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# Ralph Baer: An interactive life

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Ralph Baer (1922–2014) and his family fled Nazi Germany in 1938 and immigrated to New York. He served in the U.S. Army during World War II and became an expert in foreign small arms. After his discharge from the military, Baer trained for an engineering career in electronics, radio, and television. Fascinated by television, he came to think of it as an underused technology. He believed that television owners should be able to do more than change channels and turn the set on or off—he wanted people to interact with their sets, playing games like ping pong, tennis, and checkers. In 1966, he began experimenting with ways to realize his vision. The video game industry for the home market launched in 1972 when Magnavox debuted the Odyssey game console, based on Baer's inventions. In the course of his long career, Baer invented myriad electronic toys and games, illustrating a commitment to interactivity that continues in video games today.

**KEYWORDS**

collaborative learning, engagement, game-based learning

## 1 | INTRODUCTION

It was freezing the day we arrived in 2003, with snow on the ground and a dampness in the air that hinted at more to come—a typical February day in Manchester, New Hampshire. I had traveled with a small group of colleagues from the Smithsonian Institution in Washington, DC, to collect materials from Ralph Baer, the inventor of the home video game. We soon realized that we would be leaving New Hampshire with more than papers and artifacts documenting Baer's groundbreaking work. With warmth, generosity of spirit, and a playful nature, he welcomed us as instant, and enduring, friends.

## 2 | THE MAKING OF RALPH BAER

"I had the misfortune of being born into a horrendous situation," Ralph Baer once said.<sup>1</sup> His "situation" began on March 8, 1922, in Pirmasens, Germany, a town on the border with France, known for shoemaking and other leather industries. Named Rudolf Heinrich at birth, eventually Rudolf was shortened to Rolf and then anglicized to Ralph. Baer's father, Leo, ran a leather tannery and was later a sales representative

for some of Pirmasens's shoe manufacturers. His mother, Charlotte (née Kirschbaum), had worked for a while in a chemical laboratory in Berlin. Pirmasens, along with much of Europe, had suffered greatly during World War I, and was experiencing rampant inflation and food shortages in the early 1920s. With no sign of better times ahead, the Baer family moved to Cologne when Ralph was just over a year old. Baer wrote that his family was "typical of middle-class German Jews" in Cologne—that was, until he was barred from attending school at the age of 14, because he was Jewish.<sup>2</sup> He went to work in the office of a Jewish-owned wine importing business. "Hitler had been in power for three years by 1936 and the restrictions on what Jews could or could not do were growing daily," Baer confirmed.

As the National Socialist German Workers' Party gained more and more power in Germany, the Baer family knew they needed to leave their homeland if they wanted to survive. As Baer put it, "Life was getting harder, money was tighter." In 1938, just a few months before Kristallnacht, the Baers left Nazi Germany and immigrated to the United States, settling near family in New York City. Ralph got a factory job with a small manufacturer of personal items like cosmetic cases and wastebaskets. He credited his first invention to his work

<sup>1</sup>Transcript, Oral History of Ralph Baer, Gardner Hendrie, interviewer, Computer History Museum Reference Number X3775.2007.2.

<sup>2</sup>All direct quotations from Ralph Baer that are not otherwise sourced are from his unpublished autobiography. There is some overlap between this text and his book, *Videogames: In the Beginning* (Springfield, NJ: Rolenta Press, 2005).

there, building a machine to automate a tedious process of punching holes in leatherette pads. The work at the factory held little long term interest or promise, but his life was about to change.

"One day in 1939, during a ride to work," he recalled, "I saw an ad across the aisle on the back cover of a magazine. It advertised a Radio Servicing correspondence course offered by the National Radio Institute in Washington, DC. The ad promised 'Big Money Servicing Radios.' That piqued my interest! I decided to enroll into NRI's Basic Technician's course forthwith. It cost me \$1.25 a week out of my twelve-dollar weekly wages . . . but it opened up a new world to me." Baer completed his courses in 1940 and landed a job as a technician in a radio repair shop. This is where he had his first experience with television receivers.

These were RCA TRK-5 and TRK-9 TV sets with 5" and 9" diameter, round picture tubes. They had first been shown in the display windows of some radio stores during the 1939 World's Fair in New York. People stood at those windows and gawked for hours at the black-and-white TV sets on display there. . . . Those were exciting times for me! I couldn't wait to get my hands on a TV set.

He did have to wait, however. Ralph Baer was drafted into the U.S. Army in 1943.

After basic training, Baer reported to Camp Ritchie, a military intelligence training facility in Hagerstown, Maryland. The recruits were overwhelmingly foreign born, selected for their knowledge of languages (Baer spoke German, English, and French), and were being groomed to become interrogators. When overseas orders came in, Baer and the rest of the foreign-born recruits were sworn in as American citizens before they shipped out.

Baer spent the war years in England and France, but not primarily as an interrogator. Instead, he was put in charge of a growing collection of European military small arms used to train intelligence officers about the arsenal of the enemy. Baer became fascinated with these weapons. "I started to pick up whatever technical data was available on German handguns, rifles, sub-machine guns and light machine guns," he wrote. "That started me on the long road of mastering all manner of detail about these weapons." By the end of the war, he had become an expert in small arms, lecturing, collecting, and writing broadly on the topic. He also acted as the curator of this collection and came home with 18 tons of foreign small arms that were exhibited at Aberdeen Proving Ground in Maryland, Springfield Armory in Massachusetts, and Fort Riley, Kansas<sup>3</sup> (Figure 1).

Soon after his discharge from the Army in March 1946, Baer started working for a radio manufacturer, taking advantage of his pre-war skills in radio repair. He was bored by the job, but without even a high school diploma, he realized that the college education that could lead to a better position was out of reach. Then he learned about the American Television Institute of Technology in Chicago, which was, as he characterized it, "basically an advanced Radio and Television technical training school for ex-GIs." He passed the entrance exams with



**FIGURE 1** Ralph Baer in Normandy in 1945, posing with a display of the weapons collection that he curated for training troops in the handling of foreign arms. Courtesy of Ralph Baer

flying colors and enrolled. He graduated with a BS in Television Engineering in 1948.

Degree in hand, Baer began a series of jobs that increasingly honed his talents in building electronic equipment. He worked for a small manufacturer of electronic medical devices. He published in electronic trade magazines. He designed a variety of electronics equipment—including a television set—for the military contractor Loral.

During that design period, it occurred to me that one might be able to use a television set for something other than watching often-boring network programs. Playing simple games came to mind. I discussed the idea with Sam Lackoff [chief engineer at Loral] and got a cold reception. That was the end of that idea for a decade-and-a-half. But, fortunately for me, it would resurface in 1966, start the video game industry, and change my life.

Baer's work at Loral and at his next job at Transitron, a Loral spinoff, gave him experience designing a range of military electronics equipment. In 1955, Transitron merged with Van Norman Industries and moved from New York City to Manchester, New Hampshire. Three years later, when Transitron began to fail, Baer resigned and went to work at defense electronics contractor Sanders Associates in nearby

<sup>3</sup>Guide to the Ralph H. Baer Papers, 1943–2006, Archives Center, National Museum of American History, Smithsonian Institution, 3.

Nashua. "There," he said, "I started on a thirty-year-long career that was to change my life in unpredictable, exciting and significant ways."

### 3 | WHAT ELSE CAN YOU DO WITH A TELEVISION SET?

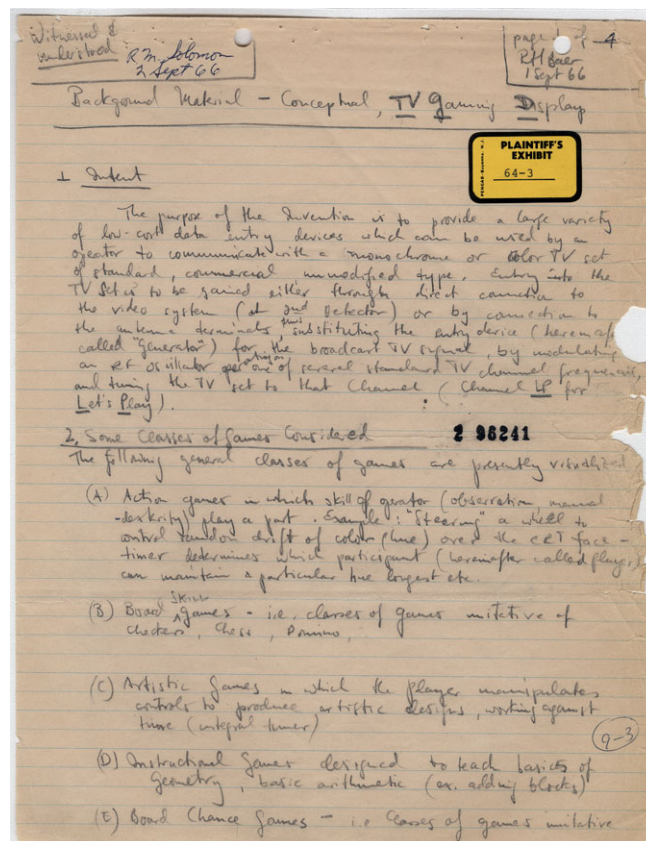
Baer climbed the corporate ladder quickly at Sanders, and was made the Chief Engineer and Manager of the Equipment Design Division in 1961. As his day-to-day work became more managerial, he was concerned about losing touch with his engineering side. So he set up an R&D unit within his division. "There is no doubt in [my] mind that this R&D activity was a watershed for me," he wrote. "The technical stimulation from this work launched me on a lifelong path of invention and development [and] set the stage for all of the Interactive-Video-related inventions and developments."

Television sets began to invade American living rooms in the 1950s and nearly 90% of U.S. households included a television by 1960.<sup>4</sup> TVs were at the forefront of a burgeoning universe of communication technologies that included satellites, audio cassettes, lasers and optical fibers, the spread of direct dial long distance phone calls, stereophonic sound for FM radio and LP discs, videotape cameras and recorders, touch tone phones, early modems, and more. Those communication advances tapped into a similar revolution in electronics—transistors, integrated circuits, ARPANET, computers, and floppy disks are just a few of the breakthroughs that became reality in the 1950s and 1960s.

Baer's work at Sanders was embedded in these fast-changing fields, and his R&D group designed apparatus that utilized many of them. His focus on television endured, resurfacing during work on a range of cathode ray tube displays. On some of these, Baer recalled, "We used test equipment to check our progress and one of the pieces of equipment we used put horizontal lines, vertical lines, cross-hatch patterns, and color lines on a screen. . . . You could move them around to some extent and use them to adjust the television set" (Donovan, 2010, p. 8). Although this work was not connected to broadcast television, it poked at the persistent idea in the back of his mind that people at home should be able to do more than change channels and turn their televisions on or off—he wanted them to interact with their sets. Baer still felt "the TV engineer lurking inside," one who "had been thinking about ways to use a TV set for something other than watching standard broadcasts."

Baer later recorded the time when he crossed the border from thinking to creating (Figure 2).

During a business trip to New York City, while waiting at a bus terminal for another Sanders engineer to come into town for a meeting with a client, I jotted



**FIGURE 2** First page of Baer's 1966 disclosure document that outlined his ideas for playing interactive games on a home television. Ralph H. Baer Papers, AC0854-0000358, Archives Center, National Museum of American History, Smithsonian Institution

down some notes on the subject of using ordinary home TV sets to play games. I distinctly recall sitting there and writing on a small spiral notepad perched on one knee.

When I got back to my office in New Hampshire on September 1st, 1966, I transcribed those notes into a four-page paper, outlining the idea of playing television games on a home TV set. I listed various types of



**FIGURE 3** The Brown Box, with two play controllers and cards indicating switch positions for various games. Copyright 2006 Smithsonian Institution; photo by Richard Strauss

<sup>4</sup>Statistical Abstract of the United States: 1960, Table No. 679 (Washington, DC: U.S. Census Bureau, 1960), 520; Cobbett S. Steinberg, *TV Facts*, New York: Facts on File, Inc., 1980, 142. The U.S. Census Bureau defines a household as "all the people who occupy a housing unit (such as a house or apartment) as their usual place of residence. A household includes the related family members and all the unrelated people, if any, such as lodgers, foster children, wards, or employees who share the housing unit," [https://www.census.gov/glossary/#term\\_Household](https://www.census.gov/glossary/#term_Household).



games that might be playable using the TV set as a display: action games, board games, sports games, chase games and others. What I had in mind at the time was to develop a small game box that would do neat things and cost, perhaps, twenty-five dollars at retail.

Baer drafted technician William Harrison and engineer William Rusch to do much of the game development benchwork in his skunkworks operation within Sanders.<sup>5</sup> In addition to ping pong, soccer, hockey, and other games, they also built a “light gun” that looked like a rifle and could shoot onscreen targets. They did not stop there (Figure 3).

By 1968 we had finished building our final demonstration game console, the Brown Box. It was switch-programmable and played a large number of sports, maze and quiz-type games as well as a golf game using an actual putter and ball; the latter was mounted at the end of a joystick controller. Hitting the captive ball with the putter, a spot on-screen would move in the direction of the putt and either land on or miss another spot, the “hole.” If the putt was sunk, the “ball” disappeared from the screen. In addition, we had several games based on the “gun” so we could shoot at stationary or moving “targets.” It worked very well and it was obvious to one and all that playing those games was fun.

Manufacturing and marketing were a different story. It took another 3 years before Sanders made a deal for the production of the game. Magnavox, a major manufacturer of television sets, licensed the technology in 1971 and released the Odyssey Model 1TL200 TV Game in 1972.

Reflecting the limits of both the graphics resolution of television sets and the cost and power of electronic components of the day, the original version offered 12 ball-and-paddle, chase, and educational games, contained on six “printed circuit game cards”: table tennis, ski, hockey, football, tennis, Simon Says, cat and mouse, haunted house, submarine, roulette, analogic (an arithmetic game), and states (a geography game). Odyssey also came with cards, dice, poker chips, scoreboards, and play money for some of the games, as well as transparent, illustrated, color plastic overlays that affixed to the television screen with static cling to provide different game backgrounds (Smith, 2015). In addition, an optional shooting gallery game and other optional individually-sold game cards were also available.<sup>6</sup>

To play the games, users first attached a small radio frequency (RF) switch box to the antenna terminals of their television set. This allowed switching between regular television broadcasts and game play. As Benj Edwards explained, “The game console had to generate



**FIGURE 4** Magnavox Odyssey. Copyright 2006 Smithsonian Institution; photo by Richard Strauss

its own broadcast TV signal (with an RF modulator). The antenna jack on the TV picked up the console's signal in the same way that it would a signal transmitted from dozens of miles away” (Edwards, 2012). So, to begin playing, users would flick the switch to “game” and turn the dial on the television to an unused channel. A cable connected the control box to the main Odyssey console, which in turn was connected by cables to the two individual game-play controllers. The controllers had knobs for vertical, horizontal, and “English” movement of the game pieces, and a button to reset play. All games were based on moving no more than three dots around the screen. The battery-powered main console also included dials to adjust the speed of play and to position the center line for games like tennis<sup>7</sup> (Figure 4).

Baer had hoped the Odyssey would retail for about \$25, but Magnavox set the list price at \$99.95.<sup>8</sup> In addition to the steep price tag (approximately \$500 in 2018 dollars), Odyssey was only available through Magnavox dealers, which may have led some consumers to believe that it would only work with a Magnavox television, although advertising materials stipulated that Odyssey could be connected to any brand of television measuring 18–25 inches diagonally.<sup>9</sup> Total sales figures are disputed, but most sources (including Baer) cite 350,000 Odyssey units sold between 1972 and 1975. Although this figure may not seem to indicate wild success and market penetration, Odyssey provided an extra income stream for Sanders Associates; the first licensing fee check was issued by Magnavox to Sanders in 1972 for \$100,000.<sup>10</sup>

While Baer worked on video game concepts, he also continued his “day job” at Sanders, resulting in a prolific period of patenting in military electronics technology. By 1974, however, Baer and Sanders

<sup>5</sup>In his unpublished autobiography, Baer wrote, “Obviously, video games had absolutely nothing to do with the normal business of developing complex military electronic systems in my division at Sanders Associates. But I was running a pretty large operation then. I could afford to put a tech on the bench and experiment with this concept without even rippling my division's substantial overhead. So I did it! It wasn't long, however, before the project became official.”

<sup>6</sup>Odyssey sales flyer, reproduced in Ralph Baer, *Videogames: In the Beginning* (Springfield, NJ: Rolenta Press, 2005), p. 77.

<sup>7</sup>In addition to Edwards, “Inside the Magnavox Odyssey,” see also the 1972 promotional film for Magnavox dealers, available on YouTube at <https://youtu.be/jLGBtkKPj2U>.

<sup>8</sup>Odyssey sales flyer, *Videogames*, p. 77.

<sup>9</sup>See, for example, Odyssey sales flyer, *Videogames*, p. 77; 1972 promotional film, YouTube.

<sup>10</sup>For the figure of 350,000 units sold, see Baer, *Videogames*, p. 7. Smith, “A Magnavox Odyssey,” cites conflicting numbers. For the \$100,000 check, see Baer, *Videogames*, p. 74.

"came to the conclusion that I should move into a staff position and pursue licensing and new TV Game product development full-time." Magnavox was responsible for sublicenses, and began suing arcade video game machine makers for infringement of Baer's seminal patent, U.S. Patent 3,728,480.<sup>11</sup> "What we were suing was," Baer said, "whom we were suing was, anybody who produced a game in which manually and machine controlled spots interacted, and specifically in ways in which the machine controlled spot would change its direction, its motion, its characteristics or whatever after coincidence with a manually controlled spot. . . . That's what our claims covered."<sup>12</sup> The resulting series of lawsuits consumed Baer for more than a decade. Among the companies involved were Nintendo, Sega, and Mattel; Atari settled out of court and became Magnavox's first licensee for video games. "Not until 1998," Baer noted, "long after all of the patents had expired, the last of the lawsuits was settled for past infringement." Baer's patent had been upheld in each case.<sup>13</sup>

The continued success of Magnavox litigation meant secure funding for Baer's work on games within Sanders. He and his colleagues developed new gaming apparatus and new games, and Baer had a sideline outside Sanders consulting on other companies' efforts to enter the market. In addition to commercial games, Baer spun his technology into interactive training programs for the military. "Much of my concentration in the 1980s at Sanders," he affirmed, "revolved around interactive video-based systems development for games, military training systems, and eventually, weapons simulations systems." These included such programs as a realistic video simulation for gunners that "had evolved from the technology for an interactive video pinball game of all things"; an anti-aircraft simulator; and an anti-tank gun trainer. "Shooting at targets in an arcade game," Baer quipped, "is not too different from shooting at targets in a weapons training exercise." Improvements in video games were applied to the training simulations, and vice versa.

He also branched out into other home applications of the interactive television technology he invented. For example, in the 1980s, he envisioned a "coupon printer" for the home.

Suppose you are in the kitchen making lunch and watching the tube; a commercial comes on and shows a product that you are interested in. You reach over to the little black box on the kitchen counter next to the TV set and push a button. Within seconds, a printed coupon comes out of the front of the black box. Next time you go to the store, you turn that coupon in for a rebate on the product you watched on television . . . it was like you were printing money in your own kitchen.

CBS licensed the technology, but Baer wrote that it failed to get approval from the Federal Communications Commission, because it required inserting a data-carrying square into the television picture.<sup>14</sup>

<sup>11</sup>Baer, Ralph. Television gaming and training apparatus. U.S. Patent 3,728,480, filed March 22, 1971, and issued April 17, 1973.

<sup>12</sup>Baer stated that the lawsuits netted Sanders about \$100 million. Oral history, Computer History Museum, pp. 47–48.

<sup>13</sup>Baer, *Videogames*, pp. 126–131.



**FIGURE 5** Ralph Baer in his New Hampshire home in 2003, with a display of the many electronic toys and games that he invented. Copyright 2003 Smithsonian Institution; photo by Jeff Tinsley

Still, the idea of making televisions interactive, whether for domestic purposes or military training and education, remained foremost in Baer's mind.

By the mid-1980s, the video game lawsuits were wrapping up and little income from video game licenses was coming into Sanders. Baer was increasingly busy with his sideline, R. H. Baer Consultants, and feeling less and less connected to Sanders, especially after the company was acquired by Lockheed. He was nearly 65 years old and looking for the next adventure. "Electronic toys and games and other consumer products were on my mind and would be for the next decade and more," he wrote. He retired from Sanders in 1987, but stayed connected to the company as an independent Engineering Fellow.

## 4 | BEYOND VIDEO GAMES

Baer had registered R. H. Baer Consultants in 1974, with a focus on "inventing, designing and developing electronic toys and games and other novel electronic consumer products." Between 1975 and 1985, he worked closely with Marvin Glass & Associates, an important toy and game developer based in Chicago. As Baer recalled, "Simon, Maniac, Amaze-A-Tron, Computer Perfection and other microprocessor-controlled hand-held games result[ed] from that long and productive relationship." His work as a consultant also included developing talking greeting cards and interactive Christmas lights for Hallmark; talking Golden Books; Tonka Talkin' Tools for Hasbro; interactive electronics for Kenner's Laser Command and MASK action figures; the Smarty Bear Interactive Video System for Galoob (which included an animated plush bear that could talk and interact with paired cartoons played on a VCR); and myriad other electronic toys and games<sup>15</sup> (Figure 5).

<sup>14</sup>Baer's accounts of the video couponing system differ somewhat between the description used here, from his unpublished autobiography, and the one he provides in *Videogames*, p. 114, where he states, "a couponing system we designed, built and licensed to CBS . . . we struck some modest pay dirt for all our efforts." He does not mention the FCC ruling in *Videogames*.

<sup>15</sup>For a partial list of Baer's toy and game inventions, see "Inventions & Products," <http://www.ralphbaer.com/inventions.htm>.

Many other ideas, of course, never made it to store shelves. One of these—a remote-controlled record changer—is a good example of Baer's somewhat prescient sense of where consumer electronics were headed. Using the remote, a music lover could select, skip, or repeat tracks, pause and resume play, mute the music, or change to a new record album. Baer designed the record changer in 1976, 25 years before the iPod made such functions commonplace. He also created a record-and-playback watch in the late 1990s. "Whenever you had a thought you didn't want to lose," he explained, "you would simply talk into your watch and store your message there." That invention was ahead of its time, too.

## 5 | BAER'S LEGACY

Over the years, Baer came to appreciate his role in the birth of an industry that he felt may have overlooked him. "I became increasingly bothered," he admitted, "to hear Nolan Bushnell referred to as the 'father' of videogames. He certainly deserves to be recognized for having started the arcade videogame industry, but was he the 'father' of (all) videogames? . . . Until I came along and disclosed the concept in 1966, nobody had pursued the idea of using home TV sets to play games . . . certainly not Nolan Bushnell."<sup>16</sup> As Baer watched the video game market grow, not just in numbers of players, but also collectors, he became concerned about the preservation of the original documents and apparatus that would cement his place in video game history.

Baer reclaimed his prototypes, which were still in storage at Sanders. With the help of David Winter, a young collector and friend, additional hardware and much of the original documentation were retrieved from court case files stored in Chicago. Included in the recovered materials was what Baer dubbed "the Magna Carta of the home video game industry"—the four-page document outlining the possibilities of interactive television games that he had written in September 1966 (see Figure 2).<sup>17</sup>

Baer's son Mark contacted the Smithsonian about his father's interest in donating his material to the museum, and that initial conversation led to our first visit to Ralph Baer's home in 2003. The rich collection of papers that he deposited is open to researchers in the National Museum of American History Archives Center, and much of the original video game documentation has been digitized and is accessible online.<sup>18</sup> We also collected several of Baer's toys, games, and prototypes, including the Brown Box, and a section of Baer's home workshop.<sup>19</sup> The workshop display is the showpiece of the museum's Innovation Wing (Figure 6).



**FIGURE 6** A section of Ralph Baer's home workshop is on display in the Innovation Wing of the Smithsonian National Museum of American History. Copyright 2015 Smithsonian Institution; photo by Richard Strauss

Additionally, our relationship with Baer spurred an ongoing research project sponsored by the Smithsonian Lemelson Center for the Study of Invention and Innovation. The Videogame Pioneers Initiative preserves the legacy of video game pioneers through in-depth oral histories and preservation of original documents and other materials. The Initiative is a unique opportunity to capture compelling personal stories in the words of the people who lived them and to trace the development of a worldwide industry. The Entertainment Software Association (2018) reports that in the United States alone, more than 150 million Americans play video games, and an average of 60% play daily. More than 24.5 billion games were sold in 2016, generating about \$30.4 billion in revenue. About 220,000 people across all 50 states work in computer and video game companies.

Yet Ralph Baer's legacy reaches beyond the preservation of documentation and the study of video game inventors and the impact of their work. Baer's experiences shed light on his invention process, and to characteristics he shared with other inventors. Baer was an inveterate maker, who could no more stop inventing than he could stop breathing. He had workshops in his home in New Hampshire and his winter retreat in Florida. He wrote patent disclosures when he was on vacation with his family. He was dedicated, ingenious, tenacious, visionary—and pragmatic. "I'm not a tinkerer," he asserted. "I'm not casual. I will never design or build anything unless it's with an end product in mind" (Wolverton, 2009).

Many inventors are adept at using analogy to further their creative thinking and Baer evidenced this talent; one of his strongest gifts was knowing how to extrapolate and morph a technology into many different products. The Brown Box was just one implementation of what is perhaps Baer's most valuable contribution to video games past, present, and future—making television sets interactive. In other iterations, this idea played out in inventions like the kitchen coupon printer (features of which later reappeared in the educational toy, Video Buddy Interactive Video Play System). In the late 1960s, he laid out his ideas for what was essentially a home shopping system, and, in the early 1970s, he explored new game

<sup>16</sup>Baer, *Videogames*, p. 125; parentheses in original.

<sup>17</sup>For Baer's description of the hunt for his papers, see "Remembering Ralph Baer," Lemelson Center for the Study of Invention and Innovation, <http://invention.si.edu/remembering-ralph-baer>.

<sup>18</sup>For the Guide to the Ralph H. Baer Papers, including links to the digitized document images, see <https://sova.si.edu/details/NMAH.AC.0854>.

<sup>19</sup>Baer gave his workshop a faux brick wall, a bright red door with a house number, and a mailbox, into which his family deposited notes to him while he was working. For more on the Smithsonian's collecting efforts, see David K. Allison, "Ralph Baer's Workshop, Icon of American Innovation," National Museum of American History, Smithsonian Institution, <http://americanhistory.si.edu/blog/ralph-baers-workshop-icon-american-innovation>.



distribution methods with his (unsuccessful) scheme for delivering video games through the nascent cable television networks.<sup>20</sup> Over the course of his long career, his toys and games evolved to take advantage of the exponential increase in graphics resolution, processing power, and connectivity.

A few themes persisted through Baer's inventions. For example, he understood the attraction of violence and guns in toys and games, designing many that involved shooting and explosions. Yet several other inventions, such as his storytelling and talking toys, Smarty Bear and talking Golden Books, attested to his concern for a softer form of interactivity. In addition, his original ball-and-paddle video games were the first in Baer's lifelong ambition to create toys and games that would be a source of fun for children and families to play together. He targeted the home audience from the beginning and was not interested in single-player, coin-operated arcade machines. PlayStation, Wii, Xbox, and other game consoles for home play trace their lineage, in spirit, to Baer's creativity.

In 1974, Baer was tasked by R. C. Sanders to "summarize where we are going with Video Games." Sanders Associates was contemplating getting into the arcade business and wanted Baer to prognosticate a bit on where the industry was headed. "Nobody knows for sure," Baer reported, "but best guess is GAMES WILL SELL BIG, IF they're different, challenging—must provide 'hand-to-hand combat' between players, lots of action, noise, not readily 'learnable' games."<sup>21</sup> Forty years later, Baer once again offered his thoughts on the future of video games:

The scale of the activity and the money involved are all orders of magnitude above those that were typical of videogame development activities taking place only a few years ago. With all that money, brains and energy being thrown at the problem of coming up with ever better resolution and novel game concepts, who knows what will be the next major step . . . the world of technology is on steroids! . . . There is no stopping this express train. Videogame displays of the future will be infinitely more realistic than they are today. Whether they will be more fun to play than crude little old Pac-Man games is another story.<sup>22</sup>

Of course, a direct line should not be drawn from Baer's video games to the most played games of today, but some of the elements that Baer outlined in 1974 and 2004 remain recognizable—in the maturation of narrative and role-playing video games, like *Dark Souls* and the *Mass Effect* series; in the heightened realism and complexity of play in games like *The Elder Scrolls V: Skyrim* or *Ark: Survival Evolved*; and in the violence and gunplay in games like *Fortnite*, *Mortal Kombat*, *Grand Theft Auto V*, and *Halo*.

Although he would continue to invent until his passing in 2014, Baer began to slow down after being diagnosed with chronic



**FIGURE 7** A chuckling Ralph Baer easily wins a game of tennis against the author on the Brown Box. Copyright 2003 Smithsonian Institution; photo by Jeff Tinsley

lymphocytic leukemia. He had received 47 patents in his lifetime of invention. He was awarded the National Medal of Technology in 2004 "for his groundbreaking and pioneering creation, development and commercialization of interactive video games, which spawned related uses, applications, and mega-industries in both the entertainment and education realms" (United States Patent and Trademark Office, 2004). To conclude his unpublished 2002 autobiography, he wrote, "I've had a good run, a great family, a super-supportive better half, great friends, and I was fortunate to have a few more or less notable accomplishments along the way. Not half bad. I'll take it" (Figure 7).

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<sup>20</sup>For more on Baer's ideas for cable, see Baer, *Videogames*, pp. 48–52.

<sup>21</sup>R. H. Baer to R. C. Sanders, Memorandum, January 24, 1974. The complete memo is reproduced in Baer, *Videogames*, pp. 95–98.

<sup>22</sup>Baer, *Videogames*, p. 170.



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