50 YEARS OF TEXT GAMES

FROM OREGON TRAIL TO AI DUNGEON

Aaron A. Reed

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For Willie, Don, Roberta, Steve, Brian, Ron, Graham, Andrew, Adam, Emily,
Nick, Victor, Carl, Peter, Dan, Jacq, Yoon, Tarn, several Sams,
and everyone else who built me a world of words

And for Dad

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GLOSSARY

AI Artificial Intelligence; in the context of text games, common AI domains include natural language understanding, characters who make plans or try to achieve goals, and generating grammatically correct or narratively interesting sentences.

ANSI graphics A way of rendering simple images on computers using colored text characters, popular in the early to mid-90s especially on BBSes; the name refers to the American National Standards Institute, though not a particular standard.

ARPANET A precursor to the modern internet developed in the 1960s and 70s by the US military's Advanced Research Projects Agency.

ASCII One of various standards for encoding text on computers defined by the American Standard Code for Information Interchange; often used to distinguish text-based from graphical game interfaces.

BASIC A programming language targeted at beginning computer users, developed in the 1960s and popular through the late 80s.

BBS Bulletin Board System, a computer connected to one or more telephone lines that allowed users with accounts to dial in via modem to access files, chat with other users, and play games (see **1991**).

C, C++ Mainstream programming languages used for many professional applications and forming the basis of many graphical game engines.

CD-ROM A media format based on compact discs, capable of holding about 650 MB of data; replaced floppy disks with far less storage capacity in the 1990s and helped bring video and multimedia to computer gaming.

changelog A file that holds a record of changes made to a program in each of its previous releases.

chatbot A program designed to converse via text with a human interactor.

choice-based In reference to interactive fiction games, those that provide a list of actions the player can take at each turn (contrast with the open-ended prompt in a parser-based game, or clickable links in hypertext fiction).

command line A computer interface based on typing textual commands at a prompt.

compass navigation In text adventures, the convention of using cardinal directions like *north* and *east* to move between areas.

compile The process of converting human-readable source code into executable machine code that runs on a particular kind of computer system.

core loop Game design term for the central cycle of player activity in a particular game; the core loop of Monopoly is rolling dice to move around a board and pay rent or buy properties.

corpus, corpora In the context of text games with AI, a data set used by a program for analysis or training, such as a corpus of public-domain novels used to train a program to recognize well-constructed sentences.

cutscene A noninteractive segment of a game, often used for exposition or major plot events in which the player isn't allowed to intervene.

CYOA Short for Choose Your Own Adventure, the popular 1980s gamebook series (see **1979**); often used generically to refer to any choice-based interactive story.

D&D *Dungeons & Dragons*, a tabletop roleplaying game first published in the 1970s and influential on many early computer games (see **1975–7**); one player (the "dungeon master") creates a fictional story or setting for the other players, each controlling a specific character, to explore.

dial-up An online service requiring a modem and telephone landline to connect.

domain-specific language (DSL) A programming language designed to author one specific kind of program, like Inform for text adventures; contrast with a general-purpose language like C++.

DOS Disk Operating System, one of several pregraphical command-line operating systems for early computers, of which Microsoft's MS-DOS was the most popular.

dumb terminal A keyboard and display with little or no local computing power, allowing a user to run a program on a distant computer. *See also* mainframe.

dungeon master *See* D&D.

emulator A program that allows software for one computer platform to be run on another; often used in games preservation to run old programs on modern machines.

flag A variable tracking a single piece of state in a program, often boolean (either set or unset); a game character might have an alive/dead flag, for example.

Flash A software platform from Macromedia (later Adobe) for creating graphical animations and user interfaces, commonly used in the 2000s to create more visually sophisticated games and apps for the web, before support for advanced styling and JavaScript features became commonplace.

floppy disk Early computer storage medium, used from the late 1970s through early 90s; common sizes included 5.25″ disks (often holding 360 KB of data) and 3.5″ disks (1.44 MB).

freemium, free-to-play A monetization strategy that became popular in the 2010s, especially for mobile games, where rather than purchasing a game outright, players are encouraged to pay for upgrades to free (but often annoyingly constrained) gameplay.

gamebook An interactive story that is (or could be) realized as a printed book.

gamemaster A system-neutral term for "dungeon master." *See also* D&D.

GDC The Game Developers Conference, held annually in the San Francisco Bay Area since 1988; one of the digital game industry's major trade shows.

Glulx A 32-bit virtual machine format designed by Andrew Plotkin in 1999 that extends Infocom's 16-bit Z-machine, allowing for text adventure games significantly larger in size and scope than those made during the 80s.

handle An alias used online, often consistently across multiple systems.

Hello World A simple example program often used as the first code encountered in a tutorial, generally printing *Hello World* to the screen or some equally simple task.

high-level In the context of programming, code that centers big-picture structures and concerns rather than underlying execution, letting authors focus on the specifics of a problem at the expense of slower execution or less control over minutia. *See also* low-level.

hypertext A textual work consisting of passages connected via clickable words, allowing multiple possible pathways through a reading.

IDE Integrated Development Environment, a tool for editing code, often with advanced features to assist and streamline common programming tasks and workflows.

IF *See* interactive fiction.

IF Comp The Interactive Fiction Competition, an annual online event since 1995, invites authors to submit an interactive story that can be enjoyed in two hours or less; players rank entries on a ten-point scale.

Infocom A 1980s game company known for releasing high-quality, imaginative parser interactive fiction games (see **1983–5**).

Inform A popular language for creating parser interactive fiction, first released in **1993**; Inform 6 became a standard from the mid-90s on, and Inform 7, with a new

natural language syntax, was released a decade later (see **2008**).

interactive fiction In this book, any text-based interactive story (though the term has been used in various ways by various people, often to mean parser-based text adventures specifically).

iOS Apple's mobile operating system, which drove devices like the iPhone and iPad from the 2000s on.

IT Information Technology, often used as a shorthand for staff in charge of maintaining computer systems at a company.

Java An object-oriented programming language popular from the late 90s on, often used in the 2000s to embed complex programs on websites.

JavaScript A programming language (largely unrelated to Java) designed originally to support lightweight scripting on websites; became the dominant platform for nearly all web-based apps and games.

low-level In the context of programming, code that is conceptually closer to the functioning of specific hardware, offering the author more control at the expense of less portability, readability, and fewer helpful abstractions. *See also* high-level.

mainframe A powerful, expensive central computer designed for many users to connect to and share, often via a teletype or dumb terminal; common before the 1980s when computers were too expensive for individual users to own. *See also* timeshare.

mechanic In a game, a rule or set of rules that enable a particular kind of action from the player; combat games might have a dodging mechanic.

microcomputer, micro A personal computer; useful term in the late 70s and early 80s contrasting with mainframes or smaller (but still massive) minicomputers.

MMO, MMORPG A massively multiplayer online game (or specifically role-playing game) that lets hundreds or thousands of players coexist within the same virtual world.

modem Hardware allowing one computer to remotely connect to another over a standard telephone landline.

MUD Multi-User Dungeon, a game genre named after progenitor *MUD* (see **1980**); multiplayer text-based virtual world, often with a fantasy setting.

newsgroups *See* Usenet.

NPC Non-Player Character: any character in an interactive story who is part of the game world but not controlled by a human player. *See also* PC.

parser A text input system designed to read a command and parse it into a form the program can understand; often used as shorthand for parser-based interactive fiction.

pathfinding Code that helps a computer-controlled game character to move from one point to another in a simulated world, or more generally, to find a route between two nodes on a graph.

PC Personal Computer; usually used to differentiate DOS- or Windows-compatible machines from Apple or other architectures, as in "PC gaming."

PC Player Character; any character in an interactive story controlled by a human. *See also* NPC.

port To rewrite or modify a program so it can run on a different kind of computer.

procgen, procedural generation A class of techniques used to build large amounts of random content (often environments, items, or characters for a game world) based on rules created by a coder or designer.

punch card, punch tape Early methods of storing binary data by punching and reading holes in paper media; mostly replaced by magnetic media by the late 1970s.

puzzle In text games, a challenge or obstacle blocking narrative progress, often used for pacing; waned in popularity during the 1990s.

PvP Player versus Player; multiplayer games that allow human players to pit their characters against each other to win points, treasure, clout etc.

QA Quality Assurance, the process of testing gameplay and reporting bugs, or the team in charge of this process.

readme A file included with a download that often explains its contents, gives instructions, and provides the author's contact details.

repo, repository A digital storehouse for a program's code, often part of a version control system that archives each prior revision.

roguelike A style of game named after *Rogue* [1980] characterized by exploring dangerous randomly generated environments, a top-down view that uses text characters as surrogate graphics, and frequent deaths and restarts as a core part of its gameplay.

roleplaying game A kind of tabletop or digital game centered on the narrative or numeric improvement over time of a strong central character or cast.

room A discrete location in a text game, which could be anything from an actual indoor room to a huge outdoor space.

RPG *See* roleplaying game.

SPAG The Society for the Promotion (originally Preservation) of Adventure Games, online newsletter promoting interactive fiction founded in 1994.

storylet A piece of content in an interactive story with rules for when it can appear; often contains attached choices and consequences.

string In programming, a piece of textual data (likely named based on its implementation as a sequence of single characters).

sysop System Operator, administrator of a networked computer system or BBS.

tabletop roleplaying game, a nondigital roleplaying game played with dice, a rulebook, a gamemaster, and a group of players.

TADS The Text Adventure Development System, a C-like language for interactive fiction authoring popular in the 1990s and 2000s.

teletype, teleprinter A typewriter that can send and receive text from a connected computer, local or remote; the primary interface for most computer users in the 1970s.

text adventure A game style characterized by a command-line parser and second-person explorations of a simulated world (see **1976**).

text game A digital game that uses primarily written or spoken language, rather than multimedia, to tell its story.

time-share A method of allocating mainframe computer time allowing many users share a single system, taking advantage of the fact that much of an interactive section is idle time as the system waits for the user to respond.

transcript A record of one playthrough of a text game.

UI User Interface, the part of a program the user directly sees and interacts with.

Usenet A distributed online discussion network organized by topic popular in the 90s and early 2000s; groups like rec.arts.int-fiction hosted important early text game design conversations.

virtual machine A computer platform designed to be easily emulated in software; useful for running the same code on many different kinds of computers.

visual novel A style of interactive story popularized in Japan in the 1990s and 2000s, characterized by conversation-heavy stories illustrated by full-screen character portraits.

walkthrough A step-by-step guide to playing through a game; for text games, often in the form of a list of commands.

Win Short for Windows, dominant operating system on PCs from the early 90s on.

Z-machine A virtual machine developed by Infocom in the early 80s to run games compiled into **Z-code**, a custom format; this let them easily port their games to many computer systems (see **1978**). The format was later repurposed by fans and used well into the 2000s. *See also* Inform.

ZIL The Zork Implementation Language, a Lisp-like programming language used by Infocom to create their games.

INTRODUCTION

The earliest version of *The Oregon Trail*—the text-only original, made long before the green-tinged Apple remake played by 80s kids in their school computer labs—debuted in a Minnesota classroom on December 3, 1971. In the fifty years since, text games—fiction you can play—have evolved from rough-hewn prototypes to mainstream successes to commercial pariahs to underdog heroes. They've been resurrected as indie punk games, award-winning art games, viral sensations, and groundbreaking pioneers of interactive storytelling techniques. Their popularity has waxed and waned, but they've never been dead, and they've never gone away. Often overlooked, frequently dismissed, these games are a vibrant part of gaming history worth remembering, playing, and continuing to make.

In this book we'll take a journey through fifty text games, one for each year of the medium's first half century. We'll take a close look at how each game works, what it says, who made it, and how it fits into the rapidly changing historical and technological context of its time. These aren't necessarily the most famous fifty games from these years, nor the best-loved, the most influential, or the most important (whatever that might mean). The constraint of picking one and only one game for each year instead suggests a grand tour, a journey that can't possibly include everything but aims to stop at many interesting sites along the way.

On our tour we'll meet games famous and obscure, amateur and commercial, some with millions of words of content and others so small their source code can fit on a single printed page. Our fifty titles hail from a surprising breadth of genres and intertwine with a vast array of technologies, from teletypes to iPhones to virtual machines to virtual reality, from cassette tapes to spoken words to paper tape to Kindles. Collectively, their story cuts a fascinating cross section through the history of computing, from the dawn of stored programs up through the cutting edge of today's AI.

Why do these games matter? Unlike mainstream computer games, they're often made by sole creators with something to say, and the freedom to explore and experiment with new ways of saying it. They have pioneered new genres and mechanics years before the same ideas make it into graphical games. They have explored countless ways stories can be dynamic, debuted influential creators who found success in the wider game or publishing industries, and served as a constant source of inspiration as creators redefine what games made of words can do, mean, and be, over and over again.

What is a text game? In brief, it's a game you want to share excerpts from, not screenshots. The broader game industry is primarily visual, trafficking in colorful screen grabs and trailers full of motion. But a screenshot of a text game is missing the point. There are few screenshots in this book, but many excerpts.

A text game tells its story with words, thus connecting more to written than filmic traditions. Some might have illustrations, as do some books, but these are not required to play (as they are in graphical adventures like *Mystery House* [On-Line Systems 1980] or *Disco Elysium* [ZA/UM 2019]), and neither are they foundational to the experience of play (unlike, say, the art in visual novels). Text games are interactive, which differentiates them from animated concrete poetry or digital word art. They use words as words, not as placeholder graphics as in roguelikes (which we'll mostly skip over but for a few exceptions that also meaningfully engage with language). Finally, the kinds of text games we talk about here are mostly digital (excluding tabletop storytelling games like *Dungeons & Dragons*) and exclusively narrative (excluding pure wordplay or other kinds of linguistic fun not concerned with story).

While there are many traditions of text games in languages other than English, this book mostly limits its scope to the English-speaking world, with a few exceptions.

see P.R.E.S.T.A.V.B.A. **1988**; and *El Museo de las Consciencias / Lieux Communs* **2007**

Text game styles can vary considerably, but the games discussed in this book can be roughly clustered by technology, structure, or audience into about a dozen nonexclusive categories.

» Resource Management. Games primarily concerned with managing a set of numeric qualities. Modern idle and clicker games fall into this category, as do many early computer games.

The Oregon Trail **1971**; *ROCKET* **1972**; *Universal Paperclips* **2017**

» Parser. A simulated world explored by typing imperative commands that are then "parsed" into valid actions. Also called text adventures or interactive fiction, parser games were massively popular in the 1980s and continue to be made today.

Adventure **1976**; *Zork* **1977**; *Pirate Adventure* **1978**; *The Hobbit* **1982**; *Suspended* **1983**; *The Hitchhiker's Guide to the Galaxy* **1984**; *A Mind Forever Voyaging* **1985**; *Plundered Hearts* **1987**; *P.R.E.S.T.A.V.B.A.* **1988**; *Silverwolf* **1992**; *Curses* **1993**; *So Far* **1996**; *Photopia* **1998**; *Galatea* **2000**; *The Fire Tower* **2004**; *El Museo de las Consciencias* and *Lieux Communs* **2007**; *Violet* **2008**

» MUD (Multi-User Dungeon). Parser games hooked up to a persistent, multiplayer world.

MUD **1980**; *LambdaMOO* **1990**; *Achaea* **1997**

» Hypertext. A tree of story nodes often explorable in nonlinear order, generally navigated by clicking linked words.

Uncle Roger **1986**; *Patchwork Girl* **1995**; *Howling Dogs* **2012**

» Choice-Based. Story nodes connected by explicit decision points, usually moving forward through a possibly-branching plot.

The Cave of Time **1979**; *Digital: A Love Story* **2010**; *80 Days* **2014**; *Lifeline* **2015**; *Choices: The Freshman* **2016**; *Weyrwood* **2018**

» Storylet-Driven. An unordered set of story nodes presented to the player in an order based on randomness, simulation qualities, or player stats.

King of Dragon Pass **1999**; *The Kingdom of Loathing* **2003**; *Fallen London* **2009**; *80 Days* **2014**

» Procedural Story. Interactive narratives shaped by complex procedures as well as player choices, usually offering multiple and sometimes emergent outcomes.

The Hobbit **1982**; *The Playground* **1994**; *King of Dragon Pass* **1999**; *Dwarf Fortress* **2006**; *Versu: A Family Supper* **2013**; *AI Dungeon* **2019**; *Scents & Semiosis* **2020**

» Roguelike. A challenging world with procedurally generated elements, often explored from a top-down perspective. Roguelikes often use text as stand-in graphics rather than primarily as words and sentences.

Hunt the Wumpus **1973**; *Super Star Trek* **1974**; *dnd* **1975**; *Shades of Doom* **2005**; *Dwarf Fortress* **2006**

» ARG (Alternate Reality Game). A live multiplayer game usually running for a limited time, often extending through multiple media and communication channels including text (though many are not primarily text-based).

The Beast **2001**

» BBS. Multiplayer games for a bulletin board system, usually designed to be played by one player at a time rather than simultaneously.

Trade Wars 2002 **1991**

» Play-by-Mail. Multiplayer games where players send in orders by mail or email, with a central computer batch processing turns at a slow cadence (often once a week) and sending personalized results as a turn report.

Monster Island **1989**

» Experimental. Text games that don't fit into any of the above styles.

His Majesty's Ship "Impetuous" **1981**; *Screen* **2002**; *Nested* **2011**

While you can read this book straight through, each entry is also cross-linked to other games connected through threads of inspiration, technology, or tradition. References to other games featured in this volume are indicated by a stylized year reference **2022**, often in a sidebar. Years are printed on the bottom outside corners of pages, making it easy to navigate through decades as well as by page numbers. Mentions of games not covered in this book are cited with [Author/Publisher and Year].

Sidebars alongside underlined body text provide additional commentary or cross-references.

Spoilers are sometimes inevitable in a detailed discussion of a game. Especially egregious ones are indicated with a vertical black bar.

Game excerpts are shown in a bordered gray box; if the excerpt is from a different game than the main topic of a chapter, the border is omitted. Player input is indicated by:

> **TEXT LIKE THIS**

In games where the player selects from a list of inputs rather than typing directly,

» *Each presented option is*
» *shown individually, and*
» **the one selected is reversed.**

Spoilers for how excerpts are styled in this book.

In games where the player interacts with text directly, interactable text is shown underlined in the excerpt (if that text was styled distinctly in the original), and the player's choice is repeated at the bottom with a cursor icon:

> interactable text

A horizontal line indicates a page clear; otherwise text scrolled in the original presentation.

If the original version is not the one being excerpted, this will be indicated.

Care has been taken to keep the content of excerpts as close as possible to the game's original release, including idiosyncrasies of spelling, line breaks, and indentation. One exception is that, in most cases, paragraphs have been rewrapped to look more natural given the book's column width. When game transcripts have been shortened for clarity, brackets [...] indicate ellipses not in the original. Game names match the title screen or opening text of the original release (hence *Adventure*, not *Colossal Cave Adventure* or *ADVENT*), except in the case of an online game later better known by a different name. Author names are their preferred name at death or publication time.

Early text games ran on systems that `COULD NOT DISPLAY LOWERCASE CHARACTERS`. This convention has been preserved in relevant excerpts. Until the mid-1990s, computer text was generally displayed with a fixed-width font; this has not been preserved except for games where this was a key part of their layout or aesthetic. In all other cases excerpts have been styled with a consistent modern font rather than attempting to emulate period text styles, not all of which are especially friendly to unpracticed eyes today.

```
10  Source code excerpts are presented in a fixed-width font.
```

Citations are numbered alphabetically at the end of each chapter. "Direct quotations only are attributed" using citation number[5] or in a sidebar for chapters without endnotes. Bibliography links to online content are given a date prepended with either *a* and date of access, or *s* and date of a snapshot from the Wayback Machine at the Internet Archive (https://archive.org).

The book is divided into five parts by decade, each beginning with a brief summary of the larger trends in text games of that period beyond the specific ten games covered. The chapter "Before the 70s" also covers the years leading up to the start of this history. A brief sampling of other noteworthy text games from each decade with capsule summaries can be found at the end of these intros.

Robert Pinsky. 1995. "The Muse in the Machine: Or, The Poetics of Zork." *New York Times*, Mar 19, 1995, sec. Books.

"What has poetry to do with computer software?" asked Robert Pinsky in 1995, precisely the middle of this history. Pinsky, a future US poet laureate, had a decade earlier authored the surreal text adventure *Mindwheel* [Brøderbund Software 1984]. Still enamored of the possibilities of "the muse in the machine," he wrote a piece for the *New York Times* defending interactive text,

a uniquely contested art form that, like poetry, "suspicious guardians of the past may hug … protectively" while "preening advocates of the future may scorn … as outmoded."

> What has this activity amounted to so far? Less than enthusiasts claim, more than the scornful might assume—an interesting infancy.… On the peculiar terrain of literature-for-the-monitor, where the most innocent science fiction adventure may overlap with the most fashionable of nonreferential language theory, the future and the past are conducting their perennial transaction.

Text and language have endured far longer than most technologies for storing information and sharing stories. The next fifty years of interactive prose, and the next after that, will build on the craft and wisdom of the pioneers in these pages, whose stories we would do well not to forget.

Index to Games by Creation Tool

An enormous variety of programming languages and authoring tools were used to create the games in this book; here's an index to games by creation tool.

ASP: The Beast **2001** (server)

BASIC: Oregon Trail **1971**; ROCKET (**1972** version); Hunt the Wumpus **1973**; Super Star Trek **1974**; Pirate Adventure **1978**; His Majesty's Ship "Impetuous" **1981**; Uncle Roger **1986** (commercial version); P.R.E.S.T.A.V.B.A. **1988**

BCPL: MUD **1980** (version 3)

C/C++: LambdaMOO **1990** (server); Achaea **1997**; King of Dragon Pass **1999**; Screen **2002**; Dwarf Fortress **2006**; Choices: The Freshman **2016**

ChoiceScript: Weyrwood **2018**

Flash: The Beast **2001** (multimedia)

FOCAL: ROCKET **1972** (original version)

Fortran: Adventure **1976**

Hap: The Playground **1994** (character logic)

Hourglass: Achaea **1997** (original server)

Inform: Curses **1993**; So Far **1996**; Photopia **1998**; Galatea **2000**; The Fire Tower **2004**; Lieux communs and El museo de las consciencias **2007**

Inform 7: Violet **2008**; Scents & Semiosis **2020**

JavaScript: The Beast **2001** (websites); Fallen London **2009** (frontend); Nested **2011**; Universal Paperclips **2018**; AI Dungeon **2019** (frontend)

Lisp: The Playground **1994** (engine)

Lua: Achaea **1997** (scripting)

MACRO-10: MUD **1980** (versions 1 & 2)

MDL: Zork **1977**

MOO: LambdaMOO **1990** (world)

MUDDL: MUD **1980** (world)

NodeJS: Fallen London **2009** (backend, 2019 redesign)

Objective C: Lifeline **2015** (app)

Pascal: Trade Wars 2002 **1991**

PAW: Silverwolf **1992**

Perl: The Kingdom of Loathing **2003** (backend)

PHP: The Kingdom of Loathing **2003** (backend)

Praxis: A Family Supper **2013** (content)

Python: AI Dungeon **2019** (backend)

QuickBasic: Monster Island **1989**

Rapture: Achaea **1997** (2001 server)

Ren'Py: Digital: A Love Story **2010**

StoryNexus: Fallen London **2009** (content)

Storyspace: Patchwork Girl **1995**

TUTOR: dnd **1975**

Twine: Howling Dogs **2012**; Lifeline **2015** (story)

Unix shell scripts: Uncle Roger **1986**

Versu: A Family Supper **2013** (engine)

Visual Basic: Shades of Doom **2005**

Vortex: Achaea **1997** (1998 server)

Z80 Assembler: The Hobbit **1982**

ZIL: Suspended **1983**; The Hitchhiker's Guide to the Galaxy **1984**; A Mind Forever Voyaging **1985**; Plundered Hearts **1987**

BEFORE THE 70s

Graphics came first, despite the popular tale of primitive text games that pretty pictures displaced. While the story holds true for some of the first generation of home computers, digital games had been around for a long time by then. The earliest, from Bertie the Brain's *Tac-Tac-Toe* [1950] to *Tennis for Two* [1958] to *Spacewar!* [1962], were all visual. It was language and text—storing it, assembling it, understanding it—that, at first, was hard.

The earliest digital games used mothballed World War II radar displays, oscilloscopes, or grids of blinking lights for their graphics. In 1947, two New Jersey physicists submitted a patent for a Cathode-Ray Tube Amusement Device, which let the player shape arcs of curved light on a screen. The beams signified the paths of virtual artillery shells, and plastic airplane decals attached to the screen showed the position of targets. If the player could align their beam with a target, they scored. Though it never moved beyond the prototype phase, even this early game had flashy graphics. On a hit, a clever engineering trick forced a resistor overload, causing the display to briefly lose focus and the bright dot of the missile to blur into a fuzzy circle—a tiny expanding explosion.

People were playing with cathode ray tubes on the other side of the Atlantic too. A technology developed in England—the Williams-Kilburn tube, after its two inventors—could both store and display persistent binary data using a grid of visible dots. By reading the location of the brightened phosphors (which represented ones) and looping back a signal to keep them lit, the tube could "store" the very data it was displaying. The technology opened up a relatively inexpensive way to give a computer random-access memory, using the electrical signal to determine whether the phosphor dot at a given position was bright or dim. The visible grid of bits could give human operators an invaluable window into a running program, but it also gave them a canvas. In 1947, Williams and Kilburn configured their prototype to display the blocky words "C.R.T. STORE," perhaps the first bitmapped text ever drawn to a screen.

Reconstruction of early digital text on a prototype Williams-Kilburn tube in 1947, configured with a 32 x 32 grid of phosphor dots. These were called "picture elements" by the tube's inventors. In later years, this would evolve into the shorthand word "pixel."

The two engineers developed a computer that could use their memory tube: the Manchester Baby, the first stored program computer. In a later incarnation, the Ferranti Mark 1, it also became one of the world's first computers to be commercially sold. One of the earliest software games without dedicated hardware was devised for the Ferranti, first running successfully in 1952. It played a game of draughts (checkers), using the grid of phosphor dots on one of its small round

Williams-Kilburn screens to draw the board and pieces. But the program could also output text to an attached teletypewriter, making it likely the earliest digital game to print full sentences. On startup, the machine would print:

Also called a teleprinter or teletype, these devices had been in use for much of the twentieth century for sending telegrams and news wires, and were rapidly repurposed as computer interfaces. Effectively, a teletype is just a typewriter that can also send and receive keystrokes as electrical signals.

```
PLEASE READ THE INSTRUCTION CARD.
```

This was necessary because playing moves meant inputting a series of 5-bit numbers via a long row of switches—the computer could print English text more easily than it could receive it. After the user learned from the card that they needed to press a particular button on the console to proceed, the printer continued:

```
SHALL WE TOSS FOR THE FIRST MOVE? WILL YOU SPIN A COIN?
TAILS
HAVE I WON?
```

Noah Wardrip-Fruin has dubbed this previously unnamed game *M.U.C. Draughts*, after the system's informal name: the Manchester University Computer.[29]

Once the player answered, the game could begin. While moves were primarily shown visually on the CRT grid, the program would use the teletype to offer occasional feedback, which could get testy if the human took too long to move or entered incorrect data:

```
YOU MUST PLAY AT ONCE OR RESIGN.
```

```
KINDLY READ THE INSTRUCTIONS AND START THE MOVE AGAIN.
```

```
I REFUSE TO WASTE ANY MORE TIME. GO AND PLAY WITH A HUMAN
BEING/.
```

The `/.` at the end of the last line above may have signified an exclamation mark, since the teleprinter hooked up to the Ferranti Mark 1 had no such dedicated symbol.

The text, and the rather clever draughts-playing program itself, were written by an unlikely programmer named Christopher Strachey. A brilliant mathematician, he had suffered a nervous breakdown halfway through his undergraduate coursework, later attributed to a struggle to reconcile his sexuality with the rigidly heteronormative world of the 1940s. Though he returned to finish his degree, he did not test well enough to continue on to graduate work and settled instead into a quiet life as a schoolteacher. But one of his college chums had been computing pioneer Alan Turing, and years later, idly curious, Strachey was able to get access to the Manchester computer through his old acquaintance.

Strachey threw himself into the extraordinary challenge of programming early computers with an almost obsessive passion. A famous anecdote tells that he asked Turing for ideas: what should he write for his first program? Without cracking a smile, Turing suggested he write some code to make the computer simulate itself. Not knowing the task would be extraordinarily difficult, Strachey nevertheless came back some weeks later with a program not only far longer than any yet written for the machine, but one that ran correctly and played "God Save the King" through the system's alert speaker

when it finished—incidentally, one of the earliest pieces of computer music. Turing, refusing to be drawn out, responded only by muttering, "Good show."

After teaching the Manchester University Computer to play draughts, Strachey next programmed it to print out procedurally generated love letters. His code filled in template sentences with random words from a list of flowery adjectives, entered one tedious character at a time into the machine. Strachey pinned the printed love notes anonymously to the department's notice board, to the consternation of colleagues:

```
HONEY DEAR
    MY SYMPATHETIC AFFECTION BEAUTIFULLY ATTRACTS YOUR
AFFECTIONATE ENTHUSIASM. YOU ARE MY LOVING ADORATION: MY
BREATHLESS ADORATION. MY FELLOW FEELING BREATHLESSLY HOPES
FOR YOUR DEAR EAGERNESS. MY LOVESICK ADORATION CHERISHES
YOUR AVID ARDOUR.
                                YOURS WISTFULLY
                                          M. U. C.
```

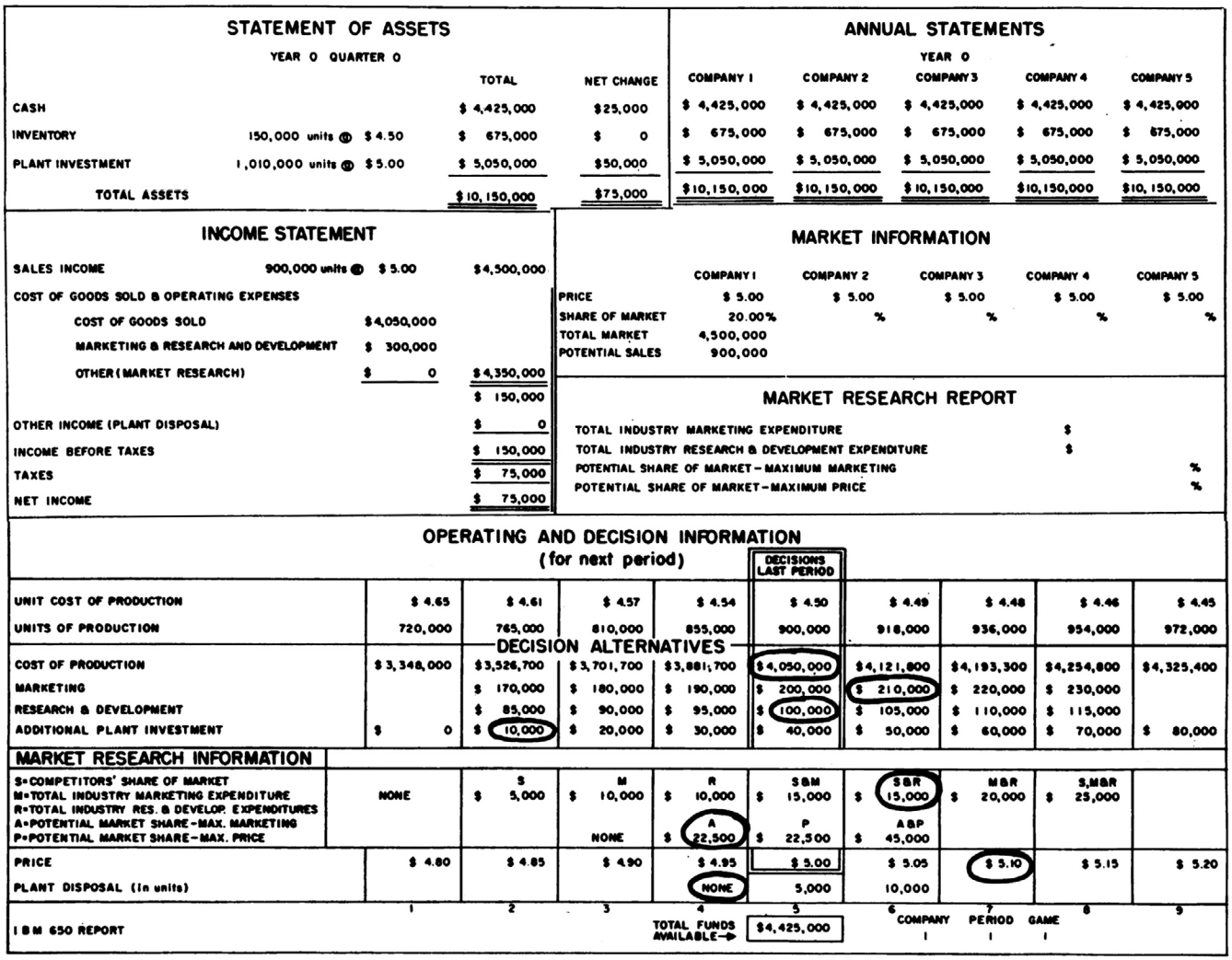
Strachey would go on to a long career as a computer scientist, pioneering many ideas in programming language design and time-sharing architecture. He was one of the very first software developers, and one of the earliest authors of prose meant for computers to perform—the godfather to all text games in the decades to come.

In the 1950s, programming computers to play games or write love letters was somewhat akin to blasphemy. Computers cost millions of dollars and were used almost exclusively for important matters like codebreaking or calculating ballistic trajectories. And indeed, some of the earliest complex computer games were wargames created by the US military as training exercises. One of these was a game called *HUTSPIEL* (1955) in which two players used a bank of dials and switches to interact with a real-time simulation—a complex model of a hypothetical battle in Europe between NATO and Soviet forces. The models that drove the game came from an unlikely source: a historian, Dr. Dorothy Kneeland Clark, whose career had centered around statistical analyses of real-world military conflicts, generalizing the messy data into reusable heuristics and equations. When a computer wargame project needed a numerical model on which to base its combat simulation, Dr. Clark was brought aboard to computerize her equations. Largely forgotten by gaming history, her work formed the foundation of one of the first complex computer games, and one of the earliest not based on an existing tabletop game like draughts.

HUTSPIEL ran on a custom analog computer (using continuous voltages to represent values, rather than ones and zeros) called the Goodyear Electronic Differential Analyzer.

Another thread of complex early computer games was evolving in the world of business management. (This might seem incongruous until you remember that management executives were some of the first customers of early computers.) In 1957, the American Management Association (AMA) ran an exclusive retreat for "participants in executive decision-making programs"[31] where attendees were placed in teams to play, essentially,

1955



STATEMENT OF ASSETS

YEAR 0 QUARTER 0

		TOTAL	NET CHANGE
CASH		$ 4,425,000	$25,000
INVENTORY	150,000 units @ $4.50	$ 675,000	$ 0
PLANT INVESTMENT	1,010,000 units @ $5.00	$ 5,050,000	$50,000
TOTAL ASSETS		$10,150,000	$75,000

ANNUAL STATEMENTS

YEAR 0

	COMPANY 1	COMPANY 2	COMPANY 3	COMPANY 4	COMPANY 5
CASH	$ 4,425,000	$ 4,425,000	$ 4,425,000	$ 4,425,000	$ 4,425,000
INVENTORY	$ 675,000	$ 675,000	$ 675,000	$ 675,000	$ 675,000
PLANT INVESTMENT	$ 5,050,000	$ 5,050,000	$ 5,050,000	$ 5,050,000	$ 5,050,000
TOTAL ASSETS	$10,150,000	$10,150,000	$10,150,000	$10,150,000	$10,150,000

INCOME STATEMENT

SALES INCOME	900,000 units @ $ 5.00		$4,500,000
COST OF GOODS SOLD & OPERATING EXPENSES			
COST OF GOODS SOLD		$4,050,000	
MARKETING & RESEARCH AND DEVELOPMENT		$ 300,000	
OTHER (MARKET RESEARCH)		$ 0	$4,350,000
			$ 150,000
OTHER INCOME (PLANT DISPOSAL)			$ 0
INCOME BEFORE TAXES			$ 150,000
TAXES			$ 75,000
NET INCOME			$ 75,000

MARKET INFORMATION

	COMPANY 1	COMPANY 2	COMPANY 3	COMPANY 4	COMPANY 5
PRICE	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00
SHARE OF MARKET	20.00%	%	%	%	%
TOTAL MARKET	4,500,000				
POTENTIAL SALES	900,000				

MARKET RESEARCH REPORT

TOTAL INDUSTRY MARKETING EXPENDITURE	$
TOTAL INDUSTRY RESEARCH & DEVELOPMENT EXPENDITURE	$
POTENTIAL SHARE OF MARKET – MAXIMUM MARKETING	%
POTENTIAL SHARE OF MARKET – MAXIMUM PRICE	%

OPERATING AND DECISION INFORMATION (for next period)

DECISIONS LAST PERIOD

UNIT COST OF PRODUCTION	$ 4.65	$ 4.61	$ 4.57	$ 4.54	$ 4.50	$ 4.49	$ 4.48	$ 4.46	$ 4.45
UNITS OF PRODUCTION	720,000	765,000	810,000	855,000	900,000	918,000	936,000	954,000	972,000
DECISION ALTERNATIVES									
COST OF PRODUCTION	$ 3,348,000	$3,526,700	$3,701,700	$3,881,700	$4,050,000	$4,121,800	$4,193,300	$4,254,800	$4,325,400
MARKETING		$ 170,000	$ 180,000	$ 190,000	$ 200,000	$ 210,000	$ 220,000	$ 230,000	
RESEARCH & DEVELOPMENT		$ 85,000	$ 90,000	$ 95,000	$ 100,000	$ 105,000	$ 110,000	$ 115,000	
ADDITIONAL PLANT INVESTMENT	$ 0	$ 10,000	$ 20,000	$ 30,000	$ 40,000	$ 50,000	$ 60,000	$ 70,000	$ 80,000
MARKET RESEARCH INFORMATION									
S=COMPETITORS' SHARE OF MARKET M=TOTAL INDUSTRY MARKETING EXPENDITURE R=TOTAL INDUSTRY RES. & DEVELOP. EXPENDITURES A=POTENTIAL MARKET SHARE – MAX. MARKETING P=POTENTIAL MARKET SHARE – MAX. PRICE	NONE	S $ 5,000	M $ 10,000	R $ 10,000 A $ 22,500 NONE	S&M $ 15,000 P $ 22,500	S&R $ 15,000 A&P $ 45,000	M&R $ 20,000	S,M&R $ 25,000	
PRICE	$ 4.80	$ 4.85	$ 4.90	$ 4.95	$ 5.00	$ 5.05	$ 5.10	$ 5.15	$ 5.20
PLANT DISPOSAL (In units)				NONE	5,000	10,000			
	1	2	3	4	5	6	7	8	9
IBM 650 REPORT				TOTAL FUNDS AVAILABLE→	$4,425,000	COMPANY 1	PERIOD 1	GAME 1	

Report form from *Top Management Decision Simulation*. The team's decisions for the next quarter are indicated by the circled "decision alternatives" in the bottom rows.

business wargames. Each team controlled a virtual firm manufacturing a product in a competitive market, setting a retail price and dividing expenditures between five possible categories including a marketing budget and production capacity. An IBM 650 would run each team's decisions against a simple economic model and churn out quarterly reports. This was AMA's *Top Management Decision Simulation*, and while it was a relatively simple demonstration for a very niche audience, it caught the attention of many businesses and business colleges eager to ride the wave of the future.

A much more complex business game, *The Carnegie Tech Management Game* (first played in 1959), was created by a group of faculty members in the institution's Graduate School of Industrial Administration. The game was designed to be played by a full class of second-year graduate students, divided into teams of five to ten that each managed a simulated company making detergent (selected, ironically, as a stable product mostly untouched by technological progress). Over the course of two semesters, teams would compete to make their company's detergent products the leader in a virtual market, with the computer crunching hundreds of variables representing everything from tax rates to warehouse storage costs, production expenses, losses from union strikes, how consumers in various regions felt about

three simulated detergent characteristics (washing power, sudsing power, and gentleness), and more. Players could make over three hundred unique decisions, and the program could generate reports with thousands of individual points of data.

But the early business management sims were very different from later generations of computer games, because most of the time spent playing them happened offline, away from the machine. Computer time in the 50s was still incredibly precious, with programs processed in stages that involved human labor and mechanical action at each step. After a program had been written and encoded on a stack of punch cards, it would be loaded into a computer's memory via a dedicated appliance the size of a refrigerator. A second stack of cards with data for the program to operate on would be loaded next. The program would execute, and the computer would output the results via another specialized appliance—a card printer, teletype, or magnetic tape storage system—that might then in turn be connected to a bulky printer to render output in a human-readable format. This system of "batch processing" programs meant dozens could be queued up for technicians to run in sequence, but it rarely allowed users to intervene in the middle of a run. Usually the earliest you could see the output of a program you wanted to run was the following day.

Batch process games had mostly died out by the 1970s as interactive computer terminals became widespread, but a curious thread of their descendants survived in the form of play-by-mail games—see **1989**.

In Carnegie Tech's management game, turns were batch processed at the end of each week and represented one month's worth of business decisions. In the interim, most of the game was played in person. Each week's turn began with the delivery of a series of "information reports," printouts detailing the status of your team's company. During the week, teams were encouraged to schedule meetings, strategize over product directions and marketing strategies, sort out issues with production lines or backlogs, and even report to a board of directors made up of faculty. Consensus would be reached through whatever org structures each team devised. By noon on Friday, teams were expected to submit a stack of "decision records" detailing changes to their corporate strategy over the next month; there were twelve different kinds of these forms, from "Production and Raw Material Ordering Decisions" to "Product Comparison Test Orders." A clerk would convert the form submissions into a stack of data punch cards for each team and hand them to an operator to run through the program over the weekend, with the next set of information reports delivered the following Monday.

The game's control team converts the selected options on a report form to data on punch cards.

The early wargames (and business wargames) were an important step toward the text games of later decades, but they lacked two defining qualities those descendants would have. First, they weren't technically interactive (an adjective that today applies to nearly all computer programs) because they couldn't be played in real time. Strachey's draughts program had allowed a user to sit in front of it and play out a full game, but this had only been

possible in a research lab. In the real world, a computer's time had to be allocated far more carefully to justify its expense. Computer access would need to become more readily available before interactive programs, and games in particular, could flourish. Second, computers and their users needed a language that each could speak with equal fluency, lest specialists remain the only ones who could use them. The most obvious choice for such a language was one the users already spoke. The quest to enable real-time, back-and-forth natural language dialogue between humans and machines would occupy the bulk of the 1960s, and many of the decades since.

A BETTER LANGUAGE WAS OF LIMITED USE while the chances to speak it were rare. Stuck in dedicated air-conditioned rooms guarded by trained technicians, each computer installation could only support a handful of users. The first time-sharing systems would go a good way toward solving this problem by the early 60s.

Time-sharing turned a weakness of early human-computer interaction into a strength. The reason most mainframes couldn't afford to be interactive was the long delay imposed by a human reading the results of an input, thinking about their next command, and typing it in—all wasted computer cycles. But if a single computer could split its time between multiple people, each connected to a remote terminal with their own sandboxed sessions, one computer might serve dozens or even hundreds of simultaneous users. Christopher Strachey filed the first patent for a time-sharing system in 1959, and by 1961 a system called CTTS (the Compatible Time-Sharing System) was running at MIT.

Time-sharing was a force multiplier on the democratizing trends in computing. Not only was hardware getting smaller, cheaper, and faster, but each machine could now be used by more people—none of whom needed physical access to the actual computer, eliminating a security risk. All that users needed was a cheap "dumb terminal," often just a teletype that could send and receive text when connected to a phone line. And that terminal might just as easily be across campus as around the world. Time-sharing began a chain of technical innovations that would lead to the modern internet.

Many teletypes featured two ink ribbons, often colored black and red, to differentiate words typed by the computer and the human when looking at the scrollback—then, a literal scroll of printer paper.

One of the first games to take advantage of time-sharing was the brainchild not of a hacker, but of a school teacher named Mabel Addis. At fifty-two years old, with hair beginning to go gray, she would design probably the earliest text game by the definition we use here. It was called *The Sumerian Game*.

```
     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 YOUR 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.
```