig: Barth, 1906), p. XI.

<sup>128</sup> Peter Weibel, “Das Goldene Quadrupel: Physik, Philosophie, Erkenntnistheorie, Sprachkritik. Die Schwelle des 20. Jahrhunderts: Wissenschaftliche Weltauffassung in Wien um 1900,” in: *Wien um 1900. Kunst und Kultur* (Wien-München: Christian Brandstätter, 1985), 407-418; J. C. Nyíri, “Ehrenfels und Masaryk: Überlegungen an der Peripherie der Geschichte.” In: *Am Rande Europas, op. cit.*, pp. 40-67.

<sup>129</sup> V. I. Lenin, *Materialism and Empirio-Criticism. Critical Comments on a Reactionary Philosophy* (1st ed. 1908; London: Lawrence and Wishart, 1950), p. 93.

<sup>130</sup> Péter Hanák, “Ernst Mach und die Position des Phänomenalismus in der Wissenschaftsgeschichte,” in *Europa um 1900* (Berlin, 1989), pp. 265-282.

<sup>131</sup> *The Encyclopaedia Britannica* (Chicago: Encyclopaedia Britannica, 1990), Vol. 7, p. 631; cf. Albert Einstein, “Principles of Research,” Address before the Physical Society in Berlin, 1918; “Geometry and Experience,” Lecture before the Prussian Academy of Sciences, January 27, 1921; “On the Theory of Relativity,” Lecture at King’s College in London, 1921; “Physics and Reality,” *The Journal of the Franklin Institute*, Vol. 221, No. 3, March 1936, republished in Albert Einstein, *Ideas and Opinions* (New York: Bonanza Books, 1954), pp. 227, 239, 248, 303.

<sup>132</sup> The first major monograph on post-World War I intellectual emigration from Hungary was Lee Congdon’s brilliant *Exile and Social Thought. Hungarian Intellectuals in Germany and Austria, 1919-1933* (Princeton, N.J.: Princeton University Press, 1991), a very important book that was of great help to me.

<sup>133</sup> Geoffrey Barraclough, ed., *The Times Atlas of World History* (Maplewood NJ: Hammond, rev. ed. 1984, repr. 1988), p. 265.

<sup>134</sup> István Deák, *Weimar Germany's Left-Wing Intellectuals. A Political History of the Weltbühne and Its Circle* (Berkeley—Los Angeles: University of California Press, 1968), pp. 13-15.

<sup>135</sup> Information from Budapest Opera conductor János Kerekes, August 1994. Cf. Antal Doráti, *Notes of Seven Decades* (London: Hodder and Stoughton, 1979), pp. 90-125.

<sup>136</sup> Cf. W. M. Johnston, *The Austrian Mind. An Intellectual and Social History, 1848-1938* (Berkeley: University of California Press, 1972); Allan Janik & Stephen Toulmin, *Wittgenstein's Vienna* (New York: Simon & Schuster, 1973), László Mátrai, *Alapját vesztett felépítmény, op. cit.*; E. Schorske, *Fin-de-Siècle*

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*Vienna. Politics and Culture* (New York: Knopf, 1980); Kristóf Nyíri, *A Monarchia szellemi életéről*, *op. cit.*; J. C. Nyíri, *Am Rande Europas*, *op. cit.*; *Wien um 1900. Kunst und Kultur* (Wien-München: Brandstätter, 1985), John Lukacs, *Budapest 1900*, *op. cit.*; Péter Hanák, *The Garden and the Workshop*, *op. cit.*

<sup>137</sup> Theodore von Kármán to Michael Polanyi, Aachen, March 17, 1920, (German), Michael Polanyi Papers, Box 17, Department of Special Collections, University of Chicago Library, Chicago, Ill.

<sup>138</sup> Leopold Fejér to E. Landau, Budapest, May 23, 1914 (German), Gábor Szegő Papers, SC 323, Boxes 85-036, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>139</sup> G. Bredig to Michael Polanyi, Karlsruhe, February 12, 1917 (German), Michael Polanyi Papers, Box 1, Folder 5, Department of Special Collections, University of Chicago Library, Chicago, Ill.

<sup>140</sup> *Ibid.*

<sup>141</sup> *Ibid.*

<sup>142</sup> Cf. e.g. the case of the son of his brother's friend Michael Becz, see Elemér Kármán to Theodore von Kármán, Budapest, May 9, 1920 (German), Theodore von Kármán Papers, File 139.1, California Institute of Technology Archives, Pasadena, CA.

<sup>143</sup> Eric R. Jette to Michael Polanyi, Up[p]sala, February 10, 1923, Michael Polanyi Papers, Box 1, Folder 19, Department of Special Collections, University of Chicago Library, Chicago, Ill.

<sup>144</sup> Eric R. Jette to Michael Polanyi, Copenhagen, March 28, 1924, Michael Polanyi Papers, Box 2, Folder 1, Department of Special Collections, University of Chicago Library, Chicago, Ill.

<sup>145</sup> Michael Polanyi to B. Lorenz, October 16, 1922 (German), Michael Polanyi Papers, Box 1, Folder 18, Department of Special Collections, University of Chicago Library, Chicago, Ill.

<sup>146</sup> Elemér Székely to Theodore von Kármán, Wien, April 29, 1924 (Hungarian), Theodore von Kármán Papers, File 29.14, California Institute of Technology Archives, Pasadena, CA.

<sup>147</sup> Mihály Freund to Michael Polanyi, May 4, 1920 (Hungarian), Michael Polanyi Papers, Box 17, Department of Special Collections, University of Chicago Library, Chicago, Ill.

<sup>148</sup> Gabor Szegő Papers, SC 323, Boxes 85-036, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>149</sup> Obersekretär Breuder [?], Technische Hochschule zu Berlin, to Michael Polanyi, Charlottenburg, November 8, 1923. (German) Michael Polanyi Papers, Box 1, Folder 20, Department of Special Collections, University of Chicago Library, Chicago, Ill.

<sup>150</sup> "Polányi Mihály Nádás Sándorhoz," *Pesti Futár*, 1929, pp. 37-38.; repr. in *Polanyiana*, I/1, 1991, p. 26.

<sup>151</sup> József Ujfalussy, *Béla Bartók* (Budapest: Corvina, 1971), pp. 237-240; György Kroó, *A Guide to Bartók* (Budapest: Corvina, 1974), pp. 97-105. The ballet was not tolerated even in Cologne, where the conservative mayor of the city, Konrad Adenauer stopped the production.

<sup>152</sup> Michael Balint interview; Columbia University Oral History Project, Columbia University Libraries, New York, N.Y. Balint authored important books on psychoanalytic and psychotherapeutic techniques such as *Primary Love and Psycho-Analytic Technique* (New York: Liveright, 1953); *The Doctor, His Patient and the Illness* (London: Pitman, 1957); [with Enid Balint], *Psychotherapeutic Techniques in Medicine*

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(London: Tavistock, 1961); *The Basic Fault. Therapeutic Aspects of Regression* (London: Tavistock, 1968).

<sup>153</sup> *Ibid.*

<sup>154</sup> Michael Polanyi to Dr. John Eggert, [Berlin,] May 16, 1922, Michael Polanyi Papers, Box 1, Folder 18, Department of Special Collections, University of Chicago Library, Chicago, Ill.

<sup>155</sup> Michael Balint interview, Columbia Oral History Project, *loc. cit.*

<sup>156</sup> Imre Brody to Michael Polanyi, August 26, 1920. (Hungarian) Michael Polanyi Papers, Box 1, Folder 10, Department of Special Collections, University of Chicago Library, Chicago, Ill.

<sup>157</sup> *Ibid.*

<sup>158</sup> *Ibid.*; Max Born to Michael Polanyi, September 26, 1921 (German); Imre Brody to Michael Polanyi, Göttingen, March 24, 1922 (Hungarian) Michael Polanyi Papers, Box 1, Folder 15, Department of Special Collections, University of Chicago Library, Chicago, Ill.

<sup>159</sup> Information obtained from Budapest Opera conductor János Kerekes, August 1994.

<sup>160</sup> Dezső Keresztury, "Berlin tetői alatt (Részletek visszaemlékezéseimből)" [Under the roofs of Berlin: From my memoirs], *Magyar Nemzet*, March 27, 1993.

<sup>161</sup> Éva Gábor, "Mannheim in Hungary and in Weimar Germany," *The Newsletter of the International Society for the Sociology of Knowledge*, Vol. 9, Nos. 1-2 (August 1983), pp. 7-14; Lee Congdon, "Karl Mannheim as Philosopher," *Journal of European Studies*, Vol. 7, Part I, No. 25 (March 1977), pp. 1-18.

<sup>162</sup> Michael Polanyi to G. Bredig, Berlin June 23, 1923 (German) Michael Polanyi Papers, Box 1, Folder 20, Department of Special Collections, University of Chicago Library, Chicago, Ill.; Brian Longhurst, *Karl Mannheim and the Contemporary Sociology of Knowledge* (New York: St. Martin's Press, 1989), p. 5; Gabor Szegő, "Otto Szász," *Bulletin of the American Mathematical Society*, Vol. 60, No. 3, May 1954, pp. 261 .

<sup>163</sup> Ephraim Katz, *The Film Encyclopedia*, *op. cit.*, pp. 476-7, 665, 1181, 1187, 1194 ; 293-4, 741-2.

<sup>164</sup> Mrs. Gábor Szegő to Mrs. Michael Polanyi, K[önigs]berg, May 15, 1929 (Hungarian), Michael Polanyi Papers, Department of Special Collections, University of Chicago Library, Chicago, Ill.

<sup>165</sup> Count Kuno Klebelsberg, "Szabad-e Dévénynél betöröm új időknek új dalaival?" [May I break in at Dévény with the new songs of new times?] *Pesti Napló*, May 5, 1929.

<sup>166</sup> *Ibid.*

<sup>167</sup> It is characteristic how Kuno Klebelsberg differentiated between ethnic vs. Non-ethnic Hungarians in 1902, respectively between representatives of national subjects vs. natural sciences 1929. Kuno Klebelsberg, "Exposé," Budapest, July 29, 1902; prime minister Kálmán Széll to foreign minister Count Agenor Goluchowsky, Budapest, March 6, 1903, published by Albert Tezla, ed. *The Hazardous Quest. Hungarian Immigrants in the United States 1895-1920. A Documentary* (Budapest: Corvina, 1993), pp. 486-492.—For the "American project" of the Hungarian Government see Ilona Kovács, *Az amerikai közönyvtárak magyar gyűjteményeinek szerepe az asszimiláció és az identitás megőrzésének kettős folyamatában 1890-1940* [The role of the Hungarian collections of American public libraries in the dual process of assimilation and identity preservation] (Budapest: Országos Széchényi Könyvtár, 1997), pp. 41-60.

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<sup>168</sup> Szent-Györgyi mistakenly remembers 1932 as the date of his return upon which he accepted the chair of Medical Chemistry at the University of Szeged, Hungary. Cf. Albert Szent-Györgyi, "Prefatory Chapter—Lost in the Twentieth Century," *Annual Review of Biochemistry*, Vol. 32, 1963, Repr., p. 8.

<sup>169</sup> Béla Bartók discussed this plan with the conductor who wanted membership in the Upper House of Hungarian Parliament, an effort that Bartók discouraged. Cf. Béla Bartók to Fritz Reiner, Budapest, October 29, 1928, published by János Demény ed. *Bartók Béla levelei* [Letters of Béla Bartók] (Budapest: Mivelt Nép Könyvkiadó, 1951), p. 109; K[ároly] K[ristóf], "Reiner Frigyes," in *Magyar Zsidó Lexikon* (Budapest: Magyar Zsidó Lexikon, 1929), p. 788.

<sup>170</sup> *The Education of Henry Adams. An Autobiography* (Boston and New York: Houghton Mifflin, 1918), p. 80. Cf. Kurt Albert Mayer, "Some German Chapters of Henry Adams's Education: 'Berlin (1858-1859),' Heine, and Goethe," *AAA—Arbeiten aus Anglistik und Amerikanistik*, Vol. 19, No. 1 (Tübingen: Narr, 1994), pp. 3-25; Kurt Albert Mayer, "Henry Adams: 'And I've Retouched My Austria,'" Francke Verlag, 1996.

<sup>171</sup> Julius Langbehn, *Rembrandt als Erzieher*, 33. ed. (Leipzig: Hirschfeld, 1891), p. 133. Quoted by Fritz Stern, *The Politics of Cultural Dispair. A Study in the Rise of the Germanic Ideology* (Berkeley—Los Angeles: University of California Press, 1974), p. 131.

<sup>172</sup> Julius Langbehn, *Rembrandt als Erzieher*, 12. ed. (Leipzig: Hirschfeld, 1890), pp. 292-293.

<sup>173</sup> Josiah Strong, *Our Country. Its Possible Future and Its Present Crisis*. Ed. by Jurgen Herbst (Cambridge, Mass.: Belknap Press of Harvard University Press, 1963), pp. 171-186.

<sup>174</sup> Julius Langbehn, *Rembrandt als Erzieher*, 49. ed. (Leipzig: Hirschfeld, 1909), p. 320. 12. ed.: ". . . der rohe Geldkultus ist auch ein nordamerikanischer Zug, welcher in dem jetzigen Berlin mehr und mehr überhand nimmt; . . ." 49. ed.: ". . . der rohe Geldkultus ist ein nordamerikanischer und zugleich — jüdischer Zug, welcher in dem jetzigen Berlin mehr und mehr überhand nimmt; . . ."

<sup>175</sup> E. A. Ross, German diary, January 26, 1889, Ross Papers, State Historical Society of Wisconsin, Madison. Quoted by R. Jackson Wilson, *In Quest of Community: Social Philosophy in the United States, 1860-1920* (London-Oxford-New York: Oxford University Press, 1970), p. 95.

<sup>176</sup> Emil Du Bois-Reymond, "Kulturgeschichte und Naturwissenschaft," in *Reden*, Vol. 1, p. 280, see also pp. 281, 283. Quoted by Otto Basler, "Amerikanismus. Geschichte des Schlagwortes," *Deutsche Rundschau*, Vol. CCXXIV (July-August-September 1930), p. 144.

<sup>177</sup> Paul Dehn, "Die Amerikanisierung der Erde," in *Weltwirtschaftliche Neubildungen* (1904), p. 238. Quoted by Otto Basler, *op. cit.*, p. 144.

<sup>178</sup> Theodor Lüddecke, "Amerikanismus als Schlagwort und als Tatsache," *Deutsche Rundschau*, Band CCXXII (Januar-Februar-März 1930), pp. 214-221; Otto Basler, *op. cit.*, pp. 142-146.

<sup>179</sup> *An Ambassador of Peace. Lord D'Abernon's Diary* (London: Hodder and Stoughton, 1929), Vol. I, p. 18.

<sup>180</sup> Lord D'Abernon, *op. cit.*, Vol. I, p. 18.

<sup>181</sup> *Ibid.*, p. 19.

<sup>182</sup> Lord D'Abernon, *op. cit.*, Vol. II, p. 102.

<sup>183</sup> Lord D'Abernon, *op. cit.*, Vol. III (1930), p. 245.

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<sup>184</sup> Lajos Kerekes, *A weimari köztársaság* [The Weimar Republic] (Budapest: Kossuth, 1985), p. 206.

<sup>185</sup> *Gesellschaft der Musikfreunde zu Berlin e. V.*, Programme Saison 1930-31, Michael Polanyi Papers, Box 45, Folder 2; *Lessing-Hochschule, Vorlesungen Frühjahr 1931*, Michael Polanyi Papers, Box 45, Folder 8, both at the Department of Special Collections, University of Chicago Library, Chicago, Ill.

<sup>186</sup> László Ormos, "Thomas Mann plaudert," *Pester Lloyd*, December 18, 1929, published by Antal Mádl and Judit Györi, eds., *Thomas Mann und Ungarn. Essays, Dokumente, Bibliographie* (Budapest: Akadémiai Kiadó, 1977), p. 342.

<sup>187</sup> There is a substantial and growing literature on Weimar Germany and its culture which I do not intend to present here. Some of the most important titles are *The Weimar Republic: A Historical Bibliography* (Santa Barbara, CA: ABC-CLIO Information Services, 1984); Peter Gay, *Weimar Culture: The Outsider as Insider* (New York: Harper and Row, 1968, 1970; Harmondsworth, Middlesex: Penguin, 1974); Gerhard Schulz, Hrsg., *Ploetz Weimarer Republik. Eine Nation im Umbruch* (Freiburg-Würzburg: Ploetz, 1987); Walter Mönch, *Weimar. Gesellschaft-Politik-Kultur in der Ersten Deutschen Republik* (Frankfurt a. M. — Bern—New York—Paris: Peter Lang, 1988); J. W. Hiden, *The Weimar Republic* (London: Longman, 1974); Frank Grube—Gerhard Richter, Hrsg., *Die Weimarer Republik* (Hamburg: Hoffmann und Campe, 1983); John Willett, *The Weimar Years. A Culture Cut Short* (London: Thames and Hudson, n.d.); Michael Stark, Hrsg., *Deutsche Intellektuelle 1910-1933. Aufrufe, Pamphlete, Betrachtungen* (Heidelberg: Lambert Schneider, 1984); Henry Pachter, *Weimar Etudes* (New York: Columbia University Press, 1982); Stephan Waetzoldt—Verena Haas, Hrsg., *Tendenzen der zwanziger Jahre* (Berlin: Dietrich Reiner Verlag, 1977).

<sup>188</sup> István Deák, *Weimar Germany, op. cit.*, pp. 13-15.

<sup>189</sup> István Deák, *Weimar Germany, op. cit.*, pp. 13-15.

<sup>190</sup> *The Education of Henry Adams. An Autobiography* (Boston and New York: Houghton Mifflin, 1918), pp. 77-78.

<sup>191</sup> István Deák, *Weimar Germany, op. cit.*, p. 14.

<sup>192</sup> Bálint Vázsonyi, *Dohnányi Ernő, op. cit.*, p. 69; William Manchester, *The Last Lion*, p. 57.

<sup>193</sup> Annemarie Lange, *Berlin in der Weimarer Republik* (Berlin: Dietz 1987), p. 596.

<sup>194</sup> Bruno Walter, *Theme and Variations; An Autobiography (1946)*. Quoted by Peter Gay, *Weimar Culture, op. cit.*, p. 130.

<sup>195</sup> Glenn Plaskin, *Horowitz. A Biography of Vladimir Horowitz* (New York: William Morrow and Co., 1983), p. 70.

<sup>196</sup> Glenn Plaskin, *Horowitz, op. cit.*, p. 69.

<sup>197</sup> Carl Zuckmeyer, quoted by Glenn Plaskin, *Horowitz, op. cit.*, p. 69.

<sup>198</sup> Glenn Plaskin, *Horowitz, op. cit.*, p. 69-70.

<sup>199</sup> Michael Polanyi to the *Wohnungsamt* in Berlin, Berlin, June 18, 1923. (German) Michael Polanyi Papers, Box 1, Folder 20, Department of Special Collections, University of Chicago Library, Chicago, Ill.

<sup>200</sup> Lipót Fejér to Gábor Szegő, Budapest April 27, 1922. (Hungarian and partly German) Gábor Szegő Papers, SC 323, Boxes 85-036, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

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<sup>201</sup> Alfred Reis to Michael Polanyi, Karlsruhe, October 14, 1920. (German) Michael Polanyi Papers, Box 1, Folder 11, Department of Special Collections, University of Chicago Library, Chicago, Ill.

<sup>202</sup> Stefan Zweig, *The World of Yesterday. An Autobiography* (1st ed. Viking Press, 1943; repr. Lincoln: University of Nebraska Press, 1964), pp. 313-314.

<sup>203</sup> G. Pólya, *How to Solve it. A New Aspect of Mathematical Method* (Princeton, N.J.: Princeton University Press, 1945). *How to Solve it* has never been out of print and has sold well over 1 million copies. It has been translated into 17 languages, probably a record for a modern mathematics book. Gerald L. Alexanderson, "Obituary. George Pólya," *Bulletin of the London Mathematical Society*, Vol. 19, 1987, p. 563, 603.

<sup>204</sup> Karl Mannheim, *Die Strukturanalyse der Erkenntnistheorie*, Kant-Studien, Ergänzungband, No. 57, Berlin, 1922. (Hungarian original: *Az ismeretelmélet szerkezeti elemzése*, Budapest: Athenaeum, 1918); Béla Zalai, "A filozófiai rendszerezés problémái," [The Problem of Philosophical Systematization] *A Szellem*, 1911, No. 2, pp. 159-186; Vilmos Szilasi, *A tudati rendszerezés elméletéről. Bevezetés* [On the Theory of Systematization of the Mind. Introduction] *A Magyar Filozófiai Társaság Könyvtára*, Vol. II, (Budapest: Franklin, 1919) Cf. Otto Beöthy, "Zalai Béla (1882-1915). Egy pálya emlékezete," [Béla Zalai (1882-1915). The Memory of a Life], in: Endre Kiss and Kristóf János Nyíri, eds., *A magyar filozófiai gondolkodás a századelőn* [Hungarian Philosophy at the Turn of the Century] (Budapest: Kossuth, 1977), pp. 228-231.

<sup>205</sup> George Polya, "Methodology or Heuristics, Strategy or Tactics?" *Archives de Philosophie*, Tome 34, Cahier 4, Octobre-Décembre 1971, pp. 623-629, quote p. 624.

<sup>206</sup> Arthur Koestler, *Insight and Outlook: An Inquiry into the Common Foundations of Science, Art and Social Ethics* (New York: Macmillan, 1949); *The Sleepwalkers: A History of Man's Changing Vision of the Universe* (New York: Grosset & Dunlap, 1959); *The Act of Creation* (New York: Macmillan, 1964). Cf. M[enachen] M. Schiffer, "George Polya, 1887-1985," George Polya Papers, SC 337, 87-034, Box 1, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA; cf. Arthur Koestler, *The Act of Creation*, *op. cit.* p. 23; Béla Hidegkuti, "Arthur Koestler and Michael Polanyi: Two Hungarian Minds in Partnership in Britain," *Polanyiana*, Vol. 4, No. 4, Winter 1995, pp. 1-81.

<sup>207</sup> Eduard Winter, Hrg., *Robert Zimmermanns Philosophische Propädeutik und die Vorlagen aus der Wissenschaftslehre Bernard Bolzanos*. Eine Dokumentation zur Geschichte des Denkens und der Erziehung in der Donaumonarchie (Wien: Verlag der Österreichischen Akademie der Wissenschaften, 1975), pp. 7-36. Cf. Bernard Bolzanos *Wissenschaftslehre: Versuch einer ausführlichen und grösstentheils neuen Darstellung der Logik mit steter Rücksicht auf deren bisherige Bearbeiter* (Sulzbach: J. E. v. Seidel, 1837)

<sup>208</sup> G. Pólya, "How to Solve It," *op. cit.*, p. vi.

<sup>209</sup> Vilmos Milkó, "Pólya Jenő emlékezete" [In memoriam Jenő Pólya], *Archivum Chirurgicum*, Vol. 1, No. 1, 1948, p.1.

<sup>210</sup> Hersh, Reuben, and Vera John-Steiner. "A Visit to Hungarian Mathematics." *The Mathematical Intelligencer* 15(2), 1993, pp. 13-26. John Horváth compared this explosion of Jewish talent after the Jewish emancipation to the surprising number of sons of Protestant ministers entering the mathematical profession in Hungary after World War II, "Those kids would have become Protestant ministers, just as the old ones would have become rabbis... mathematics is the kind of occupation where you sit at your desk and read. Instead of reading the Talmud, you read proofs and conjectures. It's really a very similar occupation." R. Hersch and V. John-Steiner, *op. cit.*

<sup>211</sup> György Pólya to Baron Gyula Madarassy-Beck, Paris, February 23, 1914. I am grateful to Professor Gerald Alexanderson of the University of Santa Clara for showing me this document as well as his

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collection of Pólya documents that were to be transferred to the George Pólya Papers, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>212</sup> Nobel Prize in Physics, 1944.

<sup>213</sup> S. M. Ulam, *Adventures of a Mathematician* (New York: Scribner's, 1976), p. 111. Cf. Tibor Fabian, "Carpathians Were a Cradle of Scientists," Princeton, NJ, November 16, 1989, *The New York Times*, December 2, 1989.—George Pólya's nephew John Béla Pólya had an even more surprising, though cautious proposition to make. He suggested that through George Pólya's mother, Anna Deutsch (1853-1939), Pólya was related to Eugene Wigner and Edward Teller, "who are thought to have" ancestry originating from the same region between the towns of Arad and Lugos in Transsylvania (then Hungary, today Roumania). Though this relationship is not yet documented and should be taken at this point merely as a piece of Pólya family legend, it is nonetheless an interesting reflexion of the strong belief in the productivity of the Jewish community in North-Eastern Hungary and Transsylvania in terms of mathematical talent. John Béla Pólya, "Notes on George Pólya's family," attached to John Béla Pólya to Gerald L. Alexanderson, Greensborough, Australia, July 28, 1986. I am deeply grateful to Gerald L. Alexanderson of Santa Clara University, Santa Clara, CA. for his generous and highly informative support of my research on George Pólya.

<sup>214</sup> Norman Macrae, *John von Neumann*, *op. cit.*, p. 9. J. M. Rosenberg, *Computer Prophets* (New York: Macmillan, 1969) p. 155. ff. Edward Teller and Alan Brown, *The Legacy of Hiroshima* (Garden City: Doubleday, 1962) p. 160. Cf. William O. McCagg, *op. cit.*, 211.

<sup>215</sup> Nicholas A. Vonneuman, *John Von Neumann as Seen by His Brother* (Meadowbrook, PA, 1987), p. 44.

<sup>216</sup> Sándor Mikola, "Die heuristische Methode im Unterricht der Mathematik der unteren Stufe," in E. Beke und S. Mikola, Hrg., *Abhandlungen über die Reform des mathematischen Unterrichts in Ungarn* (Leipzig und Berlin: Teubner, 1911), pp. 57-73.

<sup>217</sup> Gábor Szegő, "[Lipót Fejér]," MS. Gábor Szegő Papers, SC 323, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>218</sup> [Lecture outline, n.d. unpublished MS] George Pólya Papers, SC 337, 87-034, Box 1, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>219</sup> The full history of the Galileo Circle is yet to be written. Important documents were published by Zoltán Horváth in 1971: "A Galilei Körre vonatkozó ismeretlen dokumentumok," *Századok*, Vol. 105, No. 1, 1971, pp. 95-104, and an interesting memoir by Zsigmond Kende, *A Galilei Kör megalakulása* [The formation of the Galileo Circle] (Budapest: Akadémiai Kiadó, 1974). Cf. György Litván, *Magyar gondolat—szabad gondolat* [Hungarian Thought—Free Thought] (Budapest: Magvető, 1978); György Litván, "Jászi Oszkár, A magyar progresszió és a nemzet," [Oscar Jaszi, Hungarian Progressives and the Nation] in Endre Kiss, Kristóf János Nyíri, eds., *A magyar filozófiai gondolkodás a századelőn*, *op. cit.* Litván pointed out that while similar social science organizations, such as *Társadalomtudományi Társaság* or *Huszadik Század* had a fair number of gentile contributors, the Galileo Circle almost exclusively drew upon progressive Jewish students. See also Attila Pók, *A magyarországi radikális demokrata ideológia kialakulása. A "Huszadik Század" társadalomszemlélete (1900-1907)* [The Rise of Democratic Radicalism in Hungary: the Social Concept of *Huszadik Század* (1900-1907)] (Budapest: Akadémiai Kiadó, 1990) p. 152-165.

<sup>220</sup> Georg Pólya-Gábor Szegő, *Aufgaben und Lehrsätze aus der Analysis* (Berlin: Springer, 1925, new editions: 1945, 1954, 1964, 1970-71), Vols. I-II; Translations: English, 1972-76; Bulgarian, 1973; Russian, 1978; Hungarian, 1980-81.

<sup>221</sup> Gerald L. Alexanderson, "Obituary. George Pólya," *op. cit.*, pp. 562.

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- <sup>222</sup> G. Pólya, “Comment chercher la solution d’un problème de mathématiques?” *L’enseignement mathématique*, 30e année, 1931, Nos. 4-5-6.
- <sup>223</sup> G. Pólya, “Geometrische Darstellung einer Gedankenkette”, *Schweizerische Pädagogische Zeitschrift*, 1919.
- <sup>224</sup> G. Pólya, “Comment chercher,” *op. cit.*
- <sup>225</sup> Gerald L. Alexanderson, “Obituary. George Pólya,” *Bulletin of the London Mathematical Society*, Vol. 19, 1987, p. 563; on “Pólya the mathematician and teacher,” see pp. 566-570.
- <sup>226</sup> Paul Kirkpatrick, Acting Dean, School of Physical Sciences, Stanford University, Course outline, September 4, 1945, George Pólya Papers, SC 337, 87-137, Box 2, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.
- <sup>227</sup> G. Pólya, “Elementary Mathematics from Higher Point of View,” Mathematics 129, George Pólya Papers, SC 337, 86-036, Box 1, Folder 9, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA. Cf. Samuel Butler, “Miscellaneous Thoughts,” in: *The Poems of Samuel Butler*, Vol. II (Chiswick: C. Willingham, 1822), p. 281.
- <sup>228</sup> G. Pólya, “Elementary Mathematics from a Higher Point of View,” Survey of Typical Questions, George Pólya Papers, SC 337, 87-137, Box 3, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA. —Pólya was indeed very well read and liked to show his erudition by quoting Socrates, Descartes, Leibniz, Kant, Herbert Spencer, Thomas Arnold, J. W. Goethe, Leonhard Euler and his famous colleagues, such as Albert Einstein, and many others. George Pólya Papers, SC 337, 87-034, Box 1&3, 87-137, Box 2, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.
- <sup>229</sup> Untitled course description, nd. George Pólya Papers, SC 337, 86-036, Box 1, Folder 3, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.
- <sup>230</sup> G. Pólya *Mathematics and Plausible Reasoning* (Princeton, N.J.: Princeton University Press, 1954, 2nd ed. 1968), Vols. 1-2. Translations: Bulgarian, 1970; French, 1957-58; German, 1962-63; Japanese, 1959; Roumanian, 1962; Russian, 1957, 1975; Spanish, 1966; Turkish, 1966. G. Pólya, *Mathematical Discovery. On Understanding, Learning, and Teaching Problem solving* (New York-London-Sidney: John Wiley and Sons, 1965, Vols. 1-2; combined paperback ed. 1981), Translations: Bulgarian, 1968; French, 1967; German, 1966, 1967, 1979, 1983; Hungarian, 1969, 1979, Italian, 1970-71, 1979, 1982; Japanese, 1964; Polish, 1975; Roumanian, 1971; Russian 1970, 1976. Cf. Gerald L. Alexanderson, “Obituary. George Pólya,” *op. cit.*, pp. 604-605.
- <sup>231</sup> A good example was the Second International Congress on Mathematical Education at the University of Exeter, England. Cf. The invitation sent to Pólya by the Chairman of the Congress, Professor Sir James Lighthill, FRS, June 23, 1971. [Cambridge] George Pólya Papers, SC 337, 87-034, Box 1, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.
- <sup>232</sup> G. Pólya, “Die Heuristik. Versuch einer vernünftigen Zielsetzung,” *Der Mathematikunterricht*, Heft 1/64 (Stuttgart: Ernst Klett, 1964); cf. ‘L’Heuristique est-elle un sujet d’étude raisonnable?’, *La méthode dans les sciences modernes*, ‘Travail et Méthode’, numéro hors série, pp. 279-285.
- <sup>233</sup> G. Pólya, “Guessing and Proving.” Address delivered at the Convocation of the University of Waterloo, October 29, 1971. George Pólya Papers, SC 337, 87-034, Box 1, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.
- <sup>234</sup> G. Pólya, “Die Heuristik,” *op. cit.*, p. 5

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<sup>235</sup> George Pólya, Untitled note, n.d., George Pólya Papers, SC 337, 87-034, Box 1, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>236</sup> G. Pólya, "Formation, Not Only Information," Address at the Mathematical Association of America, George Pólya Papers, SC 337, 87-034, Box 1, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>237</sup> George Pólya to Robert J. Griffin, Stanford, June 12, 1962. George Pólya Papers, SC 337, 87-034, Box 2, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>238</sup> George Pólya to Anthony E. Mellor, Harper and Row, Stanford, March 11, 1974; Stanford University News Service, Februar17, 1969. George Pólya Papers, SC 337, 87-034, Box 1, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>239</sup> George Pólya, "Preface," MS George Pólya Papers, SC 337, 87-034, Box 1, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>240</sup> [Untitled MS, n.d. "The organizers' choice of George Pólya. .,"] George Pólya Papers, SC 337, 87-034, Box 2, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA. —P. R. Halmos, "The Heart of Mathematics," *American Mathematical Monthly*, Vol. 87, 1980, pp. 519-524.

<sup>241</sup> Alan H. Schoenfeld, "George Pólya and Mathematic Education," Gerald L. Alexanderson, Lester H. Lange, "Obituary. George Pólya," *Bulletin of the London Mathematical Society*, Vol. 19,1987. p. 595. Cf. Rudolf Groner, Marina Groner, Walter F. Bischof, eds., *Methods of Heuristics* (Hillsdale, N.J., London: Lawrence R. L. Baum, 1983); Stephen I. Brown-Marion E. Walter, *The Art of Problem Posing* (Philadelphia, PA: The Franklin Institute Press, 1983)

<sup>242</sup> Imre Lakatos to Dr Maier (Rockefeller Foundation), Cambridge, England, May 5, 1957. George Pólya Papers, SC 337, 87-137, Box 1, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA. —In turn, Pólya expressed his admiration for Lakatos's "Proofs and Refutations," and recommended him as Professor of Logic at the London School of Economics and Political Science, "with special reference to the Philosophy of Mathematics." George Pólya to Walter Adams (LSE), Stanford, CA, January 13, 1969, George Pólya Papers, SC 337, 87-034, Box 1, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>243</sup> Alan H. Schoenfeld, "George Pólya and Mathematic Education," Gerald L. Alexanderson, Lester H. Lange, "Obituary. George Pólya," *Bulletin of the London Mathematical Society*, Vol. 19,1987. p. 595.

<sup>244</sup> Alan H. Schoenfeld, "George Pólya and Mathematic Education," Gerald L. Alexanderson, Lester H. Lange, "Obituary. George Pólya," *Bulletin of the London Mathematical Society*, Vol. 19,1987. p. 596.

<sup>245</sup> Alan H. Schoenfeld, *Mathematical Problem solving* (Academic Press, 1985)

<sup>246</sup> Alan H. Schoenfeld, "George Pólya and Mathematic Education," Gerald L. Alexanderson, Lester H. Lange, "Obituary. George Pólya," *Bulletin of the London Mathematical Society*, Vol. 19,1987. p. 596.

<sup>247</sup> G[eorge] Pólya and J[eremy] Kilpatrick, "The Stanford University Competitive Examination in Mathematics," *American Mathematical Monthly*, Vol. 80, No.6, June-July, 1963, p. 628.

<sup>248</sup> T. Radó, "Mathematical Life in Hungary," *American Mathematical Monthly*, Vol. XXXIX, 1932. pp. 85-90; József Kürschák, *Matematikai versenytételek* (Budapest, 1929); R. Creighton Buck, "A Look at Mathematical Competitions," *American Mathematical Monthly*, Vol. LXVI, No. 3. March 1959, p. 209.

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<sup>249</sup> Department of Mathematics, Stanford University, “The Stanford University Mathematics Examination,” *American Mathematical Monthly*, Vol. LIII, No. 7, August-September, 1946, pp. 406-409. G[eorge] Pólya and J[eremy] Kilpatrick, *op. cit.*, pp. 627-640; cf. the correspondence between Harley Flanders, George Pólya and Jeremy Kilpatrick, 1970-1972, George Pólya Papers, SC 337, 87-034, Box 1, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>250</sup> R. Creighton Buck, “A Look at Mathematical Competitions,” *American Mathematical Monthly*, Vol. LXVI, No. 3, March 1959, pp. 204-205.

<sup>251</sup> H. M. Bacon, “The Stanford University Competitive Examination in Mathematics,” Report at the Meeting of the Mathematical Association of America, University of Washington, Seattle, August 20, 1956. George Pólya Papers, SC 337, 86-036, Box 2, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>252</sup> H. M. Bacon, “The Stanford University Competitive Examination in Mathematics,” Report at the Meeting of the Mathematical Association of America, University of Washington, Seattle, August 20, 1956. George Pólya Papers, SC 337, 86-036, Box 2, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>253</sup> H. M. Bacon, “The Stanford University Competitive Examination in Mathematics,” Report at the Meeting of the Mathematical Association of America, University of Washington, Seattle, August 20, 1956. Cf. Gábor Szegő, “The Stanford University Competitive Examination in Mathematics,” 16th Summer Meeting, National Council of Teachers of Mathematics, UCLA, August 21, 1956, p. 2. George Pólya Papers, SC 337, 86-036, Box 2, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>254</sup> H. M. Bacon, “The Stanford University Competitive Examination in Mathematics,” Report at the Meeting of the Mathematical Association of America, University of Washington, Seattle, August 20, 1956. George Pólya Papers, SC 337, 86-036, Box 2, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>255</sup> G. Pólya, “The 1953 Stanford Competitive Examination. Problems, Solutions, and Comments,” *California Mathematics Council Bulletin*, May 1953.

<sup>256</sup> Gábor Szegő, “The Stanford University Competitive Examination in Mathematics,” 16th Summer Meeting, National Council of Teachers of Mathematics, UCLA, August 21, 1956, p. 2. George Pólya Papers, SC 337, 86-036, Box 2, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>257</sup> G. Pólya, “The 1957 Stanford University Competitive Examination in Mathematics, March 9, 1957,” *California Mathematics Council Bulletin*, 1957, George Pólya Papers, SC 337, 87-034, Box 1, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>258</sup> David Gilbarg to George Pólya and Gabor Szego, April 25, 1966. George Pólya Papers, SC 337, 86-036, Box 2, Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA.

<sup>259</sup> Theodore von Kármán with Lee Edson, *The Wind and Beyond*, *op. cit.*, p. 23.

<sup>260</sup> Michael Polanyi, “Problem solving,” *The British Journal for the Philosophy of Science*, Vol. VIII, No. 30, August 1957, pp. 89-103; quote p. 89.

<sup>261</sup> Polanyi, “Problem solving,” *op. cit.*, pp. 93-94.

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The archival sources of this paper are scattered all around the world. This comes from the very nature of the subject matter. Many of the key Hungarian figures discussed here became émigrés early on, worked in universities or research institutes primarily in Germany, and left their papers typically to their last work place or other public institutions in the United States.

The John von Neumann Papers are preserved in the Library of Congress, Washington, DC; the George Pólya Papers in the Department of Special Collections and University Archives, Stanford University Libraries, Stanford, CA; the Theodore von Kármán Papers in the Institute Archives, Robert A. Millikan Memorial Library, California Institute of Technology in Pasadena, CA; and the Michael Polanyi Papers in the Department of Special Collections, The Joseph Regenstein Library, University of Chicago, Chicago, IL. All of these papers include private and professional correspondence, family and work related notes, drafts, photographs. For the biographer they are a must to consult, but they are also a wealth of information for research on the entire generation.

The present author has also made use of his studies in other important American collections such as the Rare Book and Manuscript Library, Columbia University, New York, NY; the New York Public Library; and the American Philosophical Society Library, Philadelphia, PA.

In Germany, the Archiv zur Geschichte der Max-Planck-Gesellschaft was of greatest use. Whatever was left in Hungary I consulted in the manuscript collections of the Országos Széchényi Könyvtár [National Széchényi Library], the Library of the Hungarian Academy of Sciences, and the University Library of Eötvös Loránd University, all in Budapest.

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