The Legacy of Paul Erdős

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Abstract

Paul Erdős (Erdős Pál, 1913-1996) was one of the most influential mathematicians of the twentieth century. Erdős' generation exhibited great talent due in part to the social and cultural changes between 1870 and 1930. In the 1930s, the Jewish Erdős left Hungary due to the worsening political climate, and eventually began a nomadic lifestyle in which he traveled across four continents collaborating with students, teachers, and professors. In popular books, he was described as a wandering ascetic searching only for mathematical truth. Those who knew him best, however, describe him as a compassionate, warm-hearted man. He was addicted to mathematics, but was also aware of current political events and cared deeply for his community of friends. In this paper, I describe the development of mathematical talent in Hungary near the turn of the century, give a biographical sketch of Erdős, and consider his collaborators' perception of him in light of popular books. Finally, I describe how Hungary continues to nurture mathematical talent, through specialized programs such as the one at Fazekas Gymnasium (Fazekas High School). I also describe the filmmaking projects that I undertook to document these subjects during the past year.

1. Introduction

In the summer of 2006, I learned about the prolific Hungarian mathematician Paul Erdős (1913-1996) through the popular biographies *My Brain is Open*, by Bruce Schechter, and *The Man Who Loved Only Numbers*, by Paul Hoffman. These books, along with the film *N is a Number*, were the only sources about Erdős' life that were readily available. The books taught me that Erdős was arguably the most prolific mathematician in history, but that he was unable to hold a driver's license or make a sandwich. He was a man who devoted his entire life to mathematics; who took amphetamines in order to work twenty hours a day; who carried all his belongings in a suit case; who whimsically believed that all the best proofs are written in *the Book*, which the almighty *Supreme Fascist* keeps from humans; who called children *epsilons* and music *noise*. In these books, Erdős' eccentricities are accentuated through stories that he and others tell about his life. Yet, this year I have spoken to some of his closest friends and read accounts by his collaborators, and they emphasize different aspects of his character. His warm-hearted nature, social capabilities, and thoughtful presence were characteristics that they talked about more than his quirky mannerisms.

To understand Erdős' life, it is helpful to recognize the larger historical and cultural framework preceding it. A burst of mathematical and scientific talent occurred between 1870 and 1930 in Budapest. In section 2.1, I draw from Tibor Frank's "The Social Construction of Genius" to describe factors that may have caused this phenomenon. I pay special attention to those factors which were part of Erdős' development. In section 2.2, I offer a brief biographical account of Erdős' life, drawing primarily from his colleagues and friends as sources. In section 2.3, I consider this portrait in light of popular literature about him. While in Hungary, I learned that there is a Hungarian film about Erdős that has not been translated into English. I discuss why it is important for this film to be translated and distributed.

In his youth, Erdős was influenced by the high school math journal called Kőmal. Kőmal and other math competitions were developed in 1894 to excite and reward young talent. Many similar programs exist today. Bright students at Fazekas Gymnasium (Fazekas High School) attend specialized programs and prepare for the International Mathematics Olympiad (IMO). During this past school year, I visited classes and competitions related to these programs. In section 3, I share my observations and describe the reasons why Hungarian mathematical education for talented students is successful. The strength of these programs suggests that Hungary will continue to produce outstanding mathematicians and scientists.

2.1 The Development of Genius

During the turn of the twentieth century, Hungary produced some of the great minds in mathematics, science, music, and art. These include scientists Leo Szilard, Ed Teller, Michael Polányi, and George Szekeres; mathematicians Johnny (János) von Neumann, George Pólya, Gábor Szegő, Paul Erdős, and Paul Turán; and many other musicians, composers, filmmakers, film producers, photographers, and social scientists (see Frank, p. 6 for a detailed list). Since Hungary is a relatively small country, how did it produce this large number of influential figures? This phenomenon, which was most pronounced between 1870 and 1930, was a result of technological innovation, cultural transfer from Germany, the assimilation of the Jewish community, and emergence of the newly-developed capital from the domination of the Habsburg Empire.

Hungary has spent one third of its existence under the control of the Habsburg Empire, and has been occupied by the Mongols, the Turks, the Germans, and the Soviets. As a consequence, it has been necessary for both the nation and the individual to adapt and assimilate in order to survive. Moreover, Hungary has been surrounded on all sides by a diversity of ethnic groups, and therefore has experienced cultural interaction from the Germans, Slavs, Croats, Romas, and many others. This mix has created rich lingual environments, in which it might be necessary to know a bit of a few languages to communicate. Routinely battered by invaders and surrounded by many other languages, Hungary's geographical and political situation has encouraged creative problem solving within the culture. Ultimately, this may have benefited the development of some of Hungary's most influential scientists, mathematicians, artists, musicians, and filmmakers (Frank 5-19).

When Hungary emerged from the direct control of the Habsburg empire in 1867, the economy was quickly modernized. Toward the end of the nineteenth century, occupational status became a source of prestige in Budapest. Ethnic groups (most significantly the Jews) who had been marginalized previously, became an integral part of society, especially in academia. In the 1920s, many Jews converted to Christianity in order to create social and economic opportunities for themselves. This assimilation was encouraged by the government, which wanted to increase the number of people who were self-identified Hungarians. In the business world, this conversion was often seen as social climbing, but the academic world was less suspicious. Many great mathematicians and scientists from that period were Jewish, including Johnny (János) von Neumann, Paul Erdős, E.P. Wigner, and Paul Turán (Frank 24-30).

The close connection between Hungarian and German education systems contributed to the development of young talent in Budapest. Both innovative and traditional ways of teaching were

imported through the Gymnasium program. Progressive schools encouraged personal relationships between students and teachers and experimented with new ways of teaching. Prodigies such as Johnny von Neumann encountered the great math educator László Rátz when he was only ten years old. Immediately, Rátz asked Johnny's father, Max, if he could tutor Johnny privately. Max agreed, and Rátz provided one-on-one tutoring free of charge. By the time Johnny was 17, he had been at the university for a few years, and many of the professors considered him their peer. The encouragement that Rátz gave was paramount to von Neumann's early success. The informal relationship between von Neumann and Rátz exemplifies the degree to which accelerated learning can help bright students. Rote learning was still common in literature and language, but the emergence of industrialization provided impetus for innovation in the sciences (Frank 39-50).

In 1894, the secondary school journal Középiskolai Matematikai Lapok (Kömal) and the Eötvös math competitions began. The journal and the competitions intended to stimulate young students of mathematics and physics. Each issue of the journal contained problems that students were encouraged to solve. They would send in their answers, and correct solutions were published, sometimes with a picture of the solver. Indeed, many great Hungarian mathematicians and scientists had their photos printed in Kömal, including Erdős, von Neumann, Szegő, Pólya, Wigner, Teller, Szekeres, Lovász, Sós, and Bollabas - to name the most well-known. When asked in 1985 about the "great flowering of Hungarian mathematics," Erdős cited Kömal as an interface between experienced professors and young students. He said that, "It is where you learned how to solve problems," but added that "such things have more than one reason" (Oláh 3-29).

The intersection of social and cultural changes in Budapest helped to create a burst of talent in the emerging capital. Hungary's history of foreign domination gradually produced the side effect of a creative problem solving ability in Hungarian culture. Toward the end of the nineteenth century, Hungary assimilated the Jewish community. Jews were drawn to academic circles, where conversion to Christianity was less often seen as a social maneuver. New forms of education imported from Germany propelled talented students. Kömal and the Eötvös competitions stimulated great young minds, while increased cultural value was placed on scientific achievement due to industrialization. The result was a flourishing of mathematical and scientific talent.

Yet as Miklós Dezső, the current head of the Rényi Institute points out, it could be argued that many famous "Hungarian" scientists owe their achievements as much to the United States or England as to Hungary. For instance, Edward Teller left Hungary at the age of 18 and lived most of his life in the United States.

He gained experience and recognition for his part in developing the hydrogen bomb in the Manhattan project, alongside von Neumann. He is considered a Hungarian-born American, since he lived more of his life in the U.S. than he did in Hungary. But both countries take credit for his achievements. Erdős, as always, is much more difficult to pin down. He left Hungary when he was 21, but returned often to his best friends in Budapest – even during the Cold War. Erdős seemed to return to Hungary more than any other place, especially toward the end of his life. Therefore, he would be considered Hungarian. It might be argued that Hungary claims certain famous scientists who lived abroad much of their life. Nevertheless, the development of their talent is unambiguous: Kömal, the Eötvös competitions, and personal instruction nurtured top students. Nowhere were these talents developed more acutely than in Paul Erdős, one of the greatest mathematicians of the twentieth century.

2.2 Biographical Sketch of Paul Erdős

Paul Erdős was born in 1913. The early death of his sisters had a great effect on his parents, who home-schooled young Paul. Both parents were mathematics and physics teachers, and they recognized his talents immediately. Before the age of five, he could multiply three digit numbers in his head and tell you how many seconds you had lived. During World War I, Paul's father was captured as a prisoner of war in Russia for six years. During that time, Paul's mother brought him up. She was extraordinarily proud of his abilities in mathematics, languages, and history. He grew close to his mother, and they remained uncommonly close throughout his adult life (Sós 205-207, Simonovits and Sós ix-xii).

In his late teens, Erdős developed his mathematical talent by solving problems from Kőmal. Through the journal, many of the best mathematicians got to know each other by face and name from a distance. When these young students moved to Budapest to study at Pázmány Péter University (now Eötvös Loránd University), they created an informal and wandering group. The group, consisting of Erdős, Gallai, Grünwald, Klein, Szekeres, Turán, Vázsonyi, and others, would take excursions through the city and trips through the park, discussing mathematics, politics, and personal gossip. Many in this tight knit group would become influential figures in mathematics. A few of the bonds would last for years. Erdős and Turán worked together regularly and kept in close correspondence. George Szekeres and Eszter Klein worked on a problem in geometry that had great significance in understanding random systems. Eventually, they married. Erdős dubbed the problem, "the Happy Ending Problem" (Sós 207-208).

Erdős made his name in mathematics early. By 18, he had gained recognition for solving a graph theoretical problem

of the Hungarian Dénes Kőnig. A few years later he gave an elementary proof of Chebeychev's theorem: that there is always a prime between *n* and *2n* (Aigner and Ziegner 7-13). He finished his Ph.D. at 21 and moved to Manchester where he studied for four years. He kept in good contact with friends and family in Budapest, visiting three times a year and continuing to collaborate with Turán. Their feverish correspondence between 1934 and 1940 gives a sense of Erdős' style in mathematics and life. His conjectures, proofs, and problems are interspersed with his political and personal concerns about the growing anti-Semitic sentiment in Europe (Halász et. al. 85-147).

Erdős returned to Hungary in 1938. The political climate was so bad that it forced Erdős to leave to the United States. He researched at the prestigious Institute of Advanced Study, but in 1939 his fellowship was not renewed. This is when he began his "nomadic" lifestyle. During the next fifty years, he traveled all across the world, giving lectures, participating in conferences and workshops, and collaborating with other mathematicians (Sós 208-209).

When Erdős was 50 (in 1963), Turán published a celebratory paper that surveyed some of Erdős' accomplishments. A striking fact about his work was that he could make significant progress in many areas: number theory, probability theory, graph theory and asymptotical combinatorics, constructive theory of functions, set theory, and set-theoretical topology, theory of series, and geometry. Rarely in the twentieth century does one mathematician work seriously in so many fields (Halász et. al. 55-60). His success was partially due to his ability to remain open to others' ideas and problems. He could strike up mathematical friendships where ever he went with students, teachers, and professors. Rather than build theorems, he attacked problems, searching for their underlying structure. He was renowned for posing problems suited to the individual with whom he worked. In his lectures, he announced general problems and offered cash rewards for solutions. The real reward, however, lay in discovery of the groundbreaking results that solutions often elicited. During his lifetime, he worked with more than 400 collaborators and produce nearly 1500 papers.

2.3 Remembering His Legacy

Popular accounts of Erdős concentrate on his quirky anecdotes and witty remarks. He would recall funny stories in interviews, so much that they became canonized. For instance, in almost every detailed account of him, he describes the situation of when he was 21 in England and was faced for the first time to make his own sandwich. This anecdote illustrates his mother's early pampering, but perhaps misleads the public to believe that his eccentricities were his most exceptional attribute. There is no doubt that Erdős' life was much different than the norm, but popular accounts tend to exaggerate these details. His collaborator, Paul Bateman has said, "Some writers give the

impression that Erdős was some sort of surreal genius, but in fact he was a solid person, with likes and dislikes, human frailties, and many lovable qualities." Much of the biographical information available to the public is written by outsiders to his life. *Paul Erdős and his Mathematics*, however, is written by those who knew him best, although the two volume set is hard to obtain and is steeped in mathematical jargon. The first 100 pages of volume one fill out the existing impression of Erdős by adding the stories and opinions of his collaborators. The common theme is that the caring nature and generous attitude of Erdős stood out more than his unique lifestyle.

The construction of Erdős' popular image has not relied on a combination of perspectives from people that knew him well. The books *My Brain is Open* and *The Man Who Loved Only Numbers*, and the film, *N is a Number*, were created by non-mathematicians outside of his community. These works determine how the public perceives Erdős. In many ways, these accounts do well. They excite the public about mathematics and entertain the reader with stories about Erdős' character. They describe his amazing mathematical ability in a way that the layperson can understand. These works also recount the events of Erdős' life, exploring the difficulties that he encourntered. However, there are certain points that could be represented more clearly.

In *The Man Who Loved Only Numbers*, Hoffman explains that Erdős devoted his entire life to math and was oblivious to anything else. He writes, "[Erdős] renounced physical pleasure and material possessions for an ascetic contemplative life, a life devoted to a single narrow mission: uncovering mathematical truth" (Hoffman 25). In talking with Professor Miklós Simonovits, a collaborator of Erdős and graph theorist at the mathematical research center in Budapest (called the Rényi Institute), I learned that Erdős enjoyed fine dining, and would go out with his friends when he had the chance. In Simonovits' estimation, he was not an ascetic. In fact, he was well-connected to the world around him. Erdős kept up with current political events and was well-versed in world history. The American mathematician P.T. Bateman recalls that "[he] had an abiding interest in political issues in countries all over the world." In 1980, while at a conference in Europe, Erdős stayed up all night to watch the U.S. Presidential election, while Bateman – the American – went to bed. The next morning, Erdős knocked on Bateman's door and said, "Reagan is your president" (Halász et. al. 9-13).

Erdős was also devoted to his friends. Both RK Guy and Joel Spencer mention that he paid attention to the names of their family members and cared about them on a personal level. During the time of Soviet rule in Hungary, János Surányi recalls how Erdős would bring back special medications from the West to friends and their families behind the Iron Curtain (Halasz et. al. 21-25, 47-51) Indeed, Erdős took special care of those close to him.

In *N is a Number*, Erdős talks about his aversion to sexual stimulation and explains that he never had a serious relationship with a woman. This raises an ethical question. Is it appropriate to discuss the sex-life of a mathematician in a documentary film? What if he talks about it on camera? Naturally, humans want to know the intimate details of others' lives. But it seems that this detail may distract from his accomplishments.

During Erdős' life, he used coffee, caffeine pills, and Benzedrine to stay awake. In *The Man Who Loved Only Numbers*, Hoffman introduces this by writing, "At five foot six, 130 pounds, Erdős had the wizened, cadaverous face of a drug addict, but friends insist that he was frail and gaunt before he started taking amphetamines" (Hoffman 7). Erdős took pills on and off throughout his life, and it was not something that he flaunted. Consequently, the discussion may deserve more sensitivity when introduced. When Hoffman asked him, Erdős said, "You shouldn't have mentioned the stuff about Benzedrine. It's not that you got it wrong. It's just that I don't want kids who are thinking about going into mathematics to think that they have to take drugs to succeed" (Hoffman 268). In *N is a Number*, his use of Benzedrine is not included and in *My Brain is Open*, it is mentioned in a more discreet way. The way in which Erdős' use of Benzedrine is discussed can shade the perception of his character. There is a fine line between telling the complete truth and exploiting the details of a subject's life.

Once I learned about the views of Erdős' collaborators, I wanted to create a documentary to explain the situation. But after speaking with some of his former colleagues at the Rényi Institute, I experienced resistance. Sós, Erdős' closest living friend, told me that in her writings she had said everything that she wanted to say about Paul. Twelve years after his death, this story did not need to be revisited by another foreigner who didn't know him personally. Upon reflection, I understood the wisdom of this attitude and decided that in fact creating my documentary might not help the situation. While talking to Miklós Simonovits, he told me about an interview of Erdős shot by a Hungarian filmmaker named Kardos István (1942-2006). I had not heard of it. Did this interview exist in English?

After speaking with the Magyar Television archive and the National Széchenyi Library, I learned that the 50 minute piece on Erdős was not in English. Moreover, Kardos István had created 70 similar pieces about influential Hungarian mathematicians and scientists, including 13 Nobel prize winners. Professor Simonovits gave me a copy of this compilation of interviews of Erdős – one shot in 1978, the other in 1988. In the film, Kardos and another reporter ask Erdős questions about his life and mathematics. He recounts his experience as a young man, reflects upon the meaning of his work, discusses his philosophy on collaborating, and gives his perspective on the future of computers. The austere set, long pauses, and slow pacing reflect the formal aspect of Hungarian culture. Most of the film is a close up of Erdős as he talks and tells stories. It is a sit down discussion, and there is little attempt to spice it up. Consequently, the film may require some patience, but in return we see Erdős responding to questions spontaneously. While many accounts of him focus on what *happened* in his life, this account also focuses on what *is happening*. It depends less on Erdős retelling stories and more on Erdős expressing his opinion. In one instance, Erdős discusses the possibilities for the new technology of computers. This topic is relevant since we are living in the future that Erdős talks about. The film is also unique because it features Erdős speaking in his mother tongue. It is the only documentation that I am aware in which Erdős speaks Hungarian. Despite its cultural and historical interest, the film could be criticized in a few ways. For instance, the questions asked are at times general or speculative. Some may argue that it is not "new" enough, since some information in the film could be found in existing materials. But the Hungarian nature of the production adds a candid portrait of Uncle Paul that cannot be reached in American works.

During my time in Hungary, I have been working to make this film available to English speakers. The most effective translation, I believe, is subtitles. Subtitles are less intrusive than dubbing: they would allow the viewer to hear Erdős' voice as he speaks. Two Hungarian students are working with me to create an English subtitle track. With the help of the Fulbright commission, I am working to gain copyright permission from Magyar Television. Ultimately, I would like to make the film available for distribution. Since the film is only 50 minutes, there would need to be more material on the DVD. Kardos created 70 other films that would be new to the English-speaking world. Vera Sós also indicated that there are other Hungarian interviews of Erdős yet to be translated. Thus, there are many possibilities to fill out this DVD, and even create a series about Hungarian-born mathematicians or based on Kardos' work.

The project would require backing to distribute. I have written the NSF with regard to their Informal Science Education program. This program provided partial funding for *N is a Number* and its values seem closely aligned to the benefits of releasing Kardos' films. The Templeton Foundation held a conference in October of 2007 about Hungarian mathematical talent around the turn of the century. I have seen the video documentation of lectures from the conference via webcast. Perhaps this footage could be combined to create a documentary about mathematical education, and then released with some of Kardos' films. This work would provide a Hungarian perspective to the existing material on Erdős, and therefore has significant cultural value.

3. Math in the Secondary School

In the 1950s, the International Mathematics Olympiad (IMO) was introduced, bringing together the top talent from six Soviet countries including Hungary. Now, more than ninety countries participate. Students from each country take two exams. They have four and a half hours to solve three difficult problems. Hungary faces giants such as Russia, China, India, and the U.S. Nevertheless, Hungary repeatedly placed within the top ranks of the competition and many Hungarian students walk away with silver medals.

Fazekas Gymnasium, located in the 8th District in Budapest, is one of the secondary school which has specialized math programs for talented students. Toward the end of February, I began to attend the informal preparations for the IMO. I could understand only bits of Hungarian, but could see how comfortable these 17 and 18 year-olds were when they solved problems at the chalkboard. I had rarely seen such confidence at my high school in the U.S., even when we solved much easier problems. Of course, the Hungarian math students who participated in the voluntary Friday afternoon preparation were no ordinary students. They were some of the best in Hungary.

After giving a few problems to the students, the teacher (and deputy coach of the Hungarian IMO team), Dobos Sándor, sat patiently at the front of the room. The class was silent – the only noise was the scratching of pencil on paper and the low buzz of the street through the window. Twenty minutes later, Sándor strolled the room quietly, peeking at his students' work and helping when necessary. Sándor's style is to allow his students to grapple with the problems, in order to encourage independent thinking. This practice is designed to prepare them for working independently at the IMO. They need to develop a self-driven, critical thinking capacity. Eventually, Sándor would ask his students to share their solutions on the chalkboard. The students explained their discoveries, frequently looking to him for approval.

Hungarian mathematics education is a century old tradition, which continues today. More than 15,000 students each year participate in the competitions hosted by the Bolyai Society (including the former Eötvös competition). Many students still greet the new publication of Kőmal with excitement and send answers each month. The Fazekas program is especially active, and similar programs exist throughout Hungary. I am currently creating a documentary film about secondary school math education, paying particular attention to the development of bright students. I interviewed Dobos Sándor and some of his students, and filmed both advanced and regular-track classes that he teaches. I also spoke with László Lovász, a world-renowned researcher in combinatorics and a member of the first ever specialized math program at Fazekas in 1962. He has lived

in the U.S. for significant periods of time, and he talked about the differences between Hungary and the U.S. in math education. In Hungary, there is a sense of community spirit, and talented students are encouraged to go deeper into mathematics, instead of speed ahead. Whereas in the U.S., the community is larger and less closely connected, and the math teachers are not trained especially for their job. I hope that the documentary will bring out these points, so that the U.S. can learn from Hungary's example.

The sense of a small, active community was evident in the "Fazekas Napok" (Fazekas Days), an informal math competition involving over 100 students. Teams of seven are given 21 questions, and they have 90 minutes to solve as many problems as they can. A correct answer wins the team between 20 to 40 points. The team loses 10 points for an incorrect answer. Pastries and soft drinks are given to the teams, who sit at circular tables and work intensely on the problems. Once a team has a solution, the team's runner delivers it to a cadre of judges, mostly first or second year students from the university (many of whom went to Fazekas the year before). Each answer is a single integer between 0 and 10,000 written on a small slip of paper. The judges grade them on the spot. The scoreboard changes in real-time, as teams turn in answers, and the teams battle each other until the very last minute. The competition encourages collaboration and cross-checking between students. Regardless of whether they win, they have a good time.

On April 4th, 2008, this year's competition took place, and I was there to film the event. The beginning was relaxed and full of playful excitement. As time ran out, the pressure and tension increased. Frantic participants speed walked to the judges, delivering their solutions. The event brought with it a real sense of enjoyment. Fazekas brought the NYU computer scientist Joel Spencer, as a guest lecturer. He gave his lecture in Hungarian to a crowd of over 90. Most of the audience were young students, who watched attentively as Spencer talked about several problems involving asymptotes and graph theory. It seemed that everyone in the audience wanted to attend the two hour session, as classes had been cancelled for the occasion.

I may have stumbled upon yet another reason that high level mathematics is so good in Hungary. Not only is the community small, but its members are friendly and helpful. Professor Simonovits introduced me to the head coach of Hungary's IMO team – József Pelikán – who then introduced me to Sándor Dobos. Teachers such as Sándor are relentless in their generosity. He has introduced me to other teachers and educators, who in turn have invited me for an interview or into their classrooms to observe and film. Each person that I talk to speaks highly of another, and this friendly spirit is conducive to collaboration. As the Fazekas teacher Pátaki János told me, the United States may be good at creating strong mathematical institutions and organizations, but Hungary knows

how to create a community spirit, where the best students are exposed to their peers so that they can learn and develop together. Given this trend, the legacy of developing talented youth in mathematics will continue, independent of political problems or lack of funding. The Hungarian math community remains strong and healthy despite the radical changes of the past century, and appears that it will continue in this way.

4. Conclusion

During this past year I learned about the golden age of Hungary. The sharp increase of talent in math and science was in large part due to a confluence of cultural and social developments linked to the newly emerging capital Budapest, innovative educational practices imported from Germany, and the assimilation of the Jewish community. The Kömal journal and the Eötvös competitions encouraged students to solve challenging questions and rewarded young talent. Due to the political climate in Hungary around World War II, many of these scientists were forced to leave for the United States. It could be said that some of the great scientists are as much American as they are Hungarian, since their most celebrated work occurred in the U.S. But the debt they owe to Hungary is undeniable. It is clear that the innovative education and exciting competitions in Hungary helped to develop the talent of many young students, some of which went on to do great works. This legacy continues today through specialized secondary school programs such as Fazekas.

Paul Erdős was one of the greatest mathematicians of the twentieth century. His character has been recorded in popular biographies by American authors who accentuate funny stories about him more than his genuine kindness. While he was addicted to math, he also cared about the people around him and paid attention to history and politics. When I spoke with his former collaborators, many approved pieces of Erdős' popular image, but explained how other parts could be more accurate. The portrait film by Kardos István shows Erdős talking in Hungarian about his life. I hope that a translation of the film would provide a fresh, new perspective that is less adulterated than the books about him. This film is the only documentation (that I am aware of) in which Erdős speaks in his mother tongue. The style of the film expresses the calm and formal nature of Hungarian culture. Moreover, the Kardos interview is less retrospective than other works, giving a chance for Erdős to express his opinion about modern issues such as how computers should be used in education. I am working on gaining copyright permission to add English subtitles, while I create a subtitle track. I am also finding a way for the film to be distributed.

Simultaneously, I am creating a documentary about mathematics secondary school education in Hungary that should be finished in May. I have observed classes, interviewed students, teachers, and professors, and filmed competitions. The end product will show some of the keys to Hungary's success in educating young talented math students. The tight-knit math community and tradition of Kőmal and other competitions bring bright students together throughout their development. Perhaps more attention should be paid to the imbalanced ratio of men to women in mathematics. Teachers such as Sándor Dobos encourage women to participate, although the larger culture may not see mathematics as a very "womanly" subject. These social morays may change, but the legacy of outstanding mathematical talent of Erdős and his contemporaries will continue.

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