ANDREA CONTATO

VIDEO GAMES

The People, Games, and Companies

STAGE ONE

1979 and Before

1978

FROM THE SUMERIAN GAME TO SANTA PARAVIA AN FIUMACCIO

DEC was not the only company interested in the potential of computer-based instruction (CBI) and the prospect of developing a range of products for schools of all types and levels. Before the Plato system attracted the interest of William Norris and prompted DEC to acquire the technology developed at the University of Illinois, one man had spent years expanding the application of automated systems. This individual was Bruse Moncreiff.[112]

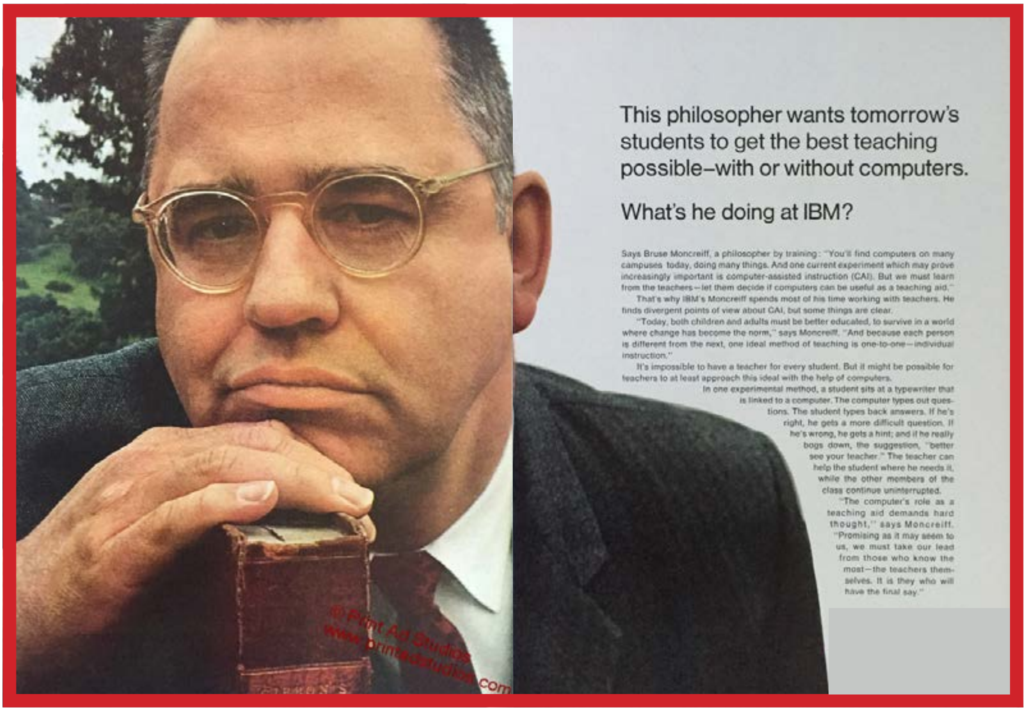
Moncreiff, a 1940 graduate of the University of Illinois in philosophy, pursued his education at the University of Chicago and Harvard. In 1947, he shifted his attention to an unquestionably innovative field: the commercial use of computers, their use in industry, and the relationship between computer operators and computer users. He moved to California, where he worked first for the Garrett Corporation and then as a consultant for the Prudential Insurance Co. at the Rand Corporation, where he had the opportunity to work with the first generation of IBM computers and study the issues associated with their

112 May 26, 1919 - September 1, 1985

use and the actions taken by their operators to keep them running.

His first experience with computer systems was with an IBM 702, and he quickly concluded that the operators of these cumbersome and costly installations were required to perform a large number of tasks, with two consequences: “1) The human operator cannot compete in speed with the machine in making routine decisions and in controlling the processing operations. 2) The human operator is more likely to make mistakes in carrying out routine instructions.”[113]

113 Proceedings of the WESTERN JOINT COMPUTER CONFERENCE, February 7-9, 1956, San Francisco, California



65: A photo of Bruse Moncreiff which appeared in the New York-based bi-weekly news magazine, The Reporter. In the December 14, 1967, edition, IBM bought a two-page advertising space to announce the company’s commitment to student education, choosing Moncreiff as its public face. The headline read: “This philosopher wants tomorrow’s students to get the best teaching possible - with or without computers. What’s he doing at IBM?”

According to Moncreiff, the machines had great potential and could be utilized in areas typically regarded as the exclusive domain of humans, such as machine maintenance. On this basis, he drafted a document in which he considered and examined the possibility of automating the IBM 702 system's supervision, culminating in the creation of a 378-block algorithm. In conclusion, he determined that it would be the subject of his investigation for the next decade. "The activities of a computer operator can be classified as (1) those things which he does when the machine is working well, and (2) those things which he does when the machine is working poorly. The supervisory routine described is intended to be an aid to and substitute for the activities of only the former class."[114]

Moncreiff's education ultimately led him to IBM. In 1957, he joined its San Jose, California, Advanced Systems Development Division. Here, he began a highly productive collaboration with Wolfgang Kuhn,[115] a music and education professor at Stanford University. Together with Kuhn and Jerome D. Harr, Moncreiff began developing software capable of analyzing students' vocal exercises, indicating their sex ("low" for males and "high" for females), and calculating the deviation from the perfect note, with values spanning from 4 to 1 percent. The program analyzed the students' singing, eventually prompting them to repeat the exercise or progress on to the next, after which it generated a comprehensive report of the exercise's results. Professor Kuhn asserted that the system was extremely reliable; out of 10,000 evaluations, only one incorrect output was returned.

Kuhn advocated the Suzuki method of music instruction, which is based on listening, imitation, and repetition. In the final report, it was stated that: "Prof. Kuhn, who used a small Music Department allocation for his study, foresees the day when a complete curricula in melodic, rhythmic and harmonic sight-singing and dictation could be computerized and adapted for any level of

114 Moncreiff, Bruse. (1956). An Automatic Supervisor for the IBM 702

115 April 12 ,1914 (Leipzig) – March 10, 2003 (Stanford): After emigrating with his family from Germany to America, he enrolled at the University of Illinois, graduating in 1936 with a degree in music, a master's in 1943 and a doctorate in music education in 1953. In 1958 he joined the Stanford faculty - here he oversaw graduate programs in music education at both the School of Education and the Department of Music. Later he collaborated with Paul Lorton, Jr, in the development of the MusicMaster computer software. Released in 1982, it used an Apple II-Plus to help students learn to play by ear.

66: Noble Gividen, right, and Richard L. Wing, with the Ford Foundation's $25,000 check to the BOCES in Westchester County. The money was used for the CAI project which resulted in The Sumerian Game. The photograph appeared in the February 7, 1963, edition of the Patent Trader.

musical development. He also envisions instructional systems for learning to play instruments."[116]

After his positive experience with Kuhn, Moncreiff continued his research to broaden the purview of computer-based instruction, while other researchers were already attempting to identify the most effective system for integrating new technologies into education. Moncreiff was promptly notified when the superintendent of the Westchester County school district in New York inquired with IBM about the possibility of initiating a study project on the use of computers in education.

This superintendent's name was Noble Gividen,[117] and he was well aware of how the education system varied throughout his school district. Students in urban areas had access to better services, whereas the situation in rural areas was already concerning. Children in poorer areas were crowded into small schools with fewer teachers, not all of whom were fully qualified. Due to a lack of personnel and adequate facilities, it was sometimes necessary to teach students of diverse ages in the same classroom. To ameliorate the circumstance, Gividen required additional resources and comprehensive reform. He hoped that information technology would assist in saving the educational system.

Gividen had IBM in his crosshairs. In the 1960s, it was renowned worldwide

116 Research and Development in the Computer and Information Sciences. NBS monograph 113, Vol 2. Processing, Storage, and Output Requirements in Information-Processing Systems A Selective Literature Review

117 February 9, 1919 - June 1, 1999: A WWII veteran, Gividen devoted his whole life to teaching. In the 1970s he moved first to Florida, then to Arkansas, where he remained active as a school counselor until his death in 1999.

67: During the War of Independence, the countryside around Westchester County was the scene of a long and exhausting guerrilla war between the Patriot and Loyalist armies. The territories that suffered the most damage were called "Neutral Zones", a no-man's land in which both armies foraged for supplies by plundering local resources. On a day dedicated to historical research and geographical pinpointing of the places mentioned in George Washington's memoirs and his correspondence with Comte de Rochambeau, Mabel Addis was photographed for the New Castle Tribune, in the October 1, 1959, edition. From left to right: Laura Bump, Mary Andrews, Richard Lucid, historian and member of the Post American Legion, and Mabel Addis.


HISTORICAL HALL

for its computer systems, and its name became synonymous with computers. Its corporate headquarters were located in Armonk, Westchester County. Gividen intended to involve IBM in a project that would help his students study more effectively and eliminate some of the disparities he had discovered in his district. He was unaware, but his timing was impeccable: Gividen contacted IBM's Armonk branch, and Moncreiff was brought back from California.

Midway through 1962, the Board of Cooperative Educational Services (BOCES) of Westchester County and the IBM Advanced Systems Development Division of Yorktown Heights, New York, established their first formal contacts. During a two-day seminar titled Simulated Environment held at IBM's Thomas A. Watson Research Laboratory in June 1962, it was decided to create a summer workshop in which BOCES delegates, IBM's ASDD team, and ten teachers from the Northern Westchester district would come together to lay the groundwork for Gividen's project.

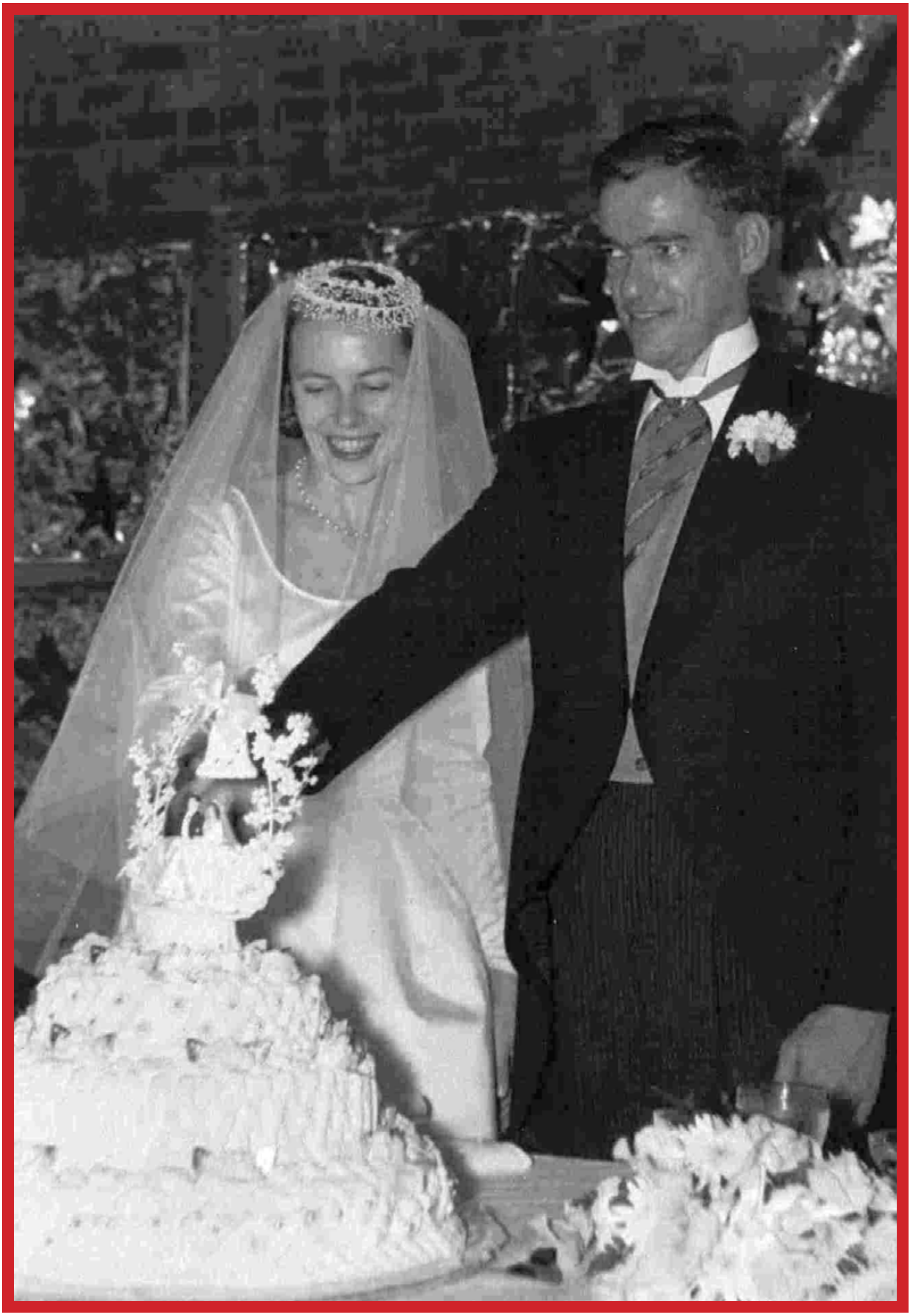
The IBM team consisted of Bruse Moncreiff, James Dinnen, and William McKay,[118] while Richard Lawrence Wing[119] was selected to represent BOCES and oversee the initiative.

Born in New Bedford, Massachusetts, on July 11, 1918, Wing attended Harvard, where he earned bachelor's and doctoral degrees in comparative education. After completing his studies, he entered the military and served in both World War II and Korea. After the two wars, he returned to the United States, where he met his future wife, Marcia Crichton, and where his daughter Debbie was born. Wing, an avid traveller with a strong passion for teaching, never remained in one place for very long. In the second half of the

118 October 9, 1927 (Philadelphia) - March 7, 2012 (Tolland)

119 July 11, 1918 (New Bedford) - March 6, 2013 (West Yarmouth)

68: William McKay and his wife Gertrude Tierney McKay on their wedding day, January 2, 1960, at St. John the Baptist Catholic Church, in Newark. A WWII veteran, McKay continued his studies at the end of the war, graduating from Drexel University with a bachelor's degree in electrical engineering and a master's in mathematics from the University of Pennsylvania. He worked at the Franklin Institute of Technology and then at IBM, where he remained until his retirement. Once retired, he devoted himself to teaching and collaborating with the Tolland Public Library.



1950s, he returned to Europe for the first time since the end of World War II. He spent two years in the Netherlands, observing the Dutch education system, before working as a school consultant in Paris, France.

Wing collaborated with William H. Burton[120] and Roland Kimball on an important study titled "Education for Efficient Thinking: An Introductory Text" during his business travels and as a result of his familiarity with diverse school systems. The purpose of the text was not to improve the reader's way of thinking but to assist instructors and educators. The authors attempted to give a response to the question, "Can we teach anyone how to think?" They then clarified: "We can aid individuals to improve the natural abilities they possess and the natural processes which they use. We can aid individuals to recognize and be sensitive to certain conventions and processes of valid thought, to certain pitfalls, fallacies, and sources of error. Certain general methods can be developed by teachers. We have made an earnest effort in this volume to set forth the outlines of these general methods of teaching."[121]

Back in the United States, he relocated to New York and joined BOCES. The subject of education was particularly important to Wing, and he obtained the position of curriculum research coordinator in 1962, just before Gividen's initiative began, as a result of his experience and studies. When he was tasked with supervising the IBM collaboration, he was designated as an impartial observer tasked with compiling and evaluating data for a detailed report to BOCES and intervening as needed to improve outcomes. He was the one who worke.

During the summer workshop conducted between July and August of 1962, the working groups developed a preliminary outline of potential study units. These were subjects for which audio-visual teaching materials could be prepared rapidly or were already available; software would be developed later. It was presumed that the 11- to 12-year-old sixth-grade students who participated in the project had adequate reading, writing, and mathematical skills.

The initial proposal included eight speculative projects spanning from mathematics to music. Before formal submission to the United States Office

120 1890 -1964: Professor in education at Harvard.

121 Burton, William H; Kimball, Roland B.; Wing, Richard L. (1960). Education for effective thinking; an introductory text

of Education for approval and budgetary allocation, the initiative was reduced to a single teaching unit. When deciding which project to retain, economic games were chosen, and among all possible economic games, it was decided to construct one set in Mesopotamia during the time of the Sumerian city-states. It was not a mere coincidence.

Moncreiff: “The idea of constructing a computer model of the ancient Sumerian civilization which could be used for teaching basic economics drew its inspiration from many sources: Rousseau’s Emile; Dewey’s emphasis on the problematic situation; a paper entitled ‘Teaching through Participation in Micro-Simulations of Social Organizations’ by Richard L. Meier delivered at the AAAAS meeting in 1961; the first chapter of Harrison Brown’s The Challenge of the Future, in which he discusses the origin of civilization in the Near East river valleys; a luncheon conversation with sociologist James Coleman of The Johns Hopkins University; and finally a PTA meeting at which the fourth-grade social studies curriculum was discussed.”

Despite the increasing recognition of their significance by the academic community, the study of pre-classical civilizations was virtually omitted from American curricula, according to Wing. This prompted Moncreiff to focus on the Sumerian setting.

Moncreiff disclosed the submission in an interview published in the Patent Trader on December 30, 1962. Seven years earlier, when he worked on the supervised algorithm for the IBM 702, he had a similar objective in mind for his project: “The teacher is, after all, only an audio-visual device with blood in the veins, into which various information has been programmed. She simply repeats it to the pupil. This is the process we could automate. Then the teacher’s role should be as a guidance specialist, to decide what particular phases of a subject the student should study, and to relate these subjects to others.”[122]

Not everyone received the announcement with enthusiasm. One youthful educator, Nancy Malawista, criticized Moncreiff’s stance in a letter to the Patent Trader. The letter was published in its entirety in an editorial titled “Young Teacher Upholds Importance Of Personal Unprogrammed

122 Patent Trader, December 30, 1962. Machine Teaching. BOCES asks $96.000 for ‘Simulation’ study

'Dialogue'",[123] to which the philosopher replied the following week: "What I intended to communicate was that one of the many tasks of a teacher is the lecturing function and, if this aspect of the teacher's role could be successfully separated from other functions, there is a real possibility that it could be automated. This would benefit both the teacher and the pupil since it would free the instructor to devote more time to other crucial aspects of the student-teacher relationship."[124]

Several weeks later, the response from the United States Office of Education arrived: they were given the go-ahead. A total of $104,000 in funding has been allocated. The estimated eighteen-month-long project could finally commence.

One of the teachers present at the summer workshop was especially enthusiastic about Moncreiff's suggestion to situate the economic simulation game in Sumerian times. Her name was Mabel Addis.[125]

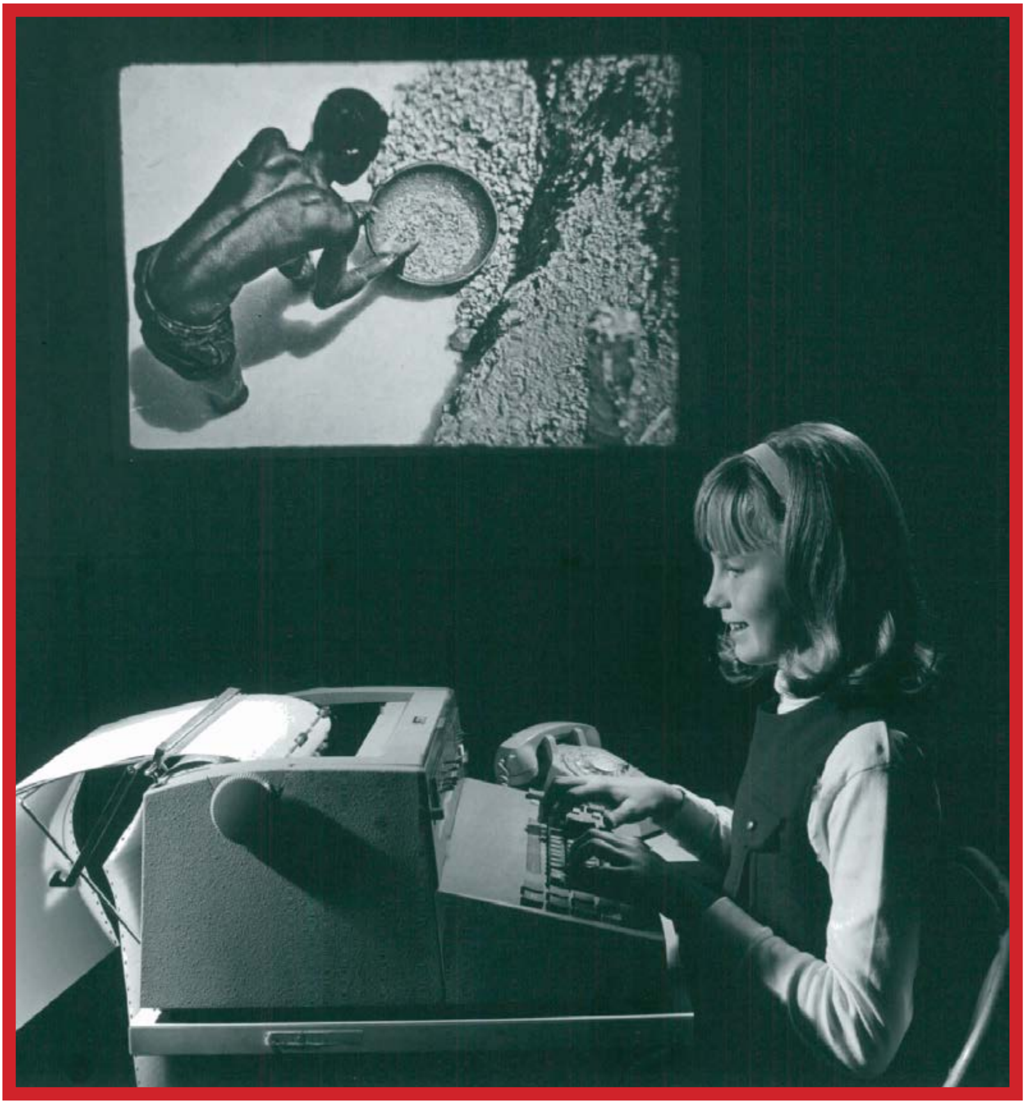
Addis, who was born Mabel Holmes, was the daughter of James P. Holmes, a veteran of the 1898 Spanish-American War and former member of the 71st New York Volunteer Battalion, and Mabel Amelia Holmes, his wife. In Mt. Vernon, New York, where his daughter Mabel was born on May 21, 1912, Holmes was employed in the construction materials trade after leaving the

123 Patent Trader, January 6, 1963. Young Teacher Upholds Importance Of Personal Unprogrammed 'Dialogue'

124 Patent Trader, January 17, 1963. Automation In Teaching - Goal Clarified

125 May 21, 1912 (Mt. Vernon) - August 13, 2004 (Purdys): Mabel Addis Mergardt was passionate about teaching and history. She retired from teaching in 1976 but continued her research and writing activities with the Somers Historical Society. Widowed in 1981, she married fellow teacher, Gerard Mergardt in 1991, taking his last name.

69: Image from the IBM archives, created for promotional purposes, which appeared in the February 15, 1968, issue of the Newspaper Enterprise Association. Notice the IBM 1050 teleprinter with telephone and, in the background, a historically themed image projected on the wall. Of the original material, only 39 slides and some printouts remain, kept by Mabel Addis Mergardt and, subsequently, by her daughter Alexandra Johnson, and recovered thanks to the work of David Monnens and donated to The Strong.



This device is not among those saved, so there is no certainty that it was actually one of those created to accompany the audio lesson. A series of shots were taken for the occasion, of which at least a second photo survived, published in the Computer and Automation magazine. The caption reads: "The front cover shows sixth grader Joanne Chomich trying her hand at running the ancient Mesopotamian city-state of Lagash with the aid of a computer. Projected on the wall is an artist's conception of what Lagash looked like in its heyday, about 3500 B.C."

army in 1911 with the rank of first lieutenant. In 1922, the family relocated to the rural, small village of Brewster, where they became very involved in the local community. Everyone in the family played a musical instrument, except for James, who remained very attached to the military and his former comrades. His wife and daughter played the piano, while his son Alden, a carpenter, played the violin.

Mabel began to demonstrate an interest in music, theatre, and history while she was still an adolescent. She won numerous spelling competitions and was nominated for the first pianist slot at the Brewster Grunge, which caused her name to appear frequently in the Brewster Herald, the local newspaper. She had the honour of delivering the valedictorian address at the Brewster High School commencement ceremony when she was seventeen years old. Mabel selected the two options that were nearest to her heart: history, one of her greatest passions, and teaching. She subsequently devoted her entire existence and all of her energy to teaching history.

She continued her studies in history and psychology and earned a master's degree in education from Teachers College, Columbia University, New York, after graduating from Barnard College. Regardless of her academic accomplishments, her first teaching position was in a one-room school in Duanesburg, where she taught pupils of varying ages. In 1937, she transferred to the Mt. Kisco Hyatt Avenue Elementary School, where she remained for eight years. In 1950, the school was annexed by the Bedford Central School District, and Mabel Holmes—who had married Alexander Lobdell Addis and assumed the name Mabel H. Addis—joined the Katonah-Lewisboro School District, where she remained until her retirement.

Here, her life became unexpectedly intertwined with the annals of video games for several years. Alexandra Johnson, her daughter, said: "[When] I graduated from high school and because college expenses would be high, my mother took a summer job at the Board of Cooperative Educational Services (BOCES). She was a fourth-grade teacher at Katonah Elementary School."

Addis shared similarities with both Moncreiff and Wing, making him the ideal person to serve as a liaison between them. She, like Wing, was motivated by a passion for teaching and a desire to educate her students with the most effective method. According to Addis, the most effective method for retaining her students' interest was to provide interactive activities that turned learning into a game. She allowed room in her lessons for students to reenact specific events and depict scenes from the daily lives of people from different eras. These activities were so numerous and varied that they frequently appeared in the Brewster Herald alongside photographs of young students costumed as Greek warriors or enjoying a café in Paris. Addis shared an interest in Mesopotamian history with Moncreiff; at Barnard College, she was a member of the Classic Club and majored in ancient history.

Therefore, she was entrusted with creating an economic simulation game set in ancient Sumer. From a historical standpoint, she was well-prepared; however, it was her first time participating in such an endeavour from an economic standpoint.

Johnson: "I imagine she chose to write the game about Sumer because she majored in Ancient history at Barnard College in New York City. The economics part she wasn't so sure about. That summer she brought home stacks of books to study all she could on the subject."

Thanks to the funding it received, the 1948 project finally began.

The primary concern of the IBM philosopher was that the teaching unit was founded on the most accurate information available at the time and that the game's mechanics were consistent with the historical period. Moncreiff: "The major problem facing the investigators was to refrain from importing market structures and price mechanisms into the model of the Sumerian economy. [...] There must also be a model which includes the functional relationships between the major economic and social variables."

Following these guidelines, Addis developed an economic simulation game in which the player assumed the role of the monarch of the Sumerian city-state Lagash and was required to make strategic decisions regarding the use of available resources on a seasonal basis. The game was divided into three segments: in the first, the player, in the role of Luduga I, struggled with the game's fundamental mechanics, while in the second and third, his descendants, Luduga II and Luduga III, encountered increasingly difficult challenges.

On paper, Addis's game, which she had written and prepared herself, was a hybrid of a quiz, a strategy game, and a narrative game. Before using the IBM 1050 teleprinter, the pupil was accompanied by a teacher to a room where they were instructed in Sumerian history and economics. While sixty-five slides containing photographs, archaeological discoveries, and illustrations of ancient Mesopotamian daily life were projected onto a wall, an audio lesson was played that explained the concepts necessary for the course's practical portion.

Finally, after the lecture, the student was granted access to the teleprinter. At the side of the instructor, whose primary responsibility was to assist the student in interacting with the computer, they were instructed to read the printed text and respond to the questions using the keyboard.

"Hello! Before we begin, will you please type your name first name first, then your last name, and then press the Return key.

Now, Scott, you are ready to operate the Sumerian Economic Model.

Imagine that you have just been made ruler of Lagash, a city-state of Sumer, in the year 3500 B.C. Twice yearly your Royal Steward, Urbaba, will report to you the economic condition of the kingdom. Guided by these reports, you will decide the use of the grain and other resources, trying to keep your population stable and well fed. Between reports, your court advisor will come to you with news of your Kingdom. The Steward will use the typewriter to report and ask for your decisions. When the "Proceed" light comes on, type your answer in figures and press "Return". (If you make a mistake, press "Cancel" instead and try again). Good luck!"

The initial level of the game was the simplest. The player had an initial supply of grain (estimated at 13,900 bushels) and had to determine how to allocate it: setting aside one portion as arable for 600 acres of cultivated land, another portion as food for 500 people, and the remaining portion for storage for future seasons.

Due to the lack of specific initial information, the student was required to enter random quantities, with only an automatic warning and confirmation request if the amount of grain set aside as sustenance was insufficient. In the meantime, the system calculated the season's outcome and printed it out

70: Richard L. Wing, with his granddaughter, Emma, in 1990 when he was seventy-two. After completing the BOCES projects, Wing took a sabbatical and returned to Europe. From 1968 -1971 he was in Germany, where he worked in the Central Directorate for Education of the USDESEA (United States Dependent Schools, European Area). He later returned to the United States, resuming his work for BOCES. In the mid-1980s he retired and moved to Sandwich, Mass (Cape Cod) where, for some time, he continued to write documentation for BOCES. He passed away in 2013, just six weeks after his wife. (Copyright Debbie Wing)

before proceeding to the next phase. The computer system calculated the new harvest and set limits on the impact of food given to the population, increasing it if the quantity of grain per capita was sufficient and decreasing it if it was insufficient. After calculating how much of the player's stored grain had been lost due to rot or rodents and applying additional modifiers where necessary, such as natural disasters (floods, fire, locust infestations), a new budget was presented to the player.

The game concluded after a predetermined number of rounds or when the population reached zero. In the first scenario, the player advanced to the next segment; in the second, the teleprinter displayed a message: "Your population has decreased to zero. Do not go on. Call the teacher."

The subsequent sections were much more intricate. The successor to King Luduga I is his son, Luduga II, who faces new challenges. He must decide how to allocate labour and how much of the grain surplus to invest in new technologies, counting on improved harvests or less severe adverse events. This segment consisted of only ten rounds and omitted the grain management and planting elements of the previous segment.

In the third segment, which introduced Luduga III, the student-player was presented with even more complex options: as the new sovereign, he could invest in new roads, canals, and schools, as well as trade surplus food for wood and other construction materials. The city's productivity increased, and its administration grew more intricate. To defend the city against external assaults, a portion of its resources had to be diverted to military purposes. In this segment, the player had complete control over all variables, including grain, cultivation, workforce, technology, and city amenities.

Each part of the game and each choice were described in great detail to help the player identify with the role he was being asked to play, almost as if he were in a role-playing game. "Imagine that you have just been made Ruler of Lagash, a City-State of Sumer, in the year 3500 B.C."

The student would be asked closed-ended questions between rounds to determine if they comprehended the game's rules. If they answered accurately, the computer would provide positive reinforcement. "Luduga, I am seeking more information. If you want your population to increase, should you 1- Feed them more grain, 2- Feed them less grain? Yes, Luduga, you must feed the people more grain."

William McKay wrote the program using a Fortran Assembly Program (FAP) for an IBM 7090 based on the texts and mechanisms devised by Mabel. Due to the intricacy of the game and the volume of text, the entire program required 15,000 lines of code and occupied 37,000 memory spaces in the Time Sharing Monitor system, while the school's terminal was connected to the mainframe via an AT&T Dataphone modem.

Since the beginning of Project 2841 two years ago, the Sumerian Game has been programmed, tested, and modified at least twice. Some of the students had experienced difficulty with the first version, which was wordier, more complex, and too protracted. As the project manager, Wing decided to modify the game slightly by optimizing the output, simplifying some of the mechanics, and shortening the first segment of the game to thirty rounds.

In addition to the Sumerian Game, the Sierra Leone Game and the Free Enterprise Game were created and tested. Jimmer Leonard,[126] a student in the Department of Sociology at Johns Hopkins University, programmed the game with Autocoder on an IBM 1401 and also re-programmed the first segment of The Sumerian Game in Autocoder for the same computer.

Debbie Wing, daughter of Richard Wing: "I went to his office frequently and had met some of the players mentioned in the Wikipedia article (Bruse Moncreiff, Mabel Addis, Nobel Gividen, and especially Jimmer Leonard), and partly because I was one of the first kids to test it! There's no way of knowing which iteration of the game that would have been, but in 1964 I was 10 and was in 6th grade. I do know that I was at the BOCES office in Westchester when I played the Sumerian Game, not in a classroom, so it might have been an early form of the game. I also remember that I wasn't such a clever ruler and everyone in my kingdom died! I also think

126 October 30, 1942 - August 7, 1999: A student at the time, nearing the end of his academic studies, Jimmer Leonard became an important member of the BOCES working group, involved in the programming of the IBM 1401 of the Sumerian Game and Walter Goodman's Sierra Leone Game. He subsequently designed and programmed The Free Enterprise Game. This set of three games was produced in 1967 and appeared in Wing's final report. When the collaboration with IBM ended, Jimmer, who succeeded Noble Gividen as head of the BOCES in Westchester, continued to work alone, studying the use of learning games, focusing on the application of CAI for disabled students, programming the Surfboard Game, in which the player was involved in the production of surfboards, and tasked with managing a workforce and deciding the retail price. According to Debbie Wing, "He was [...] a family friend. [...] My dad said he was the most brilliant guy he knew. [...] I do remember that he seemed to think of my father as a mentor and that he was very kind to me."

I played the Sierra Leone game, too."

Leonard's contributions were not insignificant. The IBM 7090 was extremely expensive to rent, while the IBM 1401 was at least thirty times less expensive: $2,500 per month. In his final report at the conclusion of Project 2841, Wing could not help but mention that in the three years between the start of 1948 and the conclusion of Project 2841, the cost per pupil had decreased dramatically, reaching $1-3 per hour, depending on the complexity of the program. The IBM 1041 had made significant contributions, but other factors were on the horizon: the CPU's power was steadily increasing, new programming tools made it simpler to create software, and storage was becoming more cost-effective. Professor Wing drew some important and precise conclusions in his report's conclusion: with computer games, students learned the subject with roughly the same precision as with traditional courses, but they did so twice as quickly and with greater concentration, possibly due to their fascination with these new machines.

On the other hand, only the brightest students learned faster through play, whereas the others, even if they picked up the skills rapidly like the control group, appeared to lose them faster. The cost was still extremely high, Wing reflected, and this was the greatest obstacle. The professor was aware that costs would ultimately decline, but he could not have predicted how quickly.

The funds for continuing the study of computer games run out at the end of 1967. Westchester BOCES continued to demonstrate the game at its offices and also made it available for sale: at least one school in the Philadelphia area used it in their curriculum. Moncreiff continued his studies at CAI, but IBM no longer participated in comparable initiatives. Professor Wing took a sabbatical and returned to Europe, to Germany, where he worked for the United States Dependent Schools, European Area (USDSEA) central educational directorate. Mabel Addis was an educator until 1976.

Despite IBM's lack of interest, the Sumerian Game story continued. As was the case elsewhere, word-of-mouth caused other institutes to learn about the project and, in the absence of IBM's original source code, which was subsequently lost forever, to begin programming alternative versions from beginning on different machines. This was the case at the University of Calgary in Canada, for instance.

Professor Herbert J. Hallworth stated in his report: "Using FOCAL, we have already written several programs to give drill in arithmetic. We have also written a version of the Sumerian game devised by IBM and the Westchester School Board at Yorktown Heights. In each case, the writing of the programs was remarkably easy for a person with some previous experience in programming. However, there are limitations. FOCAL as presently available allows too small a memory for each student, particularly when it is necessary to print out messages on the teletype. Also, it is somewhat difficult to devise tutorial type programs in this language since it is difficult to deal with the

71: Santa Paravia en Fiumaccio, in the TRS-80 version from 1978. Here we see the turn of Player 1, who controls Santa Paravia and has reached the status of Grand Duke. In the bottom right-hand corner, we see the city-state of Santa Paravia, with its perimeter walls, castle and all the buildings already built or being expanded. The game starts in the 1400s, so forty simulated years have already passed. The game is in its final stages and will end four turns later. (Source: YouTube canale vghchannel) input of words from a teletype."[127]

The laboratory at the University of Calgary was equipped with a time-sharing system based on DEC's PDP-8, a $18,000 minicomputer with 4KB of RAM and a Formulating On-Line Calculations in Algebraic Language (FOCAL) interpreter. FOCAL was a programming language created by Richard Merrill for the PDP-8 that was intended to conserve memory and therefore operate on platforms with fewer KB available. Merrill relied on another programming language, JOSS, which he had modified by simplifying the parser (the portion of the code that interprets the strings of user-entered commands) and removing a large number of features to reduce memory usage. As a result of Merrill's simplification, commands (IF, TYPE, GOTO, etc.) were reduced to a single character, the initial character. FOCAL was designed for scientific productions and had a very complex structure, or "spaghetti code" in pejorative programmer parlance, when one piece of code becomes entangled with another, rendering it illegible to those who did not write it.

The primary objective of the first segment of the Sumerian Game was to have students predict which mathematical formulas were adopted by the computer to arrive at the harvest results for each season. Using a trial-and-error system, the player had to determine the optimal grain-per-inhabitant or grain-per-acre ratio with minimal assistance from the computer, which alerted them when food became scarce. The revised version at the University of Calgary lab served a similar purpose and was used to teach algebra to students. The FOCAL version of the Sumerian Game, like the original, would have been completely forgotten if not for a series of fortuitous events.

In 1969, the University of Calgary invited Douglas Dyment, Software Manager of DEC Canada and responsible for all DEC software developed in Canada, to a conference. After the meeting, Dyment had the opportunity to speak with a student who mentioned the existence of a Sumerian-era simulation game. Dyment, unaware that the program had already been written in FOCAL, determined that such a straightforward game would be ideal for demonstrating the capabilities of DEC's new computer.

Dyment: "DEC was trying to show people the power of the language, which was well suited for the extremely small (4K) memory of the PDP-8 computer on which it ran. So I set about to write a program that would demonstrate

127 ERIC ED033575: A Computer System for a Faculty of Education (1969)

what was possible."

After a week of programming, the programmer completed his version of the Sumerian Game, which he dubbed King of Sumeria. Since it was written to save every byte, the code was difficult to comprehend and vastly different from the narrative version created by Mabel Addis. The output text was minimal, and rather than a lengthy introduction, the program hailed the player with a laconic:

"Hamurabi."[128]

Its text was minimal, but the game's mechanics were similar to those of the first segment of the Sumerian Game. The game cycle was nearly identical to the original: allocate grain for human consumption and arable, purchase fields for cultivation or storage in subsequent seasons, generate natural disasters, calculate harvests per capita, and then repeat. The only significant difference was the change of the steward's name to Hamurabi, a name similar to that of the king of Babylon, but without the letter m, a choice that would later give rise to further misunderstandings.

Once the code was complete, Dyment sent it along with other programs for publication in a DEC manual titled "Demonstration Program 1970 Focal-8". Curiously, the error in the monarch's name was repeated in the accompanying text, which described Dyment's invention as "a fun game in which the player attempts to predict his consumer market."

Later, The Sumer Game was also published in the DECUS collections, in the Focal 8–5 edition, under a different title. Several PDP-8 users, following a well-established pattern, purchased the magazine and, after entering the program, were so impressed by the game that they began working on enhancements and variations. The version written in Belgium by J.F. Champarnaud and F.H. Bostem, which was sent to DECUS and published in the FOCAL 8-186 issue under the name Sumer (French), was among the first of these translations. Curiously, it was introduced as "the French version of Hamurabi (The Sumerian Game)", which only added to the confusion surrounding the titles.

128 Dyment: "You will find it extremely difficult (if not impossible) to decipher the code. The whole point was to squeeze as much functionality into a 4K computer as possible, and I used every short cut and programming trick I could think of to do so ... legibility be damned. The final program, as listed, was the largest piece of FOCAL-8 code that could fit in a 4K machine: there was literally not room for a single extra character (if there had been, I would likely have found some way to add functionality (like give "Hamurabi" another "m")!"

David H. Ahl decided to include Dyment's game from the original version in his 1973 book, 101 Basic Computer Games, under the title HMRAB. Ahl made the same error as Dyment in his introduction, identifying Hamurabi as the Sumerian sovereign. In addition, he stated that the program's author, who had been at DEC for several years, was unknown.

Except for a peculiar addition at the end of the game, Ahl's implementation of Hamurabi in Basic was remarkably faithful to Dyment's King of Sumeria. Ahl changed this; based on the player's performance, the game ended with a message comparing their skills to those of other historical leaders, such as Benjamin Disraeli or Thomas Jefferson, if the player was successful, or Nero or Ivan the Terrible, if his performance did not meet the challenge. Not until several decades later, with Sid Meier's Civilization, was this dynamic repeated.

With the publication of Ahl's book and the conversion of Dyment's game to Basic, the Sumerian Game's mechanics gained widespread popularity. Focal's code was more difficult to read, interpret, and comprehend than Ahl's code. As a result, a large number of programmers and aspiring game developers began to modify Ahl's code or study it for inspiration, spawning a vast number of Hamurabi clones. The price of central processing units (CPUs) continued to fall, making computers affordable for families, as predicted by Richard L. Wing.

The game that Ahl ported to Basic, which is now renowned worldwide, has influenced an entire generation of programmers and future video game designers. Many added features to their versions of Hamurabi, which led to the creation of Lee Scheider and Todd Voros' Kingdom, which eventually evolved into Vince Talbot's Dukedom. Others programmed the game, albeit with minor modifications, so that it could be played on other systems using various programming languages, such as the Hamurabi version in JavaScript and the iPhone version by Alessandro Benedettini.

However, one of the most intriguing developments was George Blank's Santa Paravia en Fiumaccio.

His interest in electronics, computer science, and programming arose by accident, beginning with the most basic equipment and growing into a

72: George Blank during his trip to Italy, where he visited Brescello, the setting for Guareschi's Don Camillo novels. Here we see him in the town's main square, giving a high-five to the statue of Don Camillo. (Copyright George Blank)

passion that lead him to expand the scope of his studies.

Blank: "I was a Presbyterian Minister, pastor of a small church outside Pittsburgh, Pennsylvania. As a young pastor, I was on minimum salary, and Citizens Band radio was popular at the time. I originally was thinking about making extra money repairing and installing radios. So I took radio courses from Heathkit to start with. I did manage to get an FCC Second Class license that gave me the legal ability to repair radios, but developed an interest in electronics with the radio courses, continuing on with a course in Digital Techniques, which taught circuit design, and then Microprocessor Techniques."

Blank had begun studying programming on a computer device, the Heathkit Microprocessor Trainer, as had many others before him. Based on the Motorola 6800, this was an inexpensive, rudimentary piece of equipment with a hexadecimal keypad and a 6-digit LED display. The base model's memory was 256 bytes, and Blank paid an additional $5 to expand it to 512 bytes, or 4096 bits, which was still inadequate for any programming language.

Blank: "You had to program in [...] machine code, typing it in in Hexadecimal. I remember when I first saw an Assembly Language, I thought it was a wonderful improvement. Hex programming was a great way to learn how to think mathematically, which is the basis for computer programming."

In 1977, the first commercial microcomputers that were reasonably priced were introduced, and Blank decided to purchase one immediately. The Apple II appeared to have the most potential among those on the market due to its graphic and audio capabilities, which the others lacked. However, it was still too costly for the young pastor's budget, so he opted for the cheaper TRS-80 instead, purchasing serial number 7080 of the first TRS-80s on the market.

With significantly more RAM than his previous single-board computer, the TRS-80 contained Level 1 Basic in ROM. Blank had to first learn how this programming language worked because he was unfamiliar with it. He began by reviewing the work of other programmers, poring over the code published in periodicals, typing it out, and analyzing its functionality.

Blank: "Shortly after I bought one of the first TRS 80 computers, I started typing in games in Basic. David Ahl's book was one of the first that I bought. [...] I then decided to try to write some of my own games."

Blank's first commercial work, Nine Activities for Preschool Children,[129] was based on the activities he created for his children and was sold to Instant Software, a subsidiary of Wayne Green's Kilobaud Microcomputing magazine. Kilobaud Microcomputing was one of the first publications devoted to computer science, written for an audience with intermediate skills and complete with practical information, such as lists and operational advice, distinguishing it from the more well-known Byte magazine, also published by Green, whose articles were typically more complex and technical. Both publications were generic and unrelated to any particular platform.

Due primarily to the incompatibility of the most popular microcomputers and the presence of numerous Basic dialects, the public has shown a growing interest in specialized visits to individual platforms, where they can find useful information specific to their computer, practical advice, and software that does not require conversion operations to be compatible. This trend resulted in the establishment of SoftSide magazine for TRS-80 users in late 1978. George Blank was one of its first consumers.

The burgeoning microcomputer software market had a growing user base capable of generating significant economic interest, but the first software distribution networks were largely regional and frequently linked to individual computer stores or computer expos. As most entrepreneurial programmers used software magazines to advertise and sell by mail order, SoftSide allowed them to sell their software through TRS-80 Software Exchange,[130] a publisher linked to the magazine.

In the very first issue of SoftSide, published in October 1978, there was a lengthy list of software available for mail order. Small utility programs for specific operations, such as an electronic cash register, an accounting program, and diversions, were available in nearly equal proportions. These games included the inevitable Star Trek clones as well as the electronic versions of popular games such as Blackjack, Tic-Tac-Toe, and Reversi.

129 These were simple games in which the fun was marginal compared to the educational, which was its primary importance. Since the introduction of the 1980 RamWare edition manual: "Until they go to school, children think that learning Is fun, not work. Is this the reason they learn more quickly In the early years? Play Is natural learning. And, learning is great play!"

130 Later renamed The Software Exchange after a legal dispute with Tandy over the use of the name TRS-80.

Lance Micklus, the future programmer of the interactive fiction Dog Star Adventure[131], was unquestionably the standout of the first series of games, which included five titles.

Blank was further inspired by SoftSide's numerous listings that could be typed into a computer and studied at home, as well as his growing belief that game programming could be a source of income, as he had been rewriting one of the games included in Ahl's book, expanding its gameplay, and maximizing the capabilities of his computer.

Blank: "The ancestor of Santa Paravia was Hammurabi, [...] published in David Ahl's 101 Basic Computer Games. [...] Eventually you won by keeping a balance. [...] All text, no graphics. I thought it would be fun to take that idea and turn it into a graphical war game."

The TRS-80 lacked graphic capabilities, and Blank was studying Basic. Midway through 1978, Tanya began marketing Level II Basic ROMs, the basic dialect written by Microsoft for the TRS-80 that was more efficient than Level I (written by Steve Leininger), thereby increasing its popularity. Blank converted to the new Level II Basic for his program, taking advantage of the 16K of RAM available on his system, which was significantly more than the 4K required for the entry-level.

The gameplay was based on a turn-based system with limited resources, seasonal cycles of sowing and harvesting, and surplus to be stored or destined for technological advancements (features present in segments II and III of the Sumerian Game but absent from the Dyment game). In the numerous versions he worked on before he was satisfied that the product was ready for release, Blank added several other features and mechanisms, some of which were very similar to those created by the team of Moncreiff, Wing, and Addis, while others were entirely original.

In addition, Blank designed the game to be multiplayer from the beginning. Blank: "Since I had 4 and 6 year old sons at the time, I started writing games for them to play. Since there were two of them, I wrote the games so that they could alternate playing."

It was the traditional multiplayer system, in which players took turns at the computer keyboard using a mechanism subsequently dubbed the "hot seat". In numerous multiplayer arcade games, such as Breakout, the competitive

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mode operated similarly, with players taking shifts at the controls and the final score determining the victor. On microcomputers, however, it remained a novelty, surpassing Starfleet Orion by several months. In addition, Blank envisioned up to six participants engaging in direct competition mechanics, as opposed to score-based competition.

At the beginning of the game, the user selected between one and six participants. The first, or lone player, controlled the city-state of Santa Paravia, while the other players controlled Fiumaccio, Torricella, Molinetto, Fontanile, and Romagna, all Italian in origin and selected by Blank due to his love for the author Giovanni Guareschi and, in particular, his Don Camillo novels. Consistent with the names, Blank relocated the game's location from the valleys of Mesopotamia to 15th-century Italy and changed the unit of measurement for resources from bushels of wheat to florins.

The players took turns making the decisions essential for the management of their respective kingdoms, passing the command to the next player in turn. In addition to buying grain, sowing crops, and feeding the populace, the players of Blank's program, Santa Paravia en Fiumaccio,[132] were given the following tasks: arming soldiers to protect their lands; deciding whether to respect law and order by being just and incorruptible; raising revenue through bribes; and finally, using funds to build or upgrade existing buildings to increase the city-state's wealth and productivity. Management of the military was of particular importance. It cost money to raise an army, as well as money for each soldier, but it protected against enemy assaults. In contrast, a small army made them vulnerable to invasion.

The Sumerian Game also featured infantry, but Blank's game, with its multi-player functionality, raised the bar. Any player with an army 2.5 times larger than their opponent had the right to invade, destroying a part of the crops, killing soldiers, and potentially damaging city structures. In the absence of a sufficiently powerful participant, whoever between turns had fewer than one soldier per 500 inhabitants was invaded by the formidable Baron Peppone of

132 When Blank's game first appeared, the October 1978 issue of SoftSide dedicated a long section to it, including an explanation of the gameplay and carefully annotated code. The article was called Santa Paravia en Fiumaccio. Under the same name it was then listed in the Software Exchange program for $7.95. In the game code, however, the name was written as Santa Paravia and Fiumaccio. In subsequent editions of Software and Keypunch, the game became definitively known as Santa Paravia and Fiumaccio.

Monterana, an additional homage to Guareschi.

Another great novelty of Santa Paravia en Fiumaccio was that, following the report at the beginning of each turn, the player was able to watch their city-state manifest on the screen. Since the TRS-80 lacked certain graphic capabilities, Blank resorted to a mode with medium resolution in which each word of the 64x16 text grid was divided into 2x3 blocks, achieving a maximum resolution of 128x48. Using both text and these large blocks, Blank had the TRS-80 draw a rudimentary side view of the city, with the walls proportionate to the cultivated farmland, the castle tower proportionate to the number of soldiers, and subsequent structures such as a market, a cathedral, a woollen mill, and a palace.

In October 1978, version 6.2 of Santa Paravia en Fiumaccio was released. As he had done with his collection of nine educational minigames, Blank contacted Wayne and requested that he publish the game with Instant Software. Blank, at the suggestion of Robert Robitaille, who had just left Instant Software to become editor of SoftSide, decided to place the game in the Software Exchange and publish it as the lead article in the next issue of the magazine because Wayne had taken too long to respond. Santa Paravia en Fiumaccio appeared on the cover of the SoftSide issue in December 1978. The magazine contained a lengthy article that occupied a significant portion of the publication and described the gameplay in great detail, followed by the complete code for the October 1978 version 6.2 of the game. The program was meticulously annotated and sectioned off.

The public thoroughly enjoyed Blank's contest. Impressed by the asynchronous multiplayer, the interactivity between players who could invade each other's territories, but most of all by the presence of the rudimentary graphic representation of the city-state (capable of quickly communicating some of the key features, such as the presence of particular buildings, the defence of the army, and the expansion of farmlands), the readers of the magazine wrote to the editorial staff to offer their congratulations. Those who did not wish to manually input the lengthy listings ordered the cassette version using the appropriate form.

After several months, Wayne ultimately responded to Blank, expressing interest in the game. The developer informed him that a gratis version of the software had been published in the magazine and was available for mail order. Wayne was so enthusiastic about the product that he still wanted to license it for his Instant Software, and he was especially eager to publish the game on the Apple II and Atari computers. The representation of the players' city-states in these versions, along with later ones for Commodore 64 and Atari S, contributed significantly to the game's widespread popularity.

In addition to being innovative in comparison to Hamurabi, Blank's numerous innovations were frequently just as original in comparison to the Sumerian Game, thanks to a generation of more versatile computers marketed to a growing audience of gamers eager for new experiences. Even the numerous players who had been playing Hamurabi for a long time found Santa Paravia to be innovative, as it featured numerous new and improved game mechanics and multiple ways to win. The attention to detail was remarkable: players could choose their name and gender and, as the game progressed, ascend the social ladder from baron to king as they acquired prestige.

The most innovative aspect of Santa Paravia was its graphics, which impressed microcomputer users who had previously interacted with only text or very few graphic elements, nothing that could be compared to the stylized city map. Santa Paravia was the link between the Westchester County school experiment and the future video game industry, as well as two of the most popular genres of the 1990s, God and City-Building games.

Without realizing it, Moncreiff, Wing, Addis, Dyment, and Blank lay the groundwork for the blockbuster films that would emerge decades later.

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