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Nic FlemingFeatures correspondentGames have long been accused of making players violent, but evidence has been building over the years that they can have positive effects. Scientists say they are not only understanding why, but they also trying to put these observations to the test. The spreadsheet was seven feet long. Printed in nine-point font
were the names of the perpetrators of mass killings, the models of weapons each had used, and the number of victims. The gruesome document was discovered at the home of Adam Lanza, who on 14 December 2012 fatally shot his mother, before killing 20 children and six teachers at the Sandy Hook Elementary School in Connecticut, and turning his
assault rifle on himself. It took only a few hours for the authorities to link the massacre to Lanza's playing of violent video games. "[People heading the investigation] don't believe this was just a spreadsheet," a police officer later told the New York Daily News. "They believe it was a score sheet. This was the work of a video gamer, and it was his intent
to put his own name at the very top of that list."Lanza's shooting spree was just the latest of a long list of violent crimes that have blamed on video games. Scientists have evidence that virtual violence can trigger aggressive thoughts and anti-social behaviour, but most reject the idea that gaming can turn otherwise balanced individuals into killers. A
growing body of research is showing the flip side, though - video games can help people see better, learn more accurately, and multitask more effectively. Some video games can even make young people more empathetic, helpful and sharing. As public debate on the
subject is often highly emotive and polarised, and as more and more of us are becoming gamers, researchers say it is important to move beyond the generalisations that characterise much of the discussion. "We know there are good sugars and bad sugars, and we don't discuss whether food in general is good or bad for us," says Daphne Bavelier, a
neuroscientist at the University of Rochester, New York. "We need to be far more nuanced when we talk about the effects of video games." Douglas Gentile at Iowa State University, US, agrees. "Game research has tended to get sucked down into a black hole of people yelling at each other, saying either games are good or games are bad," says Gentile
who studies the effects of video games on physiology and behaviour. "I think we are starting to move beyond this inappropriately simplistic idea to see games can be powerful teachers that we can harness." Multi-level fieldPart of this has stemmed from the fact that 20th-Century video gaming research often failed to distinguish between game genres.
Studies lumped together the different brain processes involved when racing cars, shooting baddies, street fighting, and completing puzzles. But with the benefit of hindsight, researchers now recognise they hold only limited insights into the impacts of video games. Bavelier stumbled upon the particular effects action games may have on the brain by
accident. She was designing a test to probe the effects of congenital deafness on visual attention, and while trialling it a young researcher in her department, Shawn Green, and his friends repeatedly scored far higher than expected. Eventually they realised their exceptional performance could be traced to their fondness for the action games Counter-
Strike and Team Fortress Classic. Bavelier and Green hypothesised that this type of game had distinct effects on the brain because achieving a high score requires players to react quickly, while processing the constant player feedback. In research published in
2003, they used a series of visual puzzles to demonstrate that individuals who played action games at least four days per week for a minimum of one hour per day were better than non-gamers at rapidly processing complex information, estimating numbers of objects, controlling where their attention was focused spatially, and switching rapidly
between tasks. Was this cause or effect, though? Were the games improving people's focus or were people with good attentional focus simply more likely to play action video games?, Bavelier and Green asked non-gamers to play the first-person shooter game Medal of Honor for one hour a day for 10 days, and found their ability to focus on
environmental cues improved much more than those in a control group who played the classic puzzle game Tetris. Additional tests from other researchers came to similar conclusions. For instance, Joseph Chisholm, a psychologist at the University of British Columbia, Canada, found action video game players were better able to identify distraction
and quicker to return their focus to the main task. Bavelier wanted to pin down more precisely why action gamers appear to have better focus. She placed electroencephalography (EEG) headsets on gamers and non-gamers, and asked them to watch a screen on which three rapid sequences of letters appeared simultaneously. They were told to focus
on one of the three and press a button when numbers appeared, while ignoring distractions. The EEG headsets tracked electrical signals in the brain, allowing Bevelier to measure how much attention the volunteer was allocating to the target
sequences, but the gamers performed better and had quicker reaction times. "The big difference was action video gamers are better decisions," she says. Her team has also shown that action gamers may have stronger vision. They can better distinguish between different shades
of grey, called contrast sensitivity, which is important when driving at night and in other poor visibility situations, and is affected by ageing and undermined in those with amblyopia, or "lazy eye". They also have better visual acuity, which is what opticians measure when they ask you to read lines of ever smaller letters from a chart at distance. Bavelier
found action video games could also improve the vision of non-gamers. She asked groups of non-gamers to play 50 hours of Unreal Tournament 2004 or Call of Duty 2, or to play the slower, non-action game, The Sims 2, over nine weeks. By the end of the study, the contrast sensitivity of those who trained on action games had improved more than
those who played The Sims 2, and the benefits lasted for at least five months. Other researchers at the University of California, Berkeley, showed that adults with lazy eyes who spent 40 hours playing video games with their good eyes patched could improve their ability to distinguish smaller letters on such charts. The higher scores were not seen in
those asked to do other visually demanding tasks such as reading and knitting with their good eyes patched. Power of empathyResearchers know from years of studies that when men and women are given the task of rotating two-dimensional and three-dimensional objects in their heads, men tend to perform better than women. When Jing Feng, a
psychologist at the University of Toronto, in Canada, and colleagues asked a small group of non-gamers to play either Medal of Honor or the 3D puzzle game Ballance for 10 hours over several sessions, they were surprised by the results. They found the action game training boosted the scores of the female participants more than it did the males, and
the effect of the training was still apparent five months later. "We already knew that there are gender differences in mental rotation but it was interesting to see they exist in our ability to effectively distribute attention but it was interesting to see they exist in our ability to effectively distribute attention but it was interesting to see they exist in our ability to effectively distribute attention but it was interesting to see they exist in our ability to effectively distribute attention but it was interesting to see they exist in our ability to effectively distribute attention but it was interesting to see they exist in our ability to effectively distribute attention but it was interesting to see they exist in our ability to effectively distribute attention but it was interesting to see they exist in our ability to effect the exist i
could extract the critical training components from first-person shooter games, I could see ways to develop spatial-skills training tools to address gender differences in fields like engineering and information technology. "So if playing video games can lead to beneficial brain changes, does this positively affect behaviour? Gentile set out to find out by
testing the effects of playing "pro-social" games on young people in the US, Singapore and Japan. The children and teenagers in each study were more likely to help others in real life or in simulated tasks if they played the games where the characters co-operated, helped one another, or pitched in to clean a virtual neighbourhood. When American
students were asked to select 11 puzzles for a partner to complete and were told their partners would get $10 gift vouchers if they completed 10 of them, the pro-social game players were much more likely to choose easier puzzles than those who played violent games. "Video games are neither inherently good nor bad," says Gentile. "When we play
games we want to be affected in some way, otherwise it would be boring. What we now know is that across cultures and age groups computer games can either cause problems or be beneficial, depending on its content. "Gentile's findings are supported by a study conducted by Tobias Greitemeyer, now at the University of Innsbruck, Austria. He asked
46 German students to play Lemmings, in which players must protect groups of rodents from dangers, or Tetris. They were then asked to complete three unfinished stories that included one about a driver and a cyclist who narrowly avoid a collision; another about two friends, one of whom is unapologetic despite being always late; and a third one
about a customer speaking to a restaurant manager after waiting an hour to be served and having food spilt on him. People who played Lemmings suggested less aggressive endings. Questions still remain about how long any effects could last. Gentile recently completed a study involving 3,000 schoolchildren, studied over three years. He expects to
publish the results later this year. "What we are finding is that pro-social games affect children's sense of empathy," he says. "As they become better at noticing the feelings and reactions of others, and act in more helpful and caring ways within games, this seems to affect how in tune they are with others, and how they behave in real-life. With violent
games we see the exact opposite. "Gaming systems Taken as a whole, the research poses a problem for those hoping that video games can provide a path to smarter, kinder young people. Action games are high among the best-sellers, but they involve a lot more fighting and killing than caring and sharing. This does not put those in the field off.
Bavelier, for example, recently received a US National Science Foundation grant to create, in collaboration with educational games company E-line Media, an action game for 8-to-12 year olds that improves their ability to rapidly estimate numbers - a skill that correlates with improved mathematics performance. Meanwhile Richard Davidson, a
neuroscientist at the University of Wisconsin-Madison, is leading a project to develop two games to help 11-to-14 year olds develop greater empathy, co-operation, mental focus, and self control. In Tenacity players progress through the game by keeping track of their own breathing, which helps children develop mindfulness. In Crystals of Kaydor,
players must understand the emotions of aliens and respond helpfully to win. The games are being tested in randomised trials that began in May. Davidson is well aware that many previous efforts to develop games that are good for us have resulted in titles that players don't want to play. But he knocks those failures up to academics who don't have
the required skills or resources to develop an irresistible game. "We have had a team of 12, including some of the best game designers in the country, working on these games for a year," he says. "I believe you can have fun and have beneficial effects at the same time." Media entertainment businesses have also decided the industry would benefit from
greater links with neuroscientists and psychologists, and that by collaborating with academics they could to bring beneficial and therapeutic games to market. Ultimately, however, it will be down to consumers, or their parents, to decide whether they play the games scientists say are good for them. "Our brains are constantly being shaped by the
actions we engage in and our environment, and most of that influence is unwitting," says Davidson. "Playing games today is like being in a rudderless boat. Gaming presents us with an opportunity to take greater control over the shaping of our own minds and brains. I think going forward most parents will want their children in boats with rudders."If
you would like to comment on this article or anything else you have seen on Future, head over to our Facebook page or message us on Twitter. Scientific studies show that games positively impact gamers' social and mental well-being. Benefits range from improved hand-eye coordination to mood improvement and social interaction skills. Games can
prove to be useful in teaching gamers skills that they don't even know they're learning. We've probably all been in the position of having someone tell us we're spending too much time playing games, and that the habit will rot our brains. But we now have evidence to show that gaming can actually improve our mental acuity and mood. So here are
eight ways games can help us, proven by science. Games Are More Than Just Fun Distractions Some of us have dedicated a lot of our time to gaming as a way to relax, while others see it as a way to enjoy time with friends.
Games can help us as humans, whether social or mental, and science has the evidence to prove that they work. A cross-sectional study shows that gaming can improve your problem-solving skills. By looking at a set of 27 other studies, researchers concluded that people who were trained using games were a lot better at solving complex problems than
those who weren't. It's time to find those online co-op puzzle games to help flex your mental muscles. A meta-analysis published in 2021 mentioned that RPG games were the best at helping students learn. I guess that playing Bookworm as a kid did
have its advantages. If you've played any shooter, you'll realize how improve reaction times without sacrificing accuracy. A 2022 study looking at Esports players concluded that those games may improve hand-eye coordination in children with slow
development rates. The human brain is pretty interesting. When given a task to perform repeatedly, it excels at it. In this case, tracking movements on a screen and reacting to them with a mouse click improved hand-eye coordination through repetition. It's the essence of training to be better at something. A massive study covering around 67,000
gamers from 32 countries found that gaming can significantly lift a person's mood. The study compared the improvements in a gamer's mood to be similar to what others felt while reading, shopping, or listening to music. While this might not surprise many of us who love to relax with a nice, cozy game, it's the first study to quantitatively measure how
time and the impact it had on our interactions with others. The study found that, while many people reached out to others to game and stay socially connected during the hobby with others. We have already discussed how
gaming helps with problem-solving, but it also helps with cognitive abilities. These refer to the brain's ability to think, process, retain information, and pay attention. A 2019 systematic review noted that video games can have positive impacts on the brain's structure depending on the genre since different brain parts were used to play specific types of
games. That said, I don't expect my love of the complexity behind 4X games to help me launch a political career. But it helps me engage in problem-solving and task management in a way that's both stimulating and entertainment. Someone who plays Monster Hunter may have better spatial awareness and reaction times than I do. Cognitive abilities
go beyond just processing and affect how we function as human beings. If you've played any Soulsbourne game, you know what it feels like to fail and fail again until you've finally succeeded. That moment of triumph is unlike anything else. A March 2024 paper looks at how Celeste players persist after constant failure in the platformer. Researchers
found that persistence was possible if there was a clear goal present. However, they also found that taking breaks between runs and pacing yourself was essential to maintain your mental health. Loving these kinds of games might seem masochistic to those on the outside, but they teach valuable lessons to the fans who love them. ConcernedApe A
casual look at all the Minecraft and Legend of Zelda: Tears of the Kingdom content on YouTube should prove that gaming encourages creativity, namely: Building in games as an art form Thinking about games and their systems Systems-based game design
could result in creativity in games. The term "emergent gameplay" is used a lot in the industry, but true emergent gameplay gives the players agency to create what they want within the game world. This could be something as simple as cosmetic tweaks to entire transformative mods. As someone who has been using Duolingo to learn conversational
 Spanish for a few years, I appreciate gamification in my applications. A 2022 study mentions that educational games can significantly impact learning from video games goes beyond games that were specifically designed to teach. A 2014 article argues that some commercial
"for fun" games impart knowledge, even though they didn't initially intend to do that. However, it does end with a warning that games as learning tools have limitations. If it were so simple, I'd have passed more history exams in high school because of Civilization 3. Many of us spend a lot of time playing video games, and many of us probably never
realized how beneficial they could be. They have been changing how our brains work and giving us skills we weren't aware of. Thanks to studies into how games impact gamers, we now have objective evidence that gaming is a force for good. So, the next time someone tells you that games will rot your brain, tell them science says otherwise. The
Motorsport Images Collections captures events from 1895 to today's most recent coverage. Discover The Collection Curated, compelling, and worth your time. Explore our latest gallery of Editors' Picks. Browse Editors' Favorites Experience AI-Powered Creativity The Motorsport Images Collections captures events from 1895 to today's most recent coverage.
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Explore our latest gallery of Editors' Picks. Browse Editors' Picks. Browse Editors' Favorites Experience AI-Powered Creativity Complex, challenging, and ambitious, video games have come a long way since the simple arcade titles of the 1970s—and evidence is mounting that the benefits of play go well beyond entertainment and improved hand-eye coordination. Here are 15
 ways games are programming better people.1. Video games are producing better surgeons. Video games might make for better surgeons. PressFocus/MB Media/GettyImagesWhile you may think you want to reconsider: a study of laparoscopic (small
incision) specialists found that those who played for more than three hours per week made 32 percent fewer errors during practice procedures compared to their non-gaming counterparts.2. Video games could help people overcome dyslexia. | Emanuele Cremaschi/GettyImagesSome research
points to attention difficulties as being a key component of dyslexia. One study has shown people with dyslexia improved their reading comprehension following sessions of games heavy on action. The reason, researchers believe, is that the games have constantly changing environments that require intense focus. 3. Video games could improve your
 vision.Video games could lead to better eyesight. | PressFocus/MB Media/GettyImages"Don't sit too close to the television" used to be a common parental refrain without a lot of science to back it up. Instead, scientists are discovering games in moderation may actually improve—not strain—your vision. In one study, 10 weeks of play was associated
with a greater ability to discern between different shades of gray. Another had participants try to play games using only their "lazy" eye, with the "good" one obscured. Those players showed significant, sometimes normalized improve your
leadership skills. | PressFocus/MB Media/GettyImagesBecause certain genres of games reward and encourage leadership traits—providing for "communities," securing their real-world career goals. Improvising in a game can also translate into being faster
on your feet when an office crisis crops up.5. Video games could pique your interest in history. Video games might turn you into a history buff. | Emanuele Cremaschi/GettyImagesMany games use actual historical events to drive their stories. Those characters and places can then spark a child's interest in discovering more about the culture they're
immersed in, according to researchers. More Articles About Video Games:6. Video games can get you moving. | SOPA Images/GettyImagesSome games that involve basketball, tennis, or even skateboarding can lead
to children practicing those same skills outdoors. 7. Video games might slow down the aging process. A big display of brain games" involving problem-solving, memory, and puzzle components have been shown to have a positive benefit on older players. In one study, just 10 hours of play led to
increased cognitive functioning in participants 50 and older—improvement that lasted for several years.8. Video games might help ease pain. Video games might be a pain reliever. | Ralf-Finn Hestoft/GettyImagesIt's common to try to distract ourselves from pain by paying attention to something else or focusing on other body mechanisms, which is one
way video games might help us following an injury. In one study, participants were able to keep their hand immersed in cold water longer when playing a game compared to those watching television—a passive distraction. The more immersive, the better—which is why pending virtual reality systems may one day be as prevalent in hospitals as hand
sanitizer.9. Video games can help you make new social connections. Video games can build social skills. | PressFocus/MB Media/GettyImagesGamers are sometimes stigmatized as being too insulated, but the opposite is actually true. The rise of multi-player experiences online has given way to a new form of socializing in which players work together to
solve problems. But studies have shown games can also be the catalyst for friends to gather in person: roughly 70 percent of all players play with friends at least some of the time. 10. Video games can have balance benefits. | Neilson Barnard/GettyImagesSince it is a disorder
affecting multiple nerves, multiple nerves, multiple sclerosis patients often have problems with their balance. One study showed that MS patients who played games requiring physical interaction while standing on a balance board displayed improvement afterward.11. They can improve your decision-making skills. Video games can help you make up your mind.
Chung Sung-Jun/GettyImagesWe all know someone who seems to have a faster CPU than the rest of us, able to retrieve information or react in a split second. For some, that ability might be strengthened through gaming. Because new information is constantly being displayed during play, players are forced to adapt quickly. In one study, players who
were immersed in fast-paced games were 25 percent faster in reacting to questions about an image they had just seen compared to non-players. 12. Video games were 25 percent faster in reacting to questions about an image they had just seen compared to non-players. 12. Video games were 25 percent faster in reacting to questions about an image they had just seen compared to non-players. 12. Video games were 25 percent faster in reacting to questions about an image they had just seen compared to non-players. 12. Video games were 25 percent faster in reacting to questions about an image they had just seen compared to non-players. 12. Video games were 25 percent faster in reacting to questions about an image they had just seen compared to non-players.
controller instead. A university study revealed a 24 percent reduction in desire for their vice of choice after playing Tetris compared to participants who were told to play but had to watch the game try to load instead. 13. Video games might take the edge off. | Jemal Countess/GettyImagesWhile some games are thought
to induce stress—especially when you see your character struck down for the umpteenth time—the opposite can be true. One study [PDF] that tracked players and measured heart rate found that players enjoyed decreased stress.14. Gamers might be less likely to bully. Video games could help bullies chill. | SOPA Images/GettyImagesThough the
stance is controversial, some researchers have asserted that action games may reduce a bully's motivation to—well, bully. One study that had players assume the role of both the hero and villain showed that those controlling the bad guy's behaviors displayed a greater sense of remorse over their actions.15. Video games can help address autism. Video games may reduce a bully's motivation to—well, bully.
games can have unexpected benefits for those with autism. | Sean Gallup/GettyImagesGamers using systems that incorporate the entire body to control onscreen movement have been shown to be more engaged in celebrating victories with their peers, which runs counter to the lack of communication people with autism sometimes present. In one
study, players with autism spectrum disorders were more inclined to socialize while playing an active (full body) game than if they were engaged in other types of play or playing with a stranger. A version of this story ran in 2017; it has been updated for 2023. Playing video games can have positive effects and benefits, when played in moderation. The
most notable positive effects of gaming include: Improved cognitive abilities Improved problem-solving skills and logic Increased hand-to-eye coordination Greater multi-tasking ability Faster and more accurate decision-making Enhanced prosocial behaviors Better eyesight (attention to detail) More physical activity with games that promote physical
activity (VR, mobile games) And other benefits. The Top Positive Effects of Video Games These are the main benefits of playing video games that you should know about. Improved Cognitive Abilities Video games that you should know about.
recognize and remember objects and the relations between those objects. This skill can be essential for everyday tasks such as driving, finding your way in a city, or making sense of a map or objects around you. Spatial ability is also important in several fields of study, including mathematics, natural sciences, engineering, meteorology, and
architecture. This is one of the key positive effects of video games that might be beneficial for students and professionals, but will also serve gamers well in everyday life. Enhanced Problem Solving and Logic A recent study from 2015 from Australian and Chinese research teams showed that gaming improves problem-solving skills and logic.
Researchers performed fMRI scans on 27 professional gamers and found they had more grey matter and "heightened connectivity between certain subregions in the insular cortex". In practice, this translates to enhanced cognitive abilities, which include improved problem-solving skills and logic. Many gamers play games that require a great deal of
planning, strategic thinking and using logic to achieve goals within the game, so it makes sense that they will have enhanced development in areas of the brain dedicated to problem solving and logic. Increased Hand-to-Eye Coordination Another positive effect of gaming is increased hand-to-eye coordination. A study from the University of Toronto in
2014 found that people who play games regularly have better sensorimotor skills than those who don't play video games. These skills are key for faster learning and adoption of tasks that require hand-to-eye coordination, such as bike riding, typing, or other tasks that require you to coordinate the movement of your hands with the movement of your
eyes. The study included 18 gamers and 18 non-gamers; both groups had to perform a simple task on their screens that involved following green dots with the mouse. At first, there seemed to be no major differences between the two groups. However, as the test carried on and it got repetitive, the tests showed that gamers performed with more speed
and more accuracy than non-gamers. Games allow you to develop an ability to learn sensorimotor patterns and movements faster and more efficiently, which may help you with tasks in the physical world. Greater Multi-Tasking Ability Games have shown to improve your multitasking ability. This is one of the most notable benefits of gaming because it
provides you with the ability to perform your daily tasks better and more efficiently, and also complete many tasks at the same time - especially action games. For example, you have to look at the enemy on the screen, keep track of your health, ammo, and other stats, as well as
move your character. You might also be speaking on a microphone with your teammates and friends. With all of the fast paced action and hyper-stimulation that modern games provide, gamer's may improve their multi-tasking ability. Faster and More Accurate Decision-Making Researchers from the University of Rochester found that video games can
help you make decisions faster and more accurately, which can translate into better decision-making ability in real life. The study also found that if you play action games, in particular, you're more likely to make faster and more accurate decisions over non-gamers, and even over players that play slow-paced games. When presented with a problem
action game players were up to 25 percent faster than players of slow-paced games, and their decisions were also more accurate. This skill can be valuable in areas of work where fast decisions faster and more accurately. Enhanced Prosocial
Behaviors Even though excessive gaming can make you antisocial, there are many games out there that promote the social aspect of gaming. Some games involve cooperating with other people and have better social interactions, even when
playing games. The social aspect of gaming has also grown beyond just playing prosocial games. For example, gaming may be a popular conversation topic amongst students at school. There are also scholastic esports teams and clubs being formed, along with a convergence between gaming and social media platforms such as Twitch and Discord
Although gaming is increasingly social, it is important to maintain a balance of face-to-face interactions and physical world friendships. Better Eyesight A study from 2012 conducted by Timothy J Wright and Daniel P Blakely found that people who play games are able to see more detail, especially in the periphery of their eyesight. This is especially
true for gamers of first-person shooter games where extracting information from your visual periphery is crucial for spotting enemies or dangers. This ability to see more detail in your eyesight and in the periphery of your eyesight translates to better performance in everyday tasks such as driving. With that said, it is important to give your eyesight translates to better performance in everyday tasks such as driving. With that said, it is important to give your eyes a
break from screens, ideally for a few minutes every hour of use, as excessive screen time may cause eye irritation and eye strain. Higher Accuracy quicker and with higher accuracy. A study by James C Rosser Jr et. al. from 2007 examined
laparoscopic (abdomen) surgeon training and included young surgeons that play video games to see what effects gaming would have on their ability to perform surgeries and completed the task 27% faster than non-gamers
Their accuracy also improved with more playtime. The study found that even with more modest playing time (3 hours a week), gamers performed better at tasks that require speed, accuracy, and hand-to-eye coordination. Some Video Games Promote
Teamwork Video game players play many games that include cooperating with other members of the team to achieve the goal of the game. Some of the more popular games include Team Fortress 2, Roblox, League of Legends, Dota 2, Counter Strike, Rocket League and several others. In a study conducted by Brigham Young University, teams that
played video games together for 45 minutes performed up to 20% better than teams that were involved in other forms of team-building exercises. This suggests gaming may be a good way to develop chemistry amongst team members when used as a team-building exercises. This suggests gaming may be a good way to develop chemistry amongst team members when used as a team-building exercises.
individual's ability to cooperate with other team members, which is a valuable skill to have in today's job marketplace. More Physical Activity Playing games that promote you remain sedentary the whole time. Take VR games as an example. The vast
majority of these games will have you moving around or at least standing up, which is already better for your health than playing games where you remain seated. Gamers also find VR gaming more immersive and satisfactory than traditional gaming, so it's only a matter of time before VR games become the norm in the next few years or decades
Other Benefits In addition to all the main positive effects of video games, there are also some other effects that many gamers report, including: Non-native English speakers are able to learn English faster using video games, there are also some other effects that many gamers report, including: Non-native English speakers are able to learn English faster using video games, there are also some other effects that many gamers report, including: Non-native English speakers are able to learn English faster using video games, there are also some other effects that many gamers report, including: Non-native English speakers are able to learn English faster using video games, there are also some other effects that many gamers report, including: Non-native English speakers are able to learn English speakers are able to learn English faster using video games, there are also some other effects that many gamers report, including: Non-native English speakers are able to learn English faster using video games, there are also some other effects that many gamers report, including: Non-native English speakers are able to learn English faster using video games, there are also some other effects that many gamers report, including: Non-native English speakers are also some other effects of the property of the 
perseverance, Video game players are also able to concentrate better and for longer periods than non-gamers, Other benefits include better pattern recognition, strategic thinking, risk-taking abilities, and management. The Bottom Line Gaming can be a positive and beneficial experience, when played in moderation. To experience the positive effects
of video games, it can be helpful to identify your motivation to play. If you play games in moderation, for fun and recreation, you may experience many benefits. However, if you play games excessively to escape real-life problems, then you may begin to experience many benefits. However, if you play games in moderation, you may experience many benefits.
games can have both negative and positive implications on your quality of life so it's important to be aware of your play and keep it in balance. If you, or any of your loved ones, are experiencing any negative effects of gaming, we have several resources at Game Quitters to help you out: Video games can offer a considerable amount of adventure and the several resources at Game Quitters to help you out: Video games can offer a considerable amount of adventure and the several resources at Game Quitters to help you out: Video games can offer a considerable amount of adventure and the several resources at Game Quitters to help you out: Video games can offer a considerable amount of adventure and the several resources at Game Quitters to help you out: Video games can offer a considerable amount of adventure and the several resources at Game Quitters to help you out: Video games can offer a considerable amount of adventure and the several resources at Game Quitters to help you out: Video games can offer a considerable amount of adventure and the several resources at Game Quitters to help you out: Video games can offer a considerable amount of adventure and the several resources at Game Quitters to help you out: Video games can offer a considerable amount of adventure and the several resources are the several resources are the several resources are the several resources and the several resources are the s
entertainment. Traditional games, like Tetris, or the more modern Candy Crush Saga, are puzzling brain-busters. Others, like Nintendo's Breath of the Wild or Ubisoft's Assassin's Creed series, can provide an escape from the real world. Even new technologies have given rise to exergaming, or video games that marry technology with physical activity
like Ring Fit Adventure. But many parents and caregivers are left wondering: Are video games good for my child and their developing brain? Pediatric behavioral health specialist Michael Manos, PhD, and child psychiatrist Joseph Austerman, DO, explain how video games might affect your child's brain in good and bad ways, and when video games
addiction becomes a real problem. Is gaming good for your brain? Research into how video game is being played. A 2020 overview of commercial video game studies suggests different types of video games improve different cognitive
functions. Hitting a pixelated dot back and forth allows for a different set of skills than when you're playing a first-person shooter like Call of Duty, for example. Those games are also very different from building simulators like City Skylines or Civilization VII. Those require strategy and critical thinking. And when it comes to games like Wordle, our
brains face a different set of challenges related to language and memory. "When looking at video games in general, we tend to find that visuospatial effects, like hand-eye coordination, and directed attention tend to get a little better when we're playing video games," shares Dr. Austerman. But what's unclear is how these benefits translate to the real
world outside of gaming. "Studies show while you're playing games, these things improve," he adds. "But those skills may not translate to real-world activities." That's important to keep in mind when looking at these possible benefits: They offer a new way to socialize and make friends "Video games can actually improve social connectedness," says Dr.
Austerman. If your child has friends from school who play video games online, it allows them a secondary safe space to foster those relationships with other kids their age may also be beneficial. "What kids are able to do now is connect to people around the world that share their
interest and share their belief system," he continues. "When they're not getting those in-person relationships, they may be getting that support in online relationships through multiplayer gaming." Of course, online gaming (like social media) comes with pros and cons. While they're exposed to new relationships, your child may also be exposed to
cyberbullying, people they don't know with ulterior motives and sophisticated marketing tools your child is ill-equipped to handle. "There are safe ways to do it," notes Dr. Austerman. "You can limit your kids to only being able to connect with friends or people they know in their life and you can monitor their activity." Video games increase brain
matter "Like stimulants, video gaming can increase gray matter in the brain," says Dr. Manos. "Grey matter provides interconnectivity and allows parts of your brain to communicate with other parts of your brain — is responsible for controlling your
movement, retaining your memories and regulating your memories and regulating your emotions. Essentially, the more you learn, the more you learn, the more you learn, the more you learn, the more your brain quest
objectives you have to complete in order to beat the game. But you also have a longer list of side objectives that are optional to flesh out the game is entirely up to you. With player freedom comes increased feelings of accomplishment for every task you complete and a greater
sense of imagination. "A constant barrage of reinforcement occurs often and in succession with video games," explains Dr. Manos. "The danger of a particular situation gives you a sense of accomplishment, which doesn't happen very much in real life. This makes video games incredibly stimulating and difficult to
withdraw from to do less engaging tasks like chores in the home."You're relying on visuomotor abilities, like hand-eye coordinationYou often have to pay close attention to visual and auditory cues to accomplish certain tasks in a video game. Action-adventure games like Tomb Raider or Resident Evil have quick-time events (or QTEs). With QTEs, you
between one thing and another — is also a skill that can be developed by playing video games. But it may not be generalizable to real-life activities, like following instructions given by an adult."Switching between tasks becomes easierVideo games make you set-shift constantly. Set-shifting is the ability to move back and forth between different tasks in
quick succession. The ability to direct our attention from one thing to the next — like cooking dinner on the stove while listening to a podcast or pausing a video game to start a load of laundry — is an important skill to have. "People switch tasks all the time," shares Dr. Manos. "That executive function tends to get a little better with automatic
attention tasks when playing a video game. But it doesn't facilitate switching from automatic attention to directed attention, "Meaning, outside of a video game, set switching requires intentional effort on your part and embracing certain behavioral changes that allow for that to happen. Video games offer new ways of learning often, video games attention."
require you to remember key information in order to complete tasks. Maybe you have to remember a specific code in order to open a combination for a locked door. "Those can actually be beneficial to memory," notes Dr. Austerman. "What we don't know is if this is long-term or within a very defined realm." Still, video games can be used to enhance to open a combination for a locked door."
strategies in education. Take the museum mode in Assassin's Creed, for example. This mode allows you to walk through and explore 3D recreations of ancient locations like the Parthenon in Greece. "The key is actually making it historically accurate," he continues. "But as we integrate and utilize more of our senses and experience more of a riche
context, video games allow us to retain that information and further develop our understanding of key concepts."How much gaming doesn't appear to have damaging effects on a person's mental health — unless they have a hard time walking away from gaming. It's the latest
in a large body of research that's been slowly building over the last decade suggesting internet and video game addiction only affecting 3.05% of the world's population. Young people in particular are faced with other negative consequences when they develop video game addiction. One study found
elementary school students experience poor academic performance and worse grades when they're dependent on video games for entertainment. "It becomes a problem if you see consequences to the kids being on the screen away or stop a video game and the
child has an emotional outburst, that's a big red flag. That means they can't handle the amount of screen time they're getting."Other red flags that video games may be causing consequences for your child include: Signs of depression and and
professional relationships "All of these things are red flags that signal you need to cut back on the amount of screen time they have because they've become dependent on it and it's gotten in the way of normal emotional development," he states. Guidelines for different ages It's important to set some hard limits with screen time. The younger your child,
the less they should interact with video games and other screen-based media. "Generally, the younger your kids are, the more strict you should be with their exposure to on-screen media including video games, social media and other videos," advises Dr. Austerman. "You want to maximize in-person communication and connectedness as much as
possible for as long as possible."He suggests following the American Academy of Pediatrics recommendations: Kids and older can have two or more hours of screen time per day, as long as consequences don't
arise. "The more time you spend on screen, the less time you're face-to-face with somebody in person," he stresses. "There may be long-lasting detrimental emotional connection effects of that long term, especially the younger you're exposed to video games." Rating quidelines Beyond screen time, parents may want to be conscious of the content their
child consumes. Historically, video games have had a bad rap because there's been a long-time misconception that violence showing that video games increase real-world violence," clarifies Dr. Austerman. "But there may be kids who are prone to violence that may seek out
violent video games."The Entertainment Software Rating Board (ESRB) makes informed decisions on who should access video games based on their age group. For example, games rated E (for everyone) may contain mild violence but are understood to be suited for all ages. Games rated M are geared for people 17 and up because of things like
intense violence, gore and sexual content. As a parent, you probably know your child best and what they can or can't handle. But following these guidelines is perhaps most important for younger children. "What we do see is that anytime young kids are exposed to violence, they can begin to have anxiety symptoms. They can begin to have mood
symptoms. And they tend to be less reactive to real-world violent situations," shares Dr. Austerman. "So, they tend to have less empathy for others."How parents can make sure video games provide benefitsAccording to a 2023 summary of current data and previously published research, more than 90% of American children play video games and 75% to the summary of current data and previously published research, more than 90% of American children play video games and 75% to the summary of current data and previously published research, more than 90% of American children play video games and 75% to the summary of current data and previously published research, more than 90% of American children play video games and 75% to the summary of current data and previously published research, more than 90% of American children play video games and 75% to the summary of current data and previously published research, more than 90% of American children play video games and 75% to the summary of current data and previously published research.
of American households own a video game console. "Video games, whether they're good or bad, aren't going anywhere," says Dr. Austerman. "The time we spend in front of screens, immersed in these worlds, is only going to become a larger part of our lives." That means you should set ground rules around video games the same way you set ground.
rules for other avenues of playtime. "You want to have a line of sight on them. When they're doing. You want to have a virtual line of sight on them. You want to know who they're
connecting with, how they're connecting with them and what they're doing."One way to strengthen your relationship with everybody gathering around the table to play a board game, there are similar benefits to everybody playing
the same game together," he shares. "Whenever you marry video games with in-person interactions, there's a benefit." At the end of the day, encouraging your child to play around with the technology that's given to them couldn't hurt as long as you're vigilant and communicative about the possible dangers they're facing whenever they play a game or
get online. "Video games themselves are not good or bad. This is the world we're living in and we'll continue to progress down this path," says Dr. Austerman. "A parent's job should be to moderate their child's exposure, watch out for dangers and utilize this time to connect with their kids. It's a good time to meet them where they're at." Electronic
game with user interface and visual feedback "Video Games" redirects here. For other uses, see PC game. For other uses, see PC game (disambiguation). First-generation Pong console at the Computers pielemuseum Berlin Video
games Platforms Arcade video game Game Gonsole Home console Handheld console Handheld Console Electronic game Electronic game Browser game Audio game Electronic handheld Online game Browser game Audio game Electronic handheld Online game Browser game Audio game Electronic game Audio game Electronic handheld Online game Browser game Audio game Electronic handheld Online game Browser game Audio game Electronic handheld Online game Electronic handheld Online game Browser game Audio game Electronic handheld Online game Electronic handheld Electronic handheld Electronic handheld Electronic handheld Electronic handheld Electronic handhe
Strategy Lists Arcade games highest-grossing Best-selling games franchises Most-played mobile games Games Considered the best Game of the Year soundtracks Negative reception Cancelled games highest-grossing Best-selling games franchises Most-played mobile games franchises Most-played mobile games Games Considered the best Game of the Year soundtracks Negative reception Cancelled games franchises Most-played mobile games fr
game[a] or computer game is an electronic game that involves interaction with a user interface or input device, most commonly shown in a video format on a television set, computer monitor, flat-panel display or touchscreen on
handheld devices, or a virtual reality headset. Most modern video games are audiovisual, with audio complement delivered through speakers or headphones, and sometimes also with other types of sensory feedback (e.g., haptic technology that provides tactile sensations). Some video games also allow microphone and webcam inputs for in-game
chatting and livestreaming. Video games are typically categorized according to their hardware platform, which traditionally includes LAN games, and browser games, and computer games, and computer games, and computer games, and browser games, and computer games, and computer games, and browser game
devices (such as smartphones and tablet computers), virtual and augmented reality systems, and remote cloud gaming. Video games are also classified into a wide range of genres based on their style of gameplay and target audience. The first video game prototypes in the 1950s and 1960s were simple extensions of electronic games using video-like
output from large, room-sized mainframe computers. The first consumer video game was the arcade video game Pong and the first home console, the Magnavox Odyssey. The industry grew quickly during the
"golden age" of arcade video games from the late 1970s to early 1980s but suffered from the crash of the Morth American video game market in 1983 due to loss of publishing control and saturation of the market. Following the crash, the industry matured, was dominated by Japanese companies such as Nintendo, Sega, and Sony, and established
practices and methods around the development and distribution of video games to prevent a similar crash in the future, many of which continue to be followed. In the 2000s, the core industry centered on "AAA" games, leaving little room for riskier experimental games. Coupled with the availability of the Internet and digital distribution, this gave
room for independent video game development (or "indie games") to gain prominence into the 2010s. Since then, the commercial importance of the video game industry has been increasing. The emerging Asian markets and proliferation of smartphone games in particular are altering player demographics towards casual gaming and increasing.
monetization by incorporating games as a service. Today, video game development requires numerous skills, vision, teamwork, and liaisons between different parties, including developers, publishers, distributors, retailers, hardware manufacturers, and other marketers, to successfully bring a game to its consumers. As of 2020[update], the globa
video game market had estimated annual revenues of US$159 billion across hardware, and services, which is three times the size of the global music industry and four times that of the film industry in 2019,[1] making it a formidable heavyweight across the modern entertainment industry. The video game market is also a major influence
behind the electronics industry, where personal computer component, console, and peripheral sales, as well as consumer demands for better game performance, have been powerful driving factors for hardware design and innovation. Main articles: History of video games and Early history of video games Further information: History of arcade video
games Tennis for Two (1958), an early analog computer game that used an oscilloscope for a display Spacewar! (1962), an early mainframe computer game that used an oscilloscope for a display formats. The earliest example
is from 1947—a "cathode-ray tube amusement device" was filed for a patent on 25 January 1947, by Thomas T. Goldsmith Jr. and Estle Ray Mann, and issued on 14 December 1948, as U.S. Patent 2455992.[2] Inspired by radar display technology, it consists of an analog device allowing a user to control the parabolic arc of a dot on the screen to
simulate a missile being fired at targets, which are paper drawings fixed to the screen. [3] Other early examples include Christopher Strachev's draughts game, the Nimrod computer at the 1951 Festival of Britain; OXO, a tic-tac-toe computer game by Alexander S. Douglas for the EDSAC in 1952; Tennis for Two, an electronic interactive game
engineered by William Higinbotham in 1958; and Spacewar!, written by Massachusetts Institute of Technology students Martin Graetz, Steve Russell, and Wayne Wiltanen's on a DEC PDP-1 computer in 1962. Each game has different means of display to play tic-
tac-toe,[5] Tennis for Two has an oscilloscope to display a side view of a tennis court,[3] and Spacewar! has the DEC PDP-1's vector display to have two spaceships battle each other.[6] Ralph H. Baer in 2009Nolan Bushnell in 2013 These inventions laid the foundation for modern video games. In 1966, while working at Sanders Associates, Ralph H.
Baer devised a system to play a basic table tennis game on a television screen. With the company's approval, Baer created the prototype known as the "Brown Box". Sanders patented Baer's innovations and licensed them to Magnavox, which commercialized the technology as the first home video game console, the Magnavox Odyssey, released in
1972.[7][8] Separately, Nolan Bushnell and Ted Dabney, inspired by seeing Spacewar! running at Stanford University, devised a similar version running in a smaller coin-operated arcade cabinet using a less expensive computer. This was released as Computer Space, the first arcade video game, in 1971.[9] Bushnell and Dabney went on to form Atari
Inc., and with Allan Alcorn, created their second arcade game in 1972, the hit ping pong-style Pong, which was released by Christmas 1975.[3] The success of the Odyssey and Pong, both as an arcade game and home machine, launched the video
game industry.[10][11] Both Baer and Bushnell have been titled "Father of Video Games" for their contributions.[12][13] The term "video game" was developed to describe electronic games played on a video display rather than on a teletype printer, audio speaker, or similar device.[14] This also distinguished from handheld electronic games such as
Merlin, which commonly used LED lights for indicators not in combination for imaging purposes.[15] "Computer game" may also be used as a descriptor, as all these types of games essentially require the use of a computer processor; in some cases, it is used interchangeably with "video game".[16] Particularly in the United Kingdom and Western
Europe, this is common due to the historic relevance of domestically produced microcomputers. Other terms used include digital game, for example, by the Australian Bureau of Statistics.[17] The term "computer game" can also refer to PC games, which are played primarily on personal computers or other flexible hardware systems, to distinguish
them from console games, arcade games, or mobile games, arcade games, or "TV game", had been used in the 1970s and early 1980s, particularly for home gaming consoles that rely on connection to a television set.[18] However, these terms were also used interchangeably with "video game" in the 1970s, and early 1980s, particularly for home gaming consoles that rely on connection to a television set.[18] However, these terms were also used interchangeably with "video game" in the 1970s, and early 1980s, particularly for home gaming consoles that rely on connection to a television set.[18] However, these terms were also used interchangeably with "video game" in the 1970s, and early 1980s, particularly for home gaming consoles that rely on connection to a television set.[18] However, these terms were also used interchangeably with "video game" in the 1970s, and early 1980s, particularly for home gaming consoles that rely on connection to a television set.[18] However, these terms were also used in the 1970s and early 1980s, particularly for home gaming consoles that rely on connection to a television set.[18] However, these terms were also used in the 1970s and early 1980s, particularly for home gaming consoles that rely on connection to a television set.[18] However, the set of the 1970s and early 1980s, particularly for home gaming consoles that rely on connection to a television set.[18] However, the set of the 1970s and the
primarily due to "video" and "television" being synonymous.[19] In Japan, where consoles like the Odyssey were first imported and then made within the country by the large television manufacturers such as Toshiba and Sharp Corporation, such games are known as "TV games", "TV geemu", or "terebi geemu".[20] The term "TV game" is still
commonly used into the 21st century. [20][21] "Electronic game" may also be used to refer to video games, but this also incorporates devices like early handheld electronic game" may also be used to refer to video games, but this also incorporates devices like early handheld electronic games that lack any video output. [16] The first appearance of the term "video game" may also be used to refer to video games, but this also incorporates devices like early handheld electronic games.
BusinessWeek article as the first printed use of the term. [22] Though Bushnell believed the term may have come even earlier, appearing first in a letter dated July 10, 1972. In the letter
Bushnell uses the term "video game" twice.[24] Per video game historian Keith Smith, the sudden appearance suggested that the term had been proposed and readily adopted by those in the field. Around March 1973, Ed Adlum, who ran Cashbox's coin-operated section until 1972 and then later founded RePlay Magazine, covering the coin-operated section until 1972 and then later founded RePlay Magazine, covering the coin-operated section until 1972 and then later founded RePlay Magazine, covering the coin-operated section until 1972 and then later founded RePlay Magazine, covering the coin-operated section until 1972 and then later founded RePlay Magazine, covering the coin-operated section until 1972 and then later founded RePlay Magazine, covering the coin-operated section until 1972 and then later founded RePlay Magazine, covering the coin-operated section until 1972 and then later founded RePlay Magazine, covering the coin-operated section until 1972 and then later founded RePlay Magazine, covering the coin-operated section until 1972 and then later founded RePlay Magazine, covering the coin-operated section until 1972 and then later founded RePlay Magazine, covering the coin-operated section until 1972 and then later founded RePlay Magazine, covering the contract of the contrac
amusement field, in 1975, used the term in an article in March 1973. In a September 1982 issue of RePlay, Adlum is credited with first naming these games as "video games": "RePlay's Eddie Adlum worked at 'Cash Box' when 'TV games' first came out. The personalities in those days were Bushnell, his sales manager Pat Karns, and a handful of other
'TV game' manufacturers like Henry Leyser and the McEwan brothers. It seemed awkward to call their products 'TV games', so borrowing a word from Billboard's description of movie jukeboxes, Adlum explained in 1985 that up until
the early 1970s, amusement arcades typically had non-video arcade games such as pinball machines and electro-mechanical games. With the arrival of video games in arcades during the early 1970s, there was initially some confusion in the arcade industry over what term should be used to describe the new games. He "wrestled with descriptions of
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this type of game," alternating between "TV game" and "television game" but "finally woke up one day" and said, "What the hell... video games, new genres and innovations in game development have raised the question of what are the essential factors of a video

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game that separate the medium from other forms of entertainment. The introduction of interactive films in the 1980s with games like Dragon's Lair, featured games with full motion video played off a form of media but only limited user interaction. [26] This had required a means to distinguish these games from more traditional board games that
 happen to also use external media, such as the Clue VCR Mystery Game which required players to watch VCR clips between turns. To distinguish between these two, video games are considered to require some interactivity that affects the visual display.[15] Most video games tend to feature some type of victory or winning conditions, such as a
scoring mechanism or a final boss fight. The introduction of walking simulators (adventure games that allow for exploration but lack any objectives) like Gone Home, and empathy games (video games that tend to focus on emotion) like That Dragon, Cancer brought the idea of games that allow for exploration but lack any objectives) like Gone Home, and empathy games (video games that tend to focus on emotion) like That Dragon, Cancer brought the idea of games that tend to focus on emotion) like That Dragon, Cancer brought the idea of games that tend to focus on emotion but lack any objectives) like Gone Home, and empathy games (video games that tend to focus on emotion) like That Dragon, Cancer brought the idea of games that tend to focus on emotion but lack any objectives) like Gone Home, and empathy games (video games that tend to focus on emotion) like That Dragon, Cancer brought the idea of games that tend to focus on emotion but lack any objectives) like Gone Home, and empathy games (video games that tend to focus on emotion) like That Dragon, Cancer brought the idea of games that the i
question of whether these were actually games. [27] These are still commonly justified as video games offered on Apple's iOS
App Store. Among concerns raised were games like Fortnite Creative and Roblox which created metaverses of interactive experiences, and whether the larger game and the individual experiences themselves were games or not in relation to fees that Apple charged for the App Store. Judge Yvonne Gonzalez Rogers, recognizing that there was yet an
industry standard definition for a video game, established for her ruling that "At a bare minimum, video games appear to require some level of interactivity or involvement between the player and the medium" compared to passive entertainment like film, music, and television, and "videogames are also generally graphically rendered or animated, as
opposed to being recorded live or via motion capture as in films or television".[29] See also: Glossary of video game "appears highly eclectic and diverse".[29] See also: Glossary of video game terms Freedoom, a clone of the first-person shooter Doom. Common elements include a heads-up display along the bottom that includes the
player's remaining health and ammunition. The gameplay experience varies radically between video games, but many common elements exist. Most games will launch into a title screen and give the player a chance to review options such as the number of players before starting a game. Most games are divided into levels which the player must work
the avatar through, scoring points, collecting power-ups to boost the avatar's innate attributes, all while either using special attacks to defeat enemies or moves to avoid them. This information is relayed to the player through a type of on-screen user interface such as a heads-up display atop the rendering of the game itself. Taking damage will deplete
their avatar's health, and if that falls to zero or if the avatar otherwise falls into an impossible-to-escape location, the player will lose one of their lives. Should they lose all their lives without gaining an extra life or "1-UP", then the player will reach the "game over" screen. Many levels as well as the game's finale end with a type of boss character the
player must defeat to continue on. In some games, intermediate points between levels will offer save points where the player can create a saved game on storage media to restart the game should they lose all their lives or need to stop the game and restart at a later time. These also may be in the form of a passage that can be written down and
reentered at the title screen.[citation needed] Product flaws include software bugs, along with cheat codes, Easter eggs, and other hidden secrets that were intentionally added to the game can also be exploited.
[30][31][32][33] On some consoles, cheat cartridges allow players to execute these cheat codes, and user-developed trainers allow similar bypassing for computer software games. Both of which might make the game easier, give the player additional power-ups, or change the appearance of the game. [31] Arcade video game machines at the Sugoi
arcade game hall in Malmi, Helsinki, Finland To distinguish from electronic games, a video game is generally considered to require a platform, the hardware which contains computing elements, to process player interaction from some type of input device and displays the results to a video output display. [34] This section needs additional citations for
verification. Please help improve this article by adding citations to reliable sources in this section. Unsourced material may be challenged and removed. Find sources: "Video game" - news · newspapers · books · scholar · JSTOR (November 2022) (Learn how and when to remove this message) Various gaming consoles at the Computer Games Museum in
Berlin Video games require a platform, a specific combination of electronic components or computer hardware and associated software, to operate. [35] The term system is also commonly used. These platforms may include multiple brandsheld by platform holders, such as Nintendo or Sony, seeking to gain larger market shares. [36][37][38][39][40]
Games are typically designed to be played on one or a limited number of platforms, and exclusivity to a platform or brand is used by platform the video game market. [41] However, games may be developed for alternative platforms than intended, which are described as ports or conversions. These also may be
remasters - where most of the original game's source code is reused and art assets, models, and game levels are updated for modern systems - and remakes, where in addition to asset improvements, significant reworking of the original game and possibly from scratch is performed.[42] The list below is not exhaustive and excludes other electronic
devices capable of playing video games such as PDAs and graphing calculators. PC games involve a player interacting with a personal computer (PC) connected to a video monitor. [43] Personal computer are not dedicated game platforms, so there may be differences running the same game on different hardware. Also, the openness allows
some features to developers like reduced software cost, [44] increased flexibility, increased innovation, creation of modifications or mods, open hosting for online gaming (in which a person plays a video game with people who are in a different household) and others. A gaming computer is a PC or laptop intended specifically for gaming,
typically using high-performance, high-cost components. In addition to personal computer gaming, there also exist games that work on mainframe computers and other similarly shared systems, with users logging in remotely to use the computer sand other similarly shared systems, with users logging in remotely to use the computer sand other similarly shared systems, with users logging in remotely to use the computer.
[45]A console game is played on a home console, a specialized electronic device that connects to a common television set or composite video monitor. Home consoles are specifically designed to play games using a dedicated hardware environment, giving developers a concrete hardware environment, giving developers and assurances of what features will be a common television set or composite video monitor.
available, simplifying development compared to PC game development. Usually consoles only run games developed for it, or games from other platform made by the same company, but never games developed by its direct competitor, even if the same game is available on different platforms. It often compared to PC game developed by its direct competitor, even if the same game is available on different platforms. It often compared to PC game developed by its direct competitor, even if the same game is available on different platform made by the same company, but never games developed by its direct competitor, even if the same game is available on different platform.
console platforms include Xbox, PlayStation and Nintendo. Handheld console A handheld game console, a small, self-contained electronic device that is portable and can be held in a user's hands. It features the console, a small screen, speakers and buttons, joystick or other game controllers in a single unit. Like consoles, handhelds are dedicated
platforms, and share almost the same characteristics. Handheld hardware usually is less powerful than PC or console hardware. Some handheld games from the late 1970s and early 1980s could only play one game. In the 1990s and 2000s, a number of handheld games from the late 1970s and early 1980s could only play one game. In the 1990s and 2000s, a number of handheld games from the late 1970s and early 1980s could only play one game. In the 1990s and 2000s, a number of handheld games from the late 1970s and early 1980s could only play one game. In the 1990s and 2000s, a number of handheld games from the late 1970s and early 1980s could only play one game. In the 1990s and 2000s, a number of handheld games from the late 1970s and early 1980s could only play one game. In the 1990s and 2000s, a number of handheld games from the late 1970s and early 1980s could only play one game. In the 1990s and 2000s, a number of handheld games from the late 1970s and early 1980s could only play one game. In the 1990s and 2000s, a number of handheld games from the late 1970s and early 1980s could only play one game. In the 1990s and 2000s, a number of handheld games from the late 1970s and early 1980s could only play one game. In the 1990s and 2000s, a number of handheld games from the late 1970s and early 1980s could only play one game.
 handheld console has waned in the 2010s as mobile device gaming has become a more dominant factor. Arcade video game A police-themed arcade game in which players use a light gun An arcade video game generally refers to a game played on an even more specialized type of electronic device that is typically designed to play only one game and is
encased in a special, large coin-operated cabinet which has one built-in console, controllers (joystick, buttons, etc.), a CRT screen, and audio amplifier and speakers. Arcade games are housed in a vertical cabinet, which the user typically stands
in front of to play, some arcade games use a tabletop approach, in which the display screen is housed in a table-style cabinet with a see-through table top. With table-top games. In the 1980s, video arcades were businesses in which
game players could use a number of arcade video games. In the 2010s, there are far fewer video arcades, but some movie theaters and family entertainment centers still have them. Browser game A browser game takes advantages of standardizations of technologies for the functionality of web browsers across multiple devices providing a cross-
platform environment. These games may be identified based on the website that they appear, such as with Miniclip games. Others are named based on the programming platform used to develop them, such as Java and Flash games. Mobile game With the introduction of smartphones and tablet computers standardized on the iOS and Android
operating systems, mobile gaming has become a significant platform. These games may use unique features of mobile devices that are not necessary present on other platforms, such as accelerometers, global positioning information and camera devices to support augmented reality gameplay. Cloud gaming Cloud gaming requires a minimal hardware
device, such as a basic computer, console, laptop, mobile phone or even a dedicated hardware device connected to a display with good Internet connectivity that connects to hardware, using a number of predictive methods to reduce the network
latency between player input and output on their display device. For example, the Xbox Cloud Gaming and PlayStation Now platforms use dedicated custom server blade hardware in cloud computing centers. Virtual reality Players using the PlayStation Now platforms use dedicated custom server blade hardware in cloud computing centers. Virtual reality Players using the PlayStation Now platforms use dedicated custom server blade hardware in cloud computing centers.
mounted unit that provides stereoscopic screens and motion tracking to immerse a player within virtual environment that responds to their head movements. Some VR systems include control units for the player's hands as to provide a direct way to interact with the virtual world. VR systems generally require a separate computer, console, or other
processing device that couples with the head-mounted unit. Emulation An emulator enables games from a console or otherwise different system to be run in a type of virtual machine on a modern system, simulating the hardware of the original and allows old games to be played. While emulators themselves have been found to be legal in United States
case law, the act of obtaining the game software from game manufacturers, such as Nintendo with its Virtual Console or Nintendo Switch Online offerings. Backward compatibility Backward compatibility is similar in nature to
emulation in that older games can be played on newer platforms, but typically directly though hardware and built-in software within the playStation 2 popularized the trend by having the capability of playing past generation games from the PlayStation 2 popularized the trend by having the capability of playing past generation games from the PlayStation 2 popularized the trend by having the capability of playing past generation games from the PlayStation 2 popularized the trend by having the capability of playing past generation games from the PlayStation via inserting the original game media into the newer console, while Nintendo's Wi
could play GameCube titles as well in the same manner. [46][47][48] An unlabeled game cartridge for the Nintendo Entertainment System Early arcade games, home consoles, and handheld games were dedicated hardware units with the game's logic built into the electronic componentry of the hardware. Since then, most video game platforms are
considered programmable, having means to read and play multiple games distributed on different types of media or formats including CD-ROM and DVDs, and flash memory cards. Furthermore digital distribution
over the Internet or other communication methods as well as cloud gaming alleviate the need for any physical media. In some cases, the media serves as the direct read-only memory for the game, or it may be the form of installation media that is used to write the main assets to the player's platform's local storage for faster loading periods and later
updates. Games can be extended with new content and software patches through either expansion packs which are typically available via digital distribution. These can be offered freely or can be used to monetize a game following its initial release. Several games offer players the
ability to create user-generated content to share with others to play. Other games, mostly those on personal computers, can be extended with user-created modifications or mods that alter or add onto the game, but other games, provide official support for
modding the game. [49] Main article: Game controller A North American Super NES game controller from the early 1990s Video game can use several types of input devices to translate human actions to a game. Most common are the use of game controllers like gamepads and joysticks for most consoles, and as accessories for personal computer
systems along keyboard and mouse controls. Common controls on the most recent controllers which are shipped or bundled with the console itself, while peripheral controllers are available as a separate purchase from
the console manufacturer or third-party vendors. [50] Similar control sets are built into handheld consoles and onto arcade cabinets. Newer technology improvements have incorporated additional technology into the controller or the game platform, such as touchscreens and motion detection sensors that give more options for how the player interacts
with the game. Specialized controllers may be used for certain genres of games, including racing wheels, light guns and dance pads. Digital cameras and motion detection can capture movements of the player as input into the game, which can, in some cases, effectively eliminate the control, and on other systems such as virtual reality, are used to
enhance immersion into the game. Main article: Video game graphics Handheld units, like the Game Boy, include built-in output graphics to an external video display, such as cathode-ray tube televisions, newer liquid-crystal display (LCD) televisions and built-in
screens, projectors or computer monitors, depending on the type of platform the game is played on. Features such as color depth, refresh rate, frame rate, and screen resolution are a combination of the limitations of the game is played on. Features such as color depth, refresh rate, frame rate, and screen resolution are a combination of the limitations of the game is played on.
using LED or LCD elements, text-based games, two-dimensional and three-dimensional graphics, and augmented by sound produced by internal speakers on the game's programming. This often will include
sound effects tied to the player's actions to provide audio feedback mechanics to the player that a game can take advantage of. This is most commonly haptic technology built into the game controller, such as causing the controller to shake in the player's hands to
simulate a shaking earthquake occurring in game. Video games are frequently classified by a number of factors related to how one plays them. Main article: Video game genre See also: Gameplay involves jumping between platforms. A video game, like most other forms of media,
may be categorized into genres. However, unlike film or television which use visual or narrative elements, video games are generally categorized into genres based on their gameplay interaction, since this is the primary means which one interacts with a video game. [51][52][53] The narrative setting does not impact gameplay; a shooter game is still a
shooter game, regardless of whether it takes place in a fantasy world or in outer space. [54][55] An exception is the horror fiction, the supernatural, and psychological horror. [56] Genre names are normally self-describing in terms of the type of gameplay, such as action game,
role playing game, or shoot 'em up, though some genres have derivations from III,[58] and battle royale games from Rogue,[57] Grand Theft Auto clones from Rogue,[57] Grand Theft Auto clones from Battle Royale.
with new terms; for example, first-person shooters were originally called "Doom clones" based on the 1993 game. [60] A hierarchy of game genres exist, with top-level genres like "shooter game" and "action game" that broadly capture the game's main gameplay style, and several subgenres of specific implementation, such as within the shooter game
first-person shooter and third-person shooter. Some cross-genre types also exist that fall until multiple top-level genres such as action-adventure game. A LAN party at the 2004 DreamHack with hundreds of players A video game's mode describes how many players can use the game at the same type. This is primarily distinguished by single-player
video games and multiplayer video games. Within the latter category, multiplayer games can be played in a variety of ways, including locally at the same device, on separate devices connected through a local network such as LAN parties, or online via separate devices connected through a local network such as LAN parties, or online via separate devices connected through a local network such as LAN parties, or online via separate devices connected through a local network such as LAN parties, or online via separate devices connected through a local network such as LAN parties, or online via separate devices connected through a local network such as LAN parties, or online via separate devices connected through a local network such as LAN parties, or online via separate devices connected through a local network such as LAN parties, or online via separate devices connected through a local network such as LAN parties, or online via separate devices connected through a local network such as LAN parties, or online via separate devices connected through a local network such as LAN parties, or online via separate devices connected through a local network such as LAN parties, or online via separate devices connected through a local network such as LAN parties, or online via separate devices connected through a local network such as LAN parties, or online via separate devices and local network such as LAN parties, or online via separate devices and local network such as LAN parties, or online via separate devices and local network such as LAN parties, or online via separate devices and local network such as LAN parties, or online via separate devices and local network such as LAN parties, or online via separate devices and local network such as LAN parties, or online via separate devices and local network such as LAN parties, or online via separate devices and local network such as LAN parties, or online via separate devices and local network such as LAN parties, or online via separate devices and local network such as LAN p
many offer cooperative and team-based options as well as asymmetric games (MMOs) to support hundreds of players at the same time. A small number of video games are zero-player games, in which the player has very limited interaction with the game
itself. These are most commonly simulation games where the player may establish a starting state and then let the game proceed on its own, watching the results as a passive observer, such as with many computerized simulations of Conway's Game of Life.[61] Most video games are intended for entertainment purposes.[34] Different game types
include: Core games Core or hard-core games refer to the typical perception of video games, developed for entertainment purposes. These games typically require a fair amount of time to learn and master, in contrast to casual games, and thus are most appealing to gamers rather than a broader audience. Most of the AAA video game industry is
based around the delivery of core games. [62] Casual games In contrast to core games, casual games are designed for ease of accessibility, simple to understand gameplay and quick to grasp rule sets, and aimed at mass market audience. They frequently support the ability to jump in and out of play on demand, such as during commuting or lunch
breaks. Numerous browser and mobile games fall into the casual game area, and casual games often are from genres with low intensity game elements such as match three, hidden object, time management, and puzzle games. [63] Causal games frequently use social-network game mechanics, where players can enlist the help of friends on their social
media networks for extra turns or moves each day.[64] Popular casual games include Tetris and Candy Crush Saga. More recent, starting in the late 2010s, are hyper-casual games which use even more simplistic rules for short but infinitely replayable games, such as Flappy Bird.[65] Educational games Education software has been used in homes and
classrooms to help teach children and students, and video games have been similarly adapted for these reasons, all designed to provide a form of interactivity and entertainment tied to game design elements. There are a variety of differences in their designs and how they educate the user. These are broadly split between edutainment games that tend
to focus on the entertainment value and rote learning but are unlikely to engage in critical thinking, and educational video games that are geared towards problem solving through motivation and positive reinforcement while downplaying the entertainment value. [66] Examples of educational games include The Oregon Trail and the Carmen Sandiego
series. Further, games not initially developed for educational purposes have found their way into the classroom after release, such as that feature open worlds or virtual sandboxes like Minecraft, [67] or offer critical thinking skills through puzzle video games like SpaceChem. [68] Serious games Microsoft Flight Simulator is an example of a simulation
game. Further extending from educational games, serious games are those where the entertainment factor may be augmented, overshadowed, or even eliminated by other purposes for the game, such as using video game technology for the game, such as using video game technology for the game, such as using video game technology for the game.
gamification for reinforcement training. Educational games are a form of serious games, but other types of games that resemble flight simulators to pilot aircraft (such as Microsoft Flight Simulator), advergames that are
built around the advertising of a product (such as Pepsiman), and newsgames aimed at conveying a specific advocacy message (such as NarcoGuerra).[69][70] Art games Although video games have been considered an art form on their own, games may be developed to try to purposely communicate a story or message, using the medium as a work of
art. These art or arthouse games are designed to generate emotion and empathy from the player by challenging societal norms and offering critique through the interactivity of the video game medium. They may not have any type of win condition and are designed to let the player explore through the game world and scenarios. Most art games are
indie games in nature, designed based on personal experiences or stories through a single developer or small team. Examples of art games include Passage, Flower, and That Dragon, Cancer. [71][72][73] Main article: Video game content rating system A typical ESRB rating label, listing the rating and specific content descriptors for Rabbids Go Home
Video games can be subject to national and international content rating requirements. Like with film content ratings, video game ratings typing identify the target age group that the national or regional ratings board believes is appropriate for the player, ranging from all-ages, to a teenager-or-older, to mature, to the infrequent adult-only games.
Most content review is based on the level of violence, both in the type of violence and how graphic it may be represented, and sexual content, but other themes such as drug and alcohol use and gambling that can influence children may also be identified. A primary identifier based on a minimum age is used by nearly all systems, along with additional
descriptors to identify specific content that players and parents should be aware of. The regulations vary from country to country but generally are voluntary systems include:
Entertainment Software Rating Board (ESRB) that oversees games released in the United States. ESRB ratings are voluntary and rated along a E (Everyone 10 and older), T (Teen), M (Mature), and AO (Adults Only). Attempts to mandate video games ratings in the U.S. subsequently led to the landmark Supreme Court case, Brown v.
Entertainment Merchants Association in 2011 which ruled video games were a protected form of art, a key victory for the European Union and other European countries, replacing previous national-based systems. The PEGI system uses
content rated based on minimum recommended ages, which include 3+, 8+, 12+, 16+, and 18+. Australian Classification Board (ACB) oversees the ratings of games and other works in Australia, using ratings of G (General), PG (Parental Guidance), M (Mature), MA15+ (Mature Accompanied), R18+ (Restricted), and X (Restricted for pornographic
material). ACB can also deny to give a rating to game (RC - Refused Classification). The ACB's ratings are enforceable by law, and importantly, games cannot be imported or purchased digitally in Australia if they have failed to gain a rating or were given the RC rating, leading to a number of notable banned games. Computer Entertainment Rating
Organization (CERO) rates games for Japan. Their ratings include A (all ages), B (12 and older), C (15 and over), and Z (18 and over), 
International Age Rating Coalition (IARC), a means to streamline and align the content ratings system between different region, so that a publisher would only need to complete the content ratings review for one provider, and use the IARC transition to affirm the content rating for all other regions. Certain nations have even more restrictive rules
Communist Party. Foreign games published in China often require modification by developers and publishers to meet these requirements. [76] Main article: Video game development See also: Video game industry practices Developers use various tools to create video games. Here an editor is fine-tuning the virtual camera system. Video game
development and authorship, much like any other form of entertainment, is frequently a cross-disciplinary field. Video game developers, as employees within this industry are commonly referred to, primarily include programmers and graphic designers. Over the years, this has expanded to include almost every type of skill that one might see prevalent
in the creation of any movie or television program, including sound designers, musicians; as well as skills that are specific to video games, such as the game designer, musicians; as well as skills that are specific to video games, such as the game designer. All of these are managed by producers. In the early days of the industry, it was more common for a single person to manage all of the roles needed to create a
video game. As platforms have become more complex and powerful in the type of material they can present, larger teams have been needed to generate all of the art, programming, cinematography, and more. This is not to say that the age of the "one-man shop" is gone, as this is still sometimes found in the casual gaming and handheld markets, [77]
where smaller games are prevalent due to technical limitations such as limited RAM or lack of dedicated 3D graphics rendering capabilities on the target platform (e.g., some PDAs).[78] Video games are programmed by assembling discrete
electro-mechanical components on circuit boards, which limited games to relatively simple logic. By 1975, low-cost microprocessors were available at volume to be used for video game hardware, which allowed game developers to program more detailed games, widening the scope of what was possible. [79][80] Ongoing improvements in computer
hardware technology have expanded what has become possible to create in video games, coupled with convergence of common hardware between console, computer, and arcade platforms to simplify the development process.[81] Today, game developers have a number of commercial and open source tools available for use to make games, often
 which are across multiple platforms to support portability, or may still opt to create their own for more specialized features and direct control of the game, and rendering. These engines can be augmented with specialized engines for specific
features, such as a physics engine that simulates the physics of objects in real-time. A variety of middleware exists to help developers access other features, such as playback of videos within games, and similar features. These features can be used
from a developer's programming language of choice, or they may opt to also use game development kits that minimize the amount of customization they can add into a game. Like all software, video games usually undergo quality testing before release to assure there are no bugs or
glitches in the product, though frequently developers will release patches and updates. With the growth of the size of development teams in the industry, the problem of cost has increased. Development teams in the industry, the problem of cost has increased. Development teams in the industry, the problem of cost has increased. Development teams in the industry, the problem of cost has increased.
team ranges from 5 to 50 people, and some exceed 100. In May 2009, Assassin's Creed II was reported to have a development staff of 450.[82] The growth of team size combined with greater pressure to get completed projects into the market to begin recouping production costs has led to a greater occurrence of missed deadlines, rushed games, and
the release of unfinished products.[83] While amateur and hobbyist game programming had existed since the late 1970s with the introduction of home computers, a newer trend since the mid-2000s is indie game development. Indie games are made by small teams outside any direct publisher control, their games being smaller in scope than those
from the larger "AAA" game studios, and are often experiments in gameplay and art style. Indie gaming market, and readily-available and low-cost development tools for these platforms.[84] This section needs additional citations for verification.
Please help improve this article by adding citations to reliable sources in this section. Unsourced material may be challenged and removed. (June 2023) (Learn how and when to remove this message) Main article: Game studies Although departments of computer science have been studying the technical aspects of video games for years, theories that
examine games as an artistic medium are a relatively recent development in the humanities. The two most visible schools in this emerging field are ludology and narratology. Narrativists approach video games as a storytelling medium, ones the context of what Janet Murray calls "Cyberdrama". That is to say, their major concern is with video games as a storytelling medium, ones the context of what Janet Murray calls "Cyberdrama". That is to say, their major concern is with video games as a storytelling medium, ones the context of what Janet Murray calls "Cyberdrama".
that arises out of interactive fiction. Murray puts video games in the context of the Holodeck, a fictional piece of technology from Star Trek, arguing for the video games received early widespread popular support, and
forms the basis of films such as Tron, eXistenZ and The Last Starfighter. Ludologists break sharply and radically from this idea. They argue that a video game is first and foremost a game, which must be understood in terms of its rules, interface, and the concept of play that it deploys. Espen J. Aarseth argues that, although games certainly have plots
characters, and aspects of traditional narratives, these aspects are incidental to gameplay. For example, Aarseth is critical of the widespread attention that narrativists have given to the heroine of the game Tomb Raider, saying that "the dimensions of Lara Croft's body, already analyzed to death by film theorists, are irrelevant to me as a player,
because a different-looking body would not make me play differently... When I play, I don't even see her body, but see through it and past it."[86] Simply put, ludologists reject traditional theories of art because they claim that the artistic and socially relevant qualities of a video game are primarily determined by the underlying set of rules, demands
and expectations imposed on the player. While many games rely on emergent principles, video games commonly present simulated story worlds where emergent behavior occurs within the context of the game. The term "emergent principles, video games commonly present simulated story worlds where emergent principles, video games rely on emergent principles, video games r
to the player."[87] However, emergent behavior is not limited to sophisticated games. In general, any place where event-driven instructions occur for AI in a game, emergent behavior will exist. For instance, take a racing game in which cars are programmed to avoid crashing, and they encounter an obstacle in the track: the cars might then maneuver
to avoid the obstacle causing the cars behind them to slow or maneuver to accommodate the cars in front of them and the obstacle. The programmer never wrote code to specifically create a traffic jam, yet one now exists in the game. Main articles: Intellectual property protection of video games and Video game clone Most commonly, video games are
protected by copyright, though both patents and trademarks have been used as well. Though local copyright regulations vary to the degree of protection under the Berne Convention.[88] This typically only applies to the underlying code, as well as to the artistic
aspects of the game such as its writing, art assets, and music. Gameplay itself is generally not considered copyrightable; in the United States among other countries, video games are considered to fall into the idea-expression distinction in that it is how the game is presented and expressed to the player that can be copyrighted, but not the underlying
principles of the game.[89] Because gameplay is normally ineligible for copyright, gameplay ideas in popular games are often replicated and built upon in other games. At times, this repurposing of gameplay ican be seen as beneficial and a fundamental part of how the industry has grown by building on the ideas of others.[90][91] For example Doom
(1993) and Grand Theft Auto III (2001) introduced gameplay that created popular new game genres, the first-person shooter and the Grand Theft Auto clone, respectively, in the few years after their release.[92][93] However, at times and more frequently at the onset of the industry, developers would intentionally create video game clones of
successful games and game hardware with few changes, which led to the flooded arcade and dedicated home console market around 1978.[90][94][91] Cloning is also a major issue with countries that do not have strong intellectual property protection laws, such as within China. The lax oversight by China's government and the difficulty for foreign
companies to take Chinese entities to court had enabled China to support a large grey market of cloned hardware and software systems. [95] The industry remains challenged to distinguish between creating a clone of a game that
may simply swap out art assets.[96] Main article: Video game industry E3 was one of the typical trade show events of the video game industry, following the first game hardware releases and through 1983, had little structure. Video games quickly took off
during the golden age of arcade video games from the late 1970s to early 1980s, but the newfound industry was mainly composed of game developers with little business experience. This led to numerous companies forming simply to create clones of popular games to try to capitalize on the market.[97] Due to loss of publishing control and
oversaturation of the market, the North American home video game market crashed in 1983, dropping from revenues of around $3 billion in 1983 to $100 million by 1985. Many of the North American companies created in the prior years closed down. Japan's growing game industry was briefly shocked by this crash but had sufficient longevity to
withstand the short-term effects, and Nintendo helped to revitalize the industry with the release of the Nintendo Entertainment System in North America to prevent unlicensed game development and control game distribution on their platform, methods that
continue to be used by console manufacturers today.[97] The industry remained more conservative following the 1983 crash, forming around low-risk, triple-A games and studios with large development budgets of at least $10 million or more
[98] The advent of the Internet brought digital distribution as a viable means to distribute games, and contributed to the growth of more riskier, experimental independent game development as an alternative to triple-A games in the late 2000s and which has continued to grow as a significant portion of the video game industry.[99][84] Video games
have a large network effect that draw on many different sectors that tie into the larger video game industry. While video game developers are a significant portion of the industry, other key participants in the market includes game developers are a significant portion of the industry, other key participants in the market includes
performing the marketing, public relations, and advertising of the game. Publishers frequently pay the developers ahead of time to make their games and will be involved in critical decisions about the direction of the game's progress, and then pay the developers additional royalties or bonuses based on sales performances. Other smaller, boutique
publishers may simply offer to perform the publishing of a game for a small fee and a portion of the sales, and otherwise leave the developer with the creative freedom to proceed. A range of other publisher-developer relationships exist between these points. Distributors: Publishers often are able to produce their own game media and take the role of
distributor, but there are also third-party distributors that can mass-produce game media and distribute to retailers. Digital storefronts, which include large online retailers, department and electronic stores, and specialty video
game stores, sell games, consoles, and other accessories to consumers. This has also including a trade-in market in certain regions, allowing players to turn in used games for partial refunds or credit towards other games. However, with the uprising of digital marketplaces and e-commerce revolution, retailers have been performing worse than in the
past. Hardware manufacturers: The video game console manufacturers produce console hardware, often through a value chain system that include numerous component suppliers and contract manufacturer that assemble the consoles. Further, these console manufacturers typically require a license to develop for their platform and may control the
production of some games, such as Nintendo does with the use of game cartridges for its systems. In exchange, the manufacturers may help promote games for their system and may seek console exclusivity for certain games. For games on personal computers, a number of manufacturers are devoted to high-performance "gaming computer"
hardware, particularly in the graphics card area; several of the same companies overlap with component supplies for consoles. A range of third-party manufacturers also exist to provide equipment and gear for consoles post-sale, such as additional controllers for console or carrying cases and gear for handheld devices. Journalism: While journalism
around video games used to be primarily print-based, and focused more on post-release reviews and gameplay strategy, the Internet has brought a more proactive press that use web journalism, covering games in the months prior to release as well as beyond, helping to build excitement for games ahead of release. Influencers: With the rising
importance of social media, video game companies have found that the opinions of influencers using streaming media to play through their games has had a significant impact on game sales, and have turned to use influencers alongside traditional journalism as a means to build up attention to their game before release. Esports is a major
function of several multiplayer games with numerous professional leagues established since the 2000s, with large viewership numbers, particularly out of southeast Asia since the 2010s. Trade and advocacy groups: Trade groups like the Entertainment Software Association were established to provide a common voice for the industry in response to
governmental and other advocacy concerns. They frequently set up the major trade events and conventions for the industry such as E3. Gamers: Proactive hobbyists who are players and consumers of video games. While their representation in the industry is primarily seen through game sales, many companies follow gamers' comments on social
 media or on user reviews and engage with them to work to improve their products in addition to other feedback from other parts of the market; while once dominated by younger men, the market shifted in the mid-2010s towards women and older players who generally
preferred mobile and causal games, leading to further growth in those sectors.[101] See also: Video game industry is predominantly led by major companies and 1980s before having a larger worldwide contribution. Today, the video game industry is predominantly led by major companies and 1980s before having a larger worldwide contribution.
in North America (primarily the United States and Canada), Europe, and southeast Asia including Japan, South Korea, and China. Hardware production remains or part of the production process, but digital distribution and indie game development of the late 2000s has
allowed game developers to flourish nearly anywhere and diversify the field.[102] See also: List of best-selling video games and Golden age of arcade video games for platforms popular in the early 2000s According to the market research firm Newzoo, the global video game industry drew
estimated revenues of over $159 billion in 2020. Mobile games at 23%.[1] Sales of different types of games vary widely between countries due to local preferences. Japanese consumers tend to purchase much more
handheld games than console games and especially PC games, with a strong preference for games catering to local tastes.[103][104] Another key difference is that, though having declined in the West, arcade games remain an important sector of the Japanese gaming industry.[105] In South Korea, computer games are generally preferred over
console games, especially MMORPG games and real-time strategy games. Computer games are also popular in China.[106] Main articles: Video game culture is a worldwide new media subculture formed around video games and game
playing. As computer and video games have increased in popularity over time, they have had a significant influence on popular culture as well as the increasing popularity of mobile games. Many people who play video games identify as gamers, which can mean
anything from someone who enjoys games to someone who is passionate about it. As video games become more social with multiplayer and online capability, gamers find themselves in growing social networks. Gaming can both be entertainment as well as competition, as a new trend known as electronic sports is becoming more widely accepted. In
the 2010s, video games and discussions of video game trends and topics can be seen in social media, politics, television, film and music. The COVID-19 pandemic during 2020-2021 gave further visibility to video games as a pastime to enjoy with friends and family online as a means of social distancing. [107][108] Main article: Video games as an art
form Since the mid-2000s there has been debate whether video games qualify as art, primarily as the form's interactivity interfered with the artistic intent of the work and that they are designed for commercial appeal. A significant debate on the matter came after film critic Roger Ebert published an essay "Video Games can never be art",[109] which
challenged the industry to prove him and other critics wrong.[110] The view that video games were an art form was cemented in 2011 when the U.S. Supreme Court ruled in the landmark case Brown v. Entertainment Merchants Association that video games were an art form was cemented in 2011 when the U.S. Supreme Court ruled in the landmark case Brown v. Entertainment Merchants Association that video games were an art form was cemented in 2011 when the U.S. Supreme Court ruled in the landmark case Brown v. Entertainment Merchants Association that video games were an art form was cemented in 2011 when the U.S. Supreme Court ruled in the landmark case Brown v. Entertainment Merchants Association that video games were an art form was cemented in 2011 when the U.S. Supreme Court ruled in the landmark case Brown v. Entertainment Merchants Association that video games were an art form was cemented in 2011 when the U.S. Supreme Court ruled in the landmark case Brown v. Entertainment Merchants Association that video games were an art form was cemented in 2011 when the U.S. Supreme Court ruled in the landmark case Brown v. Entertainment Merchants Association that video games were an art form was cemented in 2011 when the U.S. Supreme Court ruled in the landmark case Brown v. Entertainment Merchants Association that video games were an art form was cemented in 2011 when the U.S. Supreme Court ruled in the U.S. Supreme Court ruled i
have come to use the form more for artistic expression, including the development of art games,[112] and the cultural heritage of video Games at the Smithsonian American Art Museum and toured at other museums from
2012 to 2016. Main articles: Film adaptation § Video game adaptation, and Hollywood and the video game industry Video game within the same franchise, but also have influenced works outside of the video game medium. Numerous television shows (both animated and live-action), films, comics and novels
have been created based on existing video game franchises. Because video games are an interactive medium there has been critically panned or treated as children's media. For example, until 2019, no video game film had ever been received a "Fresh"
rating on Rotten Tomatoes, but the releases of Detective Pikachu (2019) and Sonic the Hedgehog (2020), both receiving "Fresh" ratings, shows signs of the film industry having found an approach to adapt video games for the large screen.[113][114] That said, some early video game-based films have been highly successful at the box office, such as
1995's Mortal Kombat and 2001's Lara Croft: Tomb Raider.[115] More recently since the 2000s, there has also become a larger appreciation of video game music, which ranges from chiptunes compositions for most modern games. Such music has frequently
 served as a platform for covers and remixes, and concerts featuring video game soundtracks performed by bands or orchestras, such as Video Games Live, have also become popular. [115] Video games also frequently incorporate licensed music, particularly in the area of rhythm games, furthering the depth of which video games and music can work
together.[115] Further, video games can serve as a virtual environment under full control of a producer to create new works. With the capability to render 3D actors and settings in real-time, a new type of work machinima (short for "machine cinema") grew out from using video game engines to create new works. With the capability to render 3D actors and settings in real-time, a new type of work machinima (short for "machine cinema") grew out from using video game engines to create new works. With the capability to render 3D actors and settings in real-time, a new type of work machinima (short for "machine cinema") grew out from using video game engines to create new works.
higher fidelity, they have also become part of the tools used in more traditional filmmaking. Unreal Engine has been used as a backbone by Industrial Light & Magic for their StageCraft technology for shows like The Mandalorian.[117] Separately, video games are also frequently used as part of the promotion and marketing for other media, such as
for films, anime, and comics. However, these licensed games in the 1990s and 2000s often had a reputation for poor quality, developed without any input from the intellectual property rights owners, and several of them are considered among lists of games with notably negative reception, such as Superman 64. More recently, with these licensed
games being developed by triple-A studios or through studios directly connected to the licensed property owner, there has been a significant improvement in the quality of these games, with an early trendsetting example of Batman: Arkham Asylum.[118] This section's tone or style may not reflect the encyclopedic tone used on Wikipedia. See
 Wikipedia's guide to writing better articles for suggestions. (June 2023) (Learn how and when to remove this message) Main articles: Video games have been seen to provide value in education across several ages and comprehension
levels. Learning principles found in video games have been identified as possible techniques with which to reform the U.S. education system.[119] It has been noticed that gamers adopt an attitude while playing that is of such high concentration, they do not realize they are learning, and that if the same attitude could be adopted at school, education
would enjoy significant benefits.[120][dubious - discuss] Students are found to be "learning by doing" while playing video games while fostering creative thinking.[121] Video game players have better hand-eye coordination and visuo-motor skills, such
as their resistance to distraction, their sensitivity to information in the peripheral vision and their abilities could be acquired by training with action games, involving challenges that switch attention between different locations, but not with gamesaction, their sensitivity to information in the peripheral vision and their abilities could be acquired by training with action games, involving challenges that switch attention between different locations, but not with gamesaction and their abilities could be acquired by training with action games, involving challenges that switch attention between different locations, but not with gamesaction and their abilities could be acquired by training with action games, involving challenges that switch attention between different locations, but not with gamesaction and their abilities could be acquired by training with action games.
requiring concentration on single objects.[citation needed] A 2018 systematic review found evidence that video gaming training had positive effects on cognitive and emotional skills in the adult population, especially with young adults.[123] A 2019 systematic review also added support for the claim that video games are beneficial to the brain,
although the beneficial effects of video games types.[124] How can video games types.[124] How can video games boost your mental health? - Max Birk (Eindhoven University of Technology) Organisers of video gaming events, such as the organisers of the D-Lux video game festival in Dumfries, Scotland, have emphasised the positive aspects
video games can have on mental health. Organisers, mental health workers and mental health nurses at the event emphasised the relationships and friendships that can be built around video games and how playing games can help people learn about others as a precursor to discussing the person's mental health. [125] A study in 2020 from Oxford
greater "wellbeing".[126][127] Also in 2020, computer science professor Regan Mandryk of the University of Saskatchewan said her research also showed that video games can have health benefits such as reducing stress and improving mental health. The university's research studied all age groups - "from pre-literate children through to older adults."
living in long term care homes" - with a main focus on 18 to 55-year-olds. [128] A study of gamers attitudes towards gaming which was reported about in 2018 found that millennials use video gamers, 55% said that it "helps them to unwind and relieve stress ... and half said they see
the value in gaming as a method of escapism to help them deal with daily work pressures".[129] This section needs additional citations for verification. Please help improve this article by adding citations for verification. Please help improve this article by adding citations for verification.
scholar · JSTOR (June 2023) (Learn how and when to remove this message) Main article: Video games is believed to trigger dopamine release that can encourage addictive behavior. Video games have caused controversy since the 1970s.[130]
 Parents and children's advocates regularly raise concerns that violent video games can influence young players into performing those violent acts in real life, and events such as the Columbine High School massacre in 1999 in which some claimed the perpetrators specifically alluded to using video games to plot out their attack, raised further fears.
[citation needed] Medical experts and mental health professionals have also raised concerned that video games may be addictive, and the World Health Professionals have also raised concerned that video games may be addictive, and the World Health Professionals have also raised concerned that video games may be addictive, and the World Health Professionals have also raised concerned that video games may be addictive, and the World Health Professionals have also raised concerned that video games may be addictive, and the World Health Professionals have also raised concerned that video games may be addictive, and the World Health Professionals have also raised concerned that video games may be addictive, and the World Health Professionals have also raised concerned that video games may be addictive, and the World Health Professionals have also raised concerned that video games may be addictive, and the World Health Professionals have also raised concerned that video games may be addictive, and the World Health Professionals have also raised concerned that video games may be addictive, and the World Health Professionals have also raised concerned that video games may be addictive, and the World Health Professionals have also raised concerned that video games may be addictive, and the World Health Professional have also raised concerned that video games may be addictive, and the World Health Professional have also raised concerned that video games may be addictive, and the World Health Professional have also raised concerned that video games may be addictive, and the World Health Professional have also raised concerned that video games may be addictive, and the World Health Professional have also raised concerned that video games may be addictive, and the World Health Professional have also raised concerned that video games may be addictive, and the World Health Professional have also raised that video games are raised to the world have also raised to the world have also raised to the world have also raised to the wo
stated that there is insufficient evidence that video games can create violent tendencies or lead to addictive behavior, [131] though agree that video games typically use a compulsion loop in their core design that can create dopamine that can help reinforce the desire to continue to play through that compulsion loop and potentially lead into violent or
addictive behavior.[132][133][134] Even with case law establishing that video games qualify as a protected art form, there has been pressure on the video game industry to keep their products in check to avoid over-excessive violence particularly for games aimed at younger children. The potential addictive behavior around games, coupled with
increased used of post-sale monetization of video games, has also raised concern among parents, advocates, and government officials about gambling tendencies that may come from video games around video games and its industry have
arisen over the years, among the more notable incidents include the 1993 United States Congressional hearings on violent games like Mortal Kombat which lead to the formation of the ESRB ratings system, numerous legal actions taken by attorney Jack Thompson over violent games such as Grand Theft Auto III and Manhunt from 2003 to 2007, the
outrage over the "No Russian" level from Call of Duty: Modern Warfare 2 in 2009 which allowed the player to shoot a number of innocent non-player characters at an airport, and the Gamergate harassment campaign in 2014 that highlighted misogyny from a portion of the player demographic. The industry as a whole has also dealt with issues related
to gender, racial, and LGBTQ+ discrimination and mischaracterization of these minority groups in video games. A further issue in the industry is related to working hours, in the weeks and months ahead of a game's release to assure on-time
delivery. Main articles: Video game collecting and Video game preservation See also: List of video games from the first decades. Games in retail packaging in good shape have become collectors items for the
early days of the industry, with some rare publications having gone for over US$100,000 as of 2020[update]. Separately, there is also concern about the preservation of video games, as both game media and the hardware to play them degrade over time. Further, many of the game developers and publishers from the first decades no longer exist, so
records of their games have disappeared. Archivists and preservations have worked within the scope of copyright law to save these games as part of the cultural history of the industry. There are many video game museums around the world, including the National Videogame Museum in Frisco, Texas,[135] which serves as the largest museum wholly
dedicated to the display and preservation of the industry's most important artifacts. [136] Europe hosts video game museum such as the Computer Games Museum of Art and Digital Entertainment in Oakland, California is a dedicated
video game museum focusing on playable exhibits of console and computer games. [140] The Video Game Museum of Rome is also dedicated to preserving video games and their history. [141] The International Center for the History of Electronic Games
and game-related historical materials in the world, including a 5,000-square-foot (460 m2) exhibit which allows guests to play their way through the history of video games on permanent display: Pac-Man, Dragon's Lair, and Pong.[143] The Museum of Modern Art
has added a total of 20 video games and one video games and one video games and one video games and one video games belong in an art
museum.[149][150] Video games portal Lists of video games List of accessories to video games List of accessories to video games by system Outline of video games have a been continuously listed and esports to the next level. World Economic Forum. Archived from the original on 5 May
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Detailed empire management, seen here in Freeciv, is a central aspect of 4X strategy games. Part of a series on Strategy video games Subgenres 4X Auto battler Multiplayer online battle arena Real-time strategy Time management Real-time strategy video games. Part of a series on Strategy Time management Real-time strategy video games.
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 Emphasis is placed upon economic and technological development, as well as a range of military and non-military routes to supremacy. The earliest 4X games were turn-based, but real-time 4X games were also common. Many 4X computer games
were published in the mid-1990s, but were later outsold by other types of strategy games. Sid Meier's Civilization is an important example from this formative era, and popularized the level of detail that later became a staple of the genre. In the board (and
card) game domain, 4X is less of a distinct genre, in part because of the practical constraints of components and playing time. The Civilization board game that gave rise to Sid Meier's Civilization board game that gave rise to Sid Meier's Civilization for instance, includes neither exploration nor extermination. Unless extermination is targeted at non-player entities, it tends to be either nearly impossible and playing time.
(because of play balance mechanisms, since player elimination is usually considered an undesirable feature) or certainly unachievable (because victory conditions are triggered before extermination can be completed) in board games. 4X computer games such as Master of Orion II let empires explore the map, expanding by founding new colonies and
exploiting their resources. The game can be won by becoming an elected leader of the galaxy, exterminating all opponents, or eliminating the Antarans. The term "4X" originates from a 1993 preview of Master of Orion in Computer Gaming World by game writer Alan Emrich where he rated the game "XXXX" as a pun on the XXX rating for
pornography. The four Xs were an abbreviation for "EXplore, EXpand, EXploit and EXterminate".[7] Emrich wrote, "Quadruple-X - I give MOO a XXXX rating because it features the essential four X's of any good strategic conquest game: EXplore, EXpand, EXploit and EXterminate. In other words, players must rise from humble beginnings, finding
their way around the map while building up the largest, most efficient empire possible. Naturally, the other players will be trying to do the same, therefore their extermination becomes a paramount concern. A classic situation, indeed, and when the various parts are properly designed, other X's seem to follow. Words like EXcite, EXperiment and
EXcuses (to one's significant others) must be added to a gamer's X-Rating list."[8] By February 1994, another author in the magazine said that Command Adventures: Starship "only pays lip service to the four Xs",[9] and other game commentators adopted the "4X" label to describe similar games.[1] The 4X game genre has come to be defined as
having the four following gameplay conventions:[1][2][3] Explore means players send scouts across a map to reveal surrounding territories. Expand means players gather and use resources in areas they control, and
improve the efficiency of that usage. Exterminate means attacking and eliminating rival players. Since in some games all territory is eventually claimed, eliminating a rival's presence may be the only way to achieve further expansion. These gameplay, or may overlap with each other over varying
lengths of game time depending on game design.[10] For example, the Space Empires series and Galactic Civilizations II: Dark Avatar have a long expansion phase, because players must make large investments in research to explore and expand into all areas.[11][12][13] Emrich later expanded his concept for designing Master of Orion 3 with a fifth
X, eXperience, an aspect that came with the subject matter of the game.[14] In modern-day usage, 4X games are different from other strategy games[15][16][17] such as Command & Conquer[16][18] by their greater complexity and scale,[19] and their complex use of diplomacy.[15] Reviewers have also said that 4X games feature a range of
diplomatic options, [20][21][22][23] and that they are well known for their large detailed control over an empire's economy, while other computer strategy games simplify this in favor of combat-focused gameplay. [19] 4X computer and board games are a subgenre of strategy
games,[1][2][3] and include both turn-based and real-time strategy titles.[4][5] The gameplay involves building an empire,[6] which takes place in a setting such as Earth,[24] a fantasy world, or in space.[10] Each player takes control of a different civilization or race with unique characteristics and strengths. Most 4X games give each faction unique
economic and military bonuses. One part of Freeciv's technology tree, which represents a series of advancements that players can unlock to gain new units, buildings, and other capabilities. Technology trees in 4X games are typically larger than in
other strategy games, featuring a larger selection of different choices.[15][25] Empires must generate research resources and invest them in new technology.[26] In 4X games, the main prerequisite for researching an advanced technology.[26] In 4X games, the main prerequisite for researching an advanced technology.[26] In 4X games, the main prerequisite for researching an advanced technology.[26] In 4X games, the main prerequisite for researching an advanced technology.[26] In 4X games, the main prerequisite for research resources and invest them in new technology.[26] In 4X games, the main prerequisite for research resources and invest them in new technology.[26] In 4X games, the main prerequisite for research resources and invest them in new technology.[26] In 4X games, the main prerequisite for research resources and invest them in new technology.[26] In 4X games, the main prerequisite for research resources and invest them in new technology.[26] In 4X games, the main prerequisite for research resources and invest them in new technology.[26] In 4X games, the main prerequisite for research resources and invest them in new technology.[26] In 4X games, the main prerequisite for research resources and invest them in new technology.[26] In 4X games, the main prerequisite for research resources and invest the main prerequisite for research resources and invest the main prerequisite for research resources.
technological progress is achieved by building structures that grant access to more advanced structures and units.[27] Research is important in 4X games because technology or greater numbers, with battle tactics playing a smaller part.[29][30] In
contrast, military upgrades in non-4X games are sometimes small enough that technologically basic units remain important throughout the game. [31] Combat is an important part of 4X games allow a player to win by exterminating all rival players, or by conquering a threshold amount of the game's universe. [32] Some 4X
games, such as Galactic Civilizations, resolve battles automatically, whenever two units from warring sides meet. [33] This is in contrast to other 4X games with more detailed control over battles, victory is usually determined by
superior numbers and technology, with battle tactics playing a smaller part. [29][30] 4X games differ from other combat-focused strategy games by putting more emphasis on research and economics. [7][19] Researching new technology will grant access to new combat units. Some 4X games even allow players to research different unit components
This is more typical of space 4X games, where players may assemble a ship from a variety of engines, shields, and weaponry.[33] 4X games allow rival players to engage in diplomacy.[20][21][22][23] While some strategy games may offer shared victory and team play, diplomatic relations tend to be restricted to a binary choice between an ally or
enemy. 4X games often allow more complex diplomatic relations between competitors who are not on the same team.[15][16][17] Aside from making allies and enemies, players are also able to trade resources and information with rivals.[5] In addition to victory through conquest, 4X games offer peaceful victory conditions or goals that involve no
extermination of rival players (although war may still be a necessary by-product of reaching said goal).[19] For example, a 4X game may offer victory to a player who achieves a certain number of turns.[35] Many 4X games award victory to the first player to master an advanced technology, accumulate a larger who achieves a certain number of turns.[35] Many 4X games award victory to the first player to master an advanced technology, accumulate a larger who achieves a certain number of turns.[35] Many 4X games award victory to the first player who achieves a certain number of turns.[35] Many 4X games award victory to the first player who achieves a certain number of turns.[35] Many 4X games award victory to the first player who achieves a certain number of turns.[35] Many 4X games award victory to the first player who achieves a certain number of turns.[35] Many 4X games award victory to the first player who achieves a certain number of turns.[35] Many 4X games award victory to the first player who achieves a certain number of turns.[35] Many 4X games award victory to the first player who achieves a certain number of turns.[35] Many 4X games award victory to the first player who achieves a certain number of turns.[35] Many 4X games award victory to the first player who achieves a certain number of turns.[35] Many 4X games award victory to the first player who achieves a certain number of turns.[35] Many 4X games award victory to the first player who achieves a certain number of turns.[35] Many 4X games award victory to the first player who achieves a certain number of turns.[35] Many 4X games award victory to the first player who achieves a certain number of turns.[35] Many 4X games award victory to the first player who achieves a certain number of turns.[35] Many 4X games award victory to the first player who achieves a certain number of turns.[35] Many 4X games award victory to the first player who achieves a certain number of turns.[35] Many 4X games award victory to the first player who achieves a certain numbe
amount of culture, or complete an awe-inspiring achievement.[33] Several 4X games award "diplomatic victory" to anyone who can win an election decided by their rival players, [36][37] or maintain peace for a specified number of turns.[35] Galactic Civilizations has a diplomatic victory which involves having alliances with at least four factions, without a specified number of turns.[35] Galactic Civilizations has a diplomatic victory which involves having alliances with at least four factions, without a specified number of turns.[35] Galactic Civilizations has a diplomatic victory which involves having alliances with at least four factions, without a specified number of turns.[35] Galactic Civilizations has a diplomatic victory which involves having alliances with at least four factions, without a specified number of turns.[35] Galactic Civilizations has a diplomatic victory which involves having a specified number of turns.[35] Galactic Civilizations has a diplomatic victory which involves having a specified number of turns.[35] Galactic Civilizations has a diplomatic victory which involves having a specified number of turns.[35] Galactic Civilizations have a specified numb
no factions outside of one's alliance; there are two ways to accomplish this: ally with all factions, or ally with all factions, or ally with all factions and destroy the rest. 4X games are known for their complex gameplay [22][23] and strategic depth. [6][4][38] Gameplay usually takes priority over elaborate graphics. [25][39] Whereas other strategy
games focus on combat, 4X games also offer more detailed control over diplomacy, economics, and research; [7][19] creating opportunities for diverse strategies simultaneously, and plan for long-term objectives. [41] To experience a detailed model of a large empire, 4X games are
designed with a complex set of game rules.[22] For example, the player's productivity may be limited by pollution.[42][43] Players may need to balance a budget, such as managing debt,[44] or paying down maintenance costs.[45] 4X games often model political challenges such as civil disorder,[32][42] or a senate that can oust the player's political
party or force them to make peace. [42][46] FreeCol is typical of 4X games where there is a separate interface for management into different interface screens and modes, [19]
such as a separate screen for diplomacy,[47][48] managing individual settlements, and managing battle tactics.[33][34] Sometimes systems are intricate enough to resemble a minigame.[41][49] This is in contrast to most real-time strategy games. Dune II, which arguably established the conventions for the real-time strategy genre, was fundamentall
designed to be a "flat interface", with no additional screens. [27] Since 4X games involve managing a large, detailed empire, game sessions usually last longer than other strategy games. [19] Game sessions may require several hours of play-time, which can be particularly problematic for multiplayer matches. [50] For example, a small-scale game in
Sins of a Solar Empire can last longer than twelve hours. [22] However, fans of the genre often expect and embrace these long game sessions; [51] Emrich wrote that "when the various parts are properly designed, other X's seem to follow. Words like EXcite, EXperiment and EXcuses (to one's significant others)". [7] Turn-based 4X games typically
divide these sessions into hundreds of turns of gameplay.[41][52] Because of repetitive actions and long-playing times, 4X games have been criticized for excessive micromanagement. In early stages of a game this is usually not a problem, but later in a game directing an empire's numerous settlements can demand several minutes to play a single
turn. This increases playing-times, which are a particular burden in multiplayer games. [50] 4X games began to offer AI governors that automate the micromanagement of a colony's build orders, but players criticized these governors that automate the micromanagement of a colony's build orders, but players criticized these governors for making poor decisions. In response, developers have tried other approaches to reduce micromanagement, [53] and
made empire management more elegant. [23][38] On the other hand, Master of Orion III reduced micromanagement by limiting complete player control over their empire. [56][57] Most 4X and similar strategy games feature multiple possible ways to win the game. For example, in Civilization, players may win through total domination of all opposing
players by conquest of their cities, but may also win through technological achievements (being the first to launch a spacecraft to a new planet), diplomacy (being elected the world leader by other nations), or other means. Multiple victory conditions help to support the human player who may have to shift strategies as the game progresses and
 opponents secure key resources before the player can. However, these multiple conditions can also give the computer-controlled opponents multiple pathways to potentially outwit the player, who is generally going to be over-powered in certain areas over the computer opponents. A component of the late-game design in 4X games is forcing the player, who is generally going to be over-powered in certain areas over the computer opponents.
to commit to a specific victory condition by making the cost and resources required to secure it so great that other possible victory conditions may need to be passed over.[58] Sid Meier, the creator of the Civilization series of 4X games Early 4X games were influenced by board games, such as Stellar Conquest published by Metagaming Concepts in
1974, and text-based computer games from the 1970s. [59] Cosmic Balance II, Andromeda Conquest and Reach for the Stars were published in 1983, and are now seen retrospectively as 4X games. Although Andromeda Conquest was only a simple game of empire expansion, Reach for the Stars introduced the relationship between economic growth,
technological progress, and conquest.[28] Trade Wars, first released in 1984, though primarily regarded as the first multiplayer space trader, included space exploration, resource management, empire building, expansion and conquest. It has been cited by the author of VGA Planets as an important influence on VGA Planets 4.[60] In 1991, Sid Meier
released Civilization and popularized the level of detail that has become common in the genre.[61] Sid Meier's Civilization was influenced by board game also called Civilization. A notable similarity between the Civilization computer game and board game is the importance of diplomacy and technological
advancement. Sid Meier's Civilization was also influenced by personal computer games, such as the city management game SimCity and the wargame Empire.[62] Civilization became widely successful and influenced many 4X games to come;[61] Computer Gaming World compared its importance to computer gaming to that of the wheel.[63] Armada
2525 was also released in 1991 and was cited by the Chicago Tribune as the best space game of the year. [64] A sequel, Armada 2526, was released in 2009. [65] In 1991, two highly influential space games were released for the PC, while Spaceward Ho! was released on the Macintosh. Although 4X space games were
ultimately more influenced by the complexity of VGA Planets, Spaceward Ho! is notable for its similarity to the 1993 game Master of Orion, [7][67] with its simple yet deep gameplay. [34] Master of Orion drew upon earlier 4X games such as Reach for the Stars, [7]
[68] and is considered a classic game that sets a new standard for the genre.[34][50] In a preview of Master of Orion, Emrich coined the term "XXXX" to describe the emerging genre.[7] Eventually, the "4X" label was adopted by the game industry, and is now applied to several earlier game releases.[69] Following the success of Civilization and Master of Orion, Emrich coined the term "XXXX" to describe the emerging genre.[7] Eventually, the "4X" label was adopted by the game industry, and is now applied to several earlier game releases.
of Orion, other developers began releasing their own 4X games. In 1994, Stardock launched its first version of the Galactic Civilizations series for OS/2,[70] and the long-standing Space Empires series began as shareware. Ascendancy and Stars! were released in 1995, and both continued the genre's emphasis on strategic depth and empire
management.[69] Meanwhile, the Civilization[71] and Master of Orion[72] franchises expanded their market with versions for the Macintosh. Sid Meier's team also produced Colonization II in 1996,[73] while Simtex released Master of Orion in 1994 and Master of Orion II in 1996.[74] By the late
1990s, real-time strategy games began outselling turn-based games.[75] As they surged in popularity, major 4X developers fell into difficulties. Sid Meier's Firaxis Games released Sid Meier's Alpha Centauri in 1999 to critical acclaim, but the game fell short of commercial expectations.[76] Civilization III encountered development problems followed
by a rushed release in 2001.[77] Despite the excitement over Master of Orion III, its release in 2003 was met with criticism for its lack of player control, poor interface, and weak AI.[57] Game publishers eventually became risk-averse to financing the development of 4X games.[6] Firaxis has continued to develop the Civilization series, with Civilization
IV (2005), Civilization V (2010),[78] Civilization VI (2016), and Civilization VI (2025),[79] along with expansion packs for each. Among major changes to the series have been new victory conditions, switching from a square to a hex-based grid, de-stacking military units to encourage more strategic battles, and more customizable options for
governance and culture. Firaxis also developed Civilization Revolution (2008) and its sequel (2014) as lightweight, consoles with Civilization vI. Firaxis also developed a spiritual sequel to Sid Meier's Alpha Centauri with Civilization: Beyond Earth (2014). As of the consoles with Civilization vI. Firaxis also developed Civilization vI. Firaxis also developed a spiritual sequel to Sid Meier's Alpha Centauri with Civilization: Beyond Earth (2014). As of the consoles with Civilization vI. Firaxis also developed a spiritual sequel to Sid Meier's Alpha Centauri with Civilization vI. Firaxis also developed Civilization vI. Firaxis also developed a spiritual sequel to Sid Meier's Alpha Centauri with Civilization vI. Firaxis also developed Civilization vI. Firaxis also developed Civilization vII. Firaxis also d
2021, the Civilization series has sold more than 57 million units. [81] The Total War series remains in development, with the latest title, Total War: Pharaoh released in 2023. Stardock entered the market through a remake of the 1993 OS/2 game, Galactic Civilizations (2003), a space-themed 4X game. The game was successful and was compared
favorably to Master of Orion, and led Stardock to continue the series with Galactic Civilizations II: Dread Lords (2007), Galactic Civilizations III (2015), and Galactic Civilizations IV (2022).[82][83] Paradox Interactive is a company that was spun out from developing video game adaptions of board games from Target Games. Through 2000 and 2003
the company began producing their own grand strategy video games, which included the Europa Universalis series set in the Wictoria period, and the Hearts of Iron series involving World War II. These series, as of 2023, remain under
active development at Paradox, along with Stellaris (2016), a grand strategy title based on space conflict.[58] Paradox also acquired the Age of Wonders series, which is a 4X series based on a high fantasy world that includes elements of magic.[84] Amplitude Studios entered the 4X venue with Endless Space (2012) and its sequel (2017),[85] Endless
Legend (2014),[86] and Humankind (2021).[87][88] The 4X genre has also been extended by gamers who have supported free software releases such as Freeciv,[89] FreeCol,[90] Freeorion, Golden Age of Civilizations,[91] and C-evo.[92] Indie game developers have also contributed towards the 4X genre during the 2010s and 2020s. Grand strategy
games, such as Hearts of Iron, Crusader Kings, or Stellaris, are a sub-genre or sister genre of 4X that typically require even more detailed planning where grand strategy games originate, they are conventionally defined as those games in which the
player governs all the capacities of a nation-state, including its economy, diplomacy, and internal politics, with a focus on grand strategy (a nation-state's generalised prerogative in defining and pursuing its interests on the world stage), as against games where the player mostly commands the military during wartime. In computer gaming, this player mostly commands the military during wartime.
definition holds considerable overlap with that of 4X games, thus a more restrictive set of defining traits are usually used. Grand strategy games are typically lack
such victory conditions and instead scope themselves over a definite period of time, with specific starting and ending dates. As in 4X games, players are usually the only factor accounted for in victory. This results in longer, more complex and free-
form campaigns structured largely by player-driven goals. Grand strategy games can also differ from traditional 4X games in being "asymmetrical", meaning that players are bound to play out specific (often historical) starting conditions, rather than play as a set of equally free factions exploring and progressing in an open world. For example, 4X
Civilization starts all players on equal footing, as small tribes in a largely ahistoric wilderness, while some grand strategies seek to at least approximately represent the actual conditions of their time period, even when those are not fairly balanced toward all players. The open-ended, sprawling, and convoluted nature of grand strategy campaigns
makes even major asymmetries strategically tractable: with no hard victory conditions, players to "rush" toward instant victory thresholds (military or otherwise), and thus no simple way for any one player to credibly brandish the threat
of imminent and irremediable defeat against the others, contest in grand strategies typically emerges more organically than in 4X games, when and where it is geopolitically meaningful, rather than as the inevitable outcome of a game's initial configuration as a battle royal.[93] Eventually real-time 4X games were released, such as Imperium Galactically meaningful, rather than as the inevitable outcome of a game's initial configuration as a battle royal.[93] Eventually real-time 4X games were released, such as Imperium Galactically meaningful, rather than as the inevitable outcome of a game's initial configuration as a battle royal.[93] Eventually real-time 4X games were released, such as Imperium Galactically meaningful, rather than as the inevitable outcome of a game's initial configuration as a battle royal.[93] Eventually real-time 4X games were released, such as Imperium Galactically meaningful, rather than as the inevitable outcome of a game's initial configuration as a battle royal.[93] Eventually real-time 4X games were released, such as Imperium Galactically meaningful, rather than as the inevitable outcome of a game's initial configuration as a battle royal.[93] Eventually real-time 4X games were released, such as Imperium Galactically meaningful, rather than as the inevitable outcome of a game's initial configuration as a battle royal.[93] Eventually real-time 4X games were released, such as Imperium Galactically meaningful, rather than as the inevitable outcome of a game's initial configuration as a battle royal.[93] Eventually real-time 4X games were released, such as Imperium Galactically meaningful, rather than as the inevitable outcome of a game's initial configuration as a battle royal.[93] Eventually real-time 4X games were released, such as Imperium Galactically meaningful, rather than as the inevitable outcome of a game's initial configuration as a battle royal. The inevitable outcome of a game's initial configuration as a battle royal. The inevitable outcome of a game's initial configuration
in 1997,[4] Starships Unlimited in 2001,[5] and Sword of the Stars in 2006, featuring a combination of turn-based strategy amentage are a "RT4X" game.[2][94] This combination of features earned the game a
mention as one of the top games from 2008, including GameSpot's award for best strategy game, and IGN's award for best PC game. [95][96][97][98] The Total War, combines a turn-based campaign map and real-time tactical battles. Cross-fertilization between board games and video games continued
For example, some aspects of Master of Orion III were drawn from the first edition of the board game Twilight Imperium.[99] Even Sins of a Solar Empire was inspired by the idea of adapting the board game Buck Rogers Battle for the 25th Century into a real-time video game.[100] Going in the opposite direction, in 2002 Eagle Games made a board
game adaptation of Sid Meier's Civilization, entitled simply Sid Meier's Civilization: The Board Game, was released in 2010 by Fantasy Flight
Games, followed by Civilization: A New Dawn in 2017.[102][103] Through the Ages: A Story of Civilization is a board game for 2-4 players designed by Vlaada Chvatil and published by Czech Board Games in 2006. Its theme is the development of human civilization and the players determine the progress of their own civilization in different fields
including culture, government, leadership, religion and science.[104] The game won multiple awards in 2010, where it was published as Cywilizacja: Poprzez Wieki.[105] Scythe is a board game for one to five players designed by Jamey Stegmaier and published by
Stonemaier Games in 2016. Set in an alternate history version of 1920s Europe, players control factions that produce resources, develop economic infrastructure, and use dieselpunk war machines, called "mechs", to engage in combat and control territories. [106] Players take up to two actions per turn using individual player boards, and the game
proceeds until one player has earned six achievements. At this point, the players receive coins for the achievements they have attained and the territories they control, and the player with the most coins is declared the winner. [107] As of June 2023 [update], Board Game Geek listed slightly over 200 board games classified under 4X type, including titles
such as Eclipse (2011) and Heroes of Land, Air & Sea (2018).[108] List of 4X video games a b c d Habib, J. "PyroFalkon" (2006-08-17). "Civilization IV: Warlords Guide". IGN. Archived from the original on December 17,
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For other uses, see 4X (disambiguation). Detailed empire management, seen here in Freeciv, is a central aspect of 4X strategy games. Part of a series on Strategy Time management Real-time tactics Tactical RPG Tower defense Turn-based strategy Turn-based
tactics Artillery Wargame Lists List of 4X video games List of massively multiplayer online turn-based strategy games List of massively multiplayer online t
tactics video games List of tactical role-playing video games List of turn-based strategy video games List of turn-based and real-time strategy video games vte 4X (abbreviation of Explore, Expand, Exploit, Exterminate) is a subgenre of strategy-based computer and board games, [1][2][3] and includes both turn-based and real-time strategy titles. [4][5] The gameplay
generally involves building an empire.[6] Emphasis is placed upon economic and technological development, as well as a range of military and non-military routes to supremacy. The earliest 4X games borrowed ideas from board games were
also common. Many 4X computer games were published in the mid-1990s, but were later outsold by other types of strategy games. Sid Meier's Civilization is an important example from this formative era, and popularized the level of detail that later became a staple of the genre. In the new millennium, several 4X releases have become critically and
commercially successful. In the board (and card) game domain, 4X is less of a distinct genre, in part because of the practical constraints of components and playing time. The Civilization hoard game that gave rise to Sid Meier's Civilization, for instance, includes neither exploration nor extermination. Unless extermination is targeted at non-player
entities, it tends to be either nearly impossible (because of play balance mechanisms, since player elimination is usually considered an undesirable feature) or certainly unachievable (because victory conditions are triggered before extermination can be completed) in board games. 4X computer games such as Master of Orion II let empires explore the
map, expanding by founding new colonies and exploiting their resources. The game can be won by becoming an elected leader of the galaxy, exterminating all opponents, or eliminating the Antarans. The term "4X" originates from a 1993 preview of Master of Orion in Computer Gaming World by game writer Alan Emrich where he rated the game
"XXXX" as a pun on the XXX rating for pornography. The four Xs were an abbreviation for "Explore, Expand, Exploit and Exterminate". [7] Emrich wrote, "Quadruple-X - I give MOO a XXXX rating because it features the essential four X's of any good strategic conquest game: Explore, Expand, Exploit and Exterminate. In other words, players must
rise from humble beginnings, finding their way around the map while building up the largest, most efficient empire possible. Naturally, the other players will be trying to do the same, therefore their extermination becomes a paramount concern. A classic situation, indeed, and when the various parts are properly designed, other X's seem to follow.
Words like EXcite, EXperiment and EXcuses (to one's significant others) must be added to a gamer's X-Rating list."[8] By February 1994, another author in the magazine said that Command Adventures: Starship "only pays lip service to the four Xs",[9] and other game commentators adopted the "4X" label to describe similar games.[1] The 4X game
genre has come to be defined as having the four following gameplay conventions:[1][2][3] Explore means players send scouts across a map to reveal surrounding the influence of existing settlements. Exploit means players gather and use
resources in areas they control, and improve the efficiency of that usage. Exterminate means attacking and eliminating rival players. Since in some games all territory is eventually claimed, eliminating a rival's presence may be the only way to achieve further expansion. These gameplay elements may happen in separate phases of gameplay, or may
overlap with each other over varying lengths of game time depending on game design.[10] For example, the Space Empires series and Galactic Civilizations II: Dark Avatar have a long expansion phase, because players must make large investments in research to explore and expand into all areas.[11][12][13] Emrich later expanded his concept for
designing Master of Orion 3 with a fifth X, experience, an aspect that came with the subject matter of the games [15][16][17] such as Command & Conquer[16][18] by their greater complexity and scale, [19] and their complex use of diplomacy. [15] Reviewers have also said
that 4X games feature a range of diplomatic options, [20][21][22][23] and that they are well known for their large detailed control over an empire's economy, while other computer strategy games simplify this in favor of combat-focused gameplay, [19] 4X computer and board
games are a subgenre of strategy games,[1][2][3] and include both turn-based and real-time strategy titles.[4][5] The gameplay involves building an empire,[6] which takes place in a setting such as Earth,[24] a fantasy world, or in space.[10] Each player takes control of a different civilization or race with unique characteristics and strengths. Most 4X
games give each faction unique economic and military bonuses. One part of Freeciv's technology tree, which represents a series of advancements that players can unlock to gain new units, buildings, and other capabilities. Technology trees in 4X
games are typically larger than in other strategy games, featuring a larger selection of different choices.[15][25] Empires must generate research resources and invest them in new technology.[26] In 4X games, the main prerequisite for research resources and invest them in new technology.[16] This is in contrast to non-4X real-time
strategy games, where technological progress is achieved by building structures that grant access to more advanced structures and units.[27] Research is important in 4X games because technology or greater numbers, with battle tactics playing a smaller
part.[29][30] In contrast, military upgrades in non-4X games are sometimes small enough that technologically basic units remain important throughout the game.[31] Combat is an important part of 4X games allow a player to win by exterminating all rival players, or by conquering a threshold amount of the game's universe.[32]
Some 4X games, such as Galactic Civilizations, resolve battles automatically, whenever two units from warring sides meet.[33] This is in contrast to other 4X games with more detailed control over battles, victory is usually determined
by superior numbers and technology, with battle tactics playing a smaller part. [29][30] 4X games by putting more emphasis on research different unit components.
This is more typical of space 4X games, where players may assemble a ship from a variety of engines, shields, and weaponry.[23] 4X games may offer shared victory and team play, diplomatic relations tend to be restricted to a binary choice between an ally or
enemy. 4X games often allow more complex diplomatic relations between competitors who are not on the same team.[15][16][17] Aside from making allies and enemies, players are also able to trade resources and information with rivals.[5] In addition to victory through conquest, 4X games offer peaceful victory conditions or goals that involve no
extermination of rival players (although war may still be a necessary by-product of reaching said goal).[19] For example, a 4X game may offer victory to a player who achieves a certain score of the highest score after a certain number of turns.[35] Many 4X games award victory to the first player to master an advanced technology, accumulate a large
amount of culture, or complete an awe-inspiring achievement. [33] Several 4X games award "diplomatic victory" to anyone who can win an election decided by their rival players, [36][37] or maintain peace for a specified number of turns.
no factions outside of one's alliance; there are two ways to accomplish this: ally with all factions, or ally with all factions and destroy the rest. 4X games are known for their complex gameplay [22][23] and strategic depth.[6][4][38] Gameplay usually takes priority over elaborate graphics.[25][39] Whereas other strategy
games focus on combat, 4X games also offer more detailed control over diplomacy, economics, and research; [7][19] creating opportunities for diverse strategies simultaneously, and plan for long-term objectives. [41] To experience a detailed model of a large empire, 4X games are
designed with a complex set of game rules.[22] For example, the player's productivity may be limited by pollution.[42][43] Players may need to balance a budget, such as civil disorder,[32][42] or a senate that can oust the player's political
party or force them to make peace. [42][46] FreeCol is typical of 4X games where there is a separate interface for managing each settlement. Such complexity requires players to manage a larger amount of information than other strategy games. [38] Game designers often organize empire management into different interface screens and modes, [19]
such as a separate screen for diplomacy, [47][48] managing individual settlements, and managing battle tactics, [33][34] Sometimes systems are intricate enough to resemble a minigame, [41][49] This is in contrast to most real-time strategy games. Dune II, which arguably established the conventions for the real-time strategy games, and managing battle tactics.
designed to be a "flat interface", with no additional screens.[27] Since 4X games involve managing a large, detailed empire, game sessions usually last longer than other strategy games.[19] Game sessions may require several hours of play-time, which can be particularly problematic for multiplayer matches.[50] For example, a small-scale game in
Sins of a Solar Empire can last longer than twelve hours. [22] However, fans of the genre often expect and embrace these long game sessions; [51] Emrich wrote that "when the various parts are properly designed, other X's seem to follow. Words like EXcite, EXperiment and EXcuses (to one's significant others)". [7] Turn-based 4X games typically
divide these sessions into hundreds of turns of gameplay.[41][52] Because of repetitive actions and long-playing times, 4X games have been criticized for excessive micromanagement. In early stages of a game this is usually not a problem, but later in a game directing an empire's numerous settlements can demand several minutes to play a single
turn. This increases playing-times, which are a particular burden in multiplayer games. [50] 4X games began to offer AI governors that automate the micromanagement of a colony's build orders, but players criticized these governors that automate the micromanagement, [53] and
some approaches have been more well received than others. Commentators generally agree that Galactic Civilizations succeeds, which GamingNexus.com attributes to the game's interface
made empire management more elegant. [23][38] On the other hand, Master of Orion III reduced micromanagement by limiting complete player control over their empire. [56][57] Most 4X and similar strategy games feature multiple possible ways to win the game. For example, in Civilization, players may win through total domination of all opposing
players by conquest of their cities, but may also win through technological achievements (being the first to launch a spacecraft to a new planet), diplomacy (being elected the world leader by other nations), or other means. Multiple victory conditions help to support the human player who may have to shift strategies as the game progresses and
opponents secure key resources before the player can. However, these multiple conditions can also give the computer-controlled opponents multiple pathways to potentially outwit the player, who is generally going to be over-powered in certain areas over the computer opponents. A component of the late-game design in 4X games is forcing the player
to commit to a specific victory condition by making the cost and resources required to secure it so great that other possible victory conditions may need to be passed over.[58] Sid Meier, the creator of the Civilization series of 4X games Early 4X games were influenced by board games, such as Stellar Conquest published by Metagaming Concepts in
1974, and text-based computer games from the 1970s.[59] Cosmic Balance II, Andromeda Conquest and Reach for the Stars were published in 1983, and are now seen retrospectively as 4X games. Although Andromeda Conquest was only a simple game of empire expansion, Reach for the Stars introduced the relationship between economic growth,
technological progress, and conquest. [28] Trade Wars, first released in 1984, though primarily regarded as the first multiplayer space trader, included space exploration, resource management, empire building, expansion and conquest. It has been cited by the author of VGA Planets as an important influence on VGA Planets 4.[60] In 1991, Sid Meier
released Civilization and popularized the level of detail that has become common in the genre.[61] Sid Meier's Civilization was influenced by board game also called Civilization was influenced by board game and board game is the importance of diplomacy and technological
advancement. Sid Meier's Civilization was also influenced by personal computer games, such as the city management game SimCity and the wargame Empire. [62] Civilization became widely successful and influenced many 4X games to come; [61] Computer Gaming World compared its importance to computer gaming to that of the wheel. [63] Armada
2525 was also released in 1991 and was cited by the Chicago Tribune as the best space game of the year.[64] A sequel, Armada 2526, was released for the PC, while Spaceward Ho! was released on the Macintosh. Although 4X space games were
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ultimately more influenced by the complexity of VGA Planets, Spaceward Ho! earned praise for its relatively simple yet challenging game design.[66] Spaceward Ho! is notable for its similarity to the 1993 game Master of Orion,[7][67] with its simple yet deep gameplay.[34] Master of Orion drew upon earlier 4X games such as Reach for the Stars,[7][67] with its simple yet deep gameplay.[34] Master of Orion drew upon earlier 4X games such as Reach for the Stars,[7][67] with its simple yet deep gameplay.[34] Master of Orion drew upon earlier 4X games such as Reach for the Stars,[7][67] with its simple yet deep gameplay.[34] Master of Orion drew upon earlier 4X games such as Reach for the Stars, [7][67] with its simple yet deep gameplay.[34] Master of Orion drew upon earlier 4X games such as Reach for the Stars, [7][67] with its simple yet deep gameplay.[34] Master of Orion drew upon earlier 4X games such as Reach for the Stars, [7][67] with its simple yet deep gameplay.[34] Master of Orion drew upon earlier 4X games such as Reach for the Stars, [7][67] with its simple yet deep gameplay.[34] Master of Orion drew upon earlier 4X games such as Reach for the Stars, [7][67] with its simple yet deep gameplay.[34] Master of Orion drew upon earlier 4X games such as Reach for the Stars, [7][67] with its simple yet deep gameplay.[34] Master of Orion drew upon earlier 4X games such as Reach for the Stars, [7][67] with its simple yet deep gameplay.[34] Master of Orion drew upon earlier 4X games such as Reach for the Stars, [7][67] with its simple yet deep gameplay.[34] Master of Orion drew upon earlier 4X games such as Reach for the Stars, [7][67] with its simple yet deep gameplay.[34] Master of Orion drew upon earlier 4X games such as Reach for the Stars, [7][67] with its simple yet deep gameplay.[34] with its simple yet deep gameplay as Reach for the Stars, [7][67] with its simple yet deep gameplay as Reach for the Stars, [7][67] with its simple yet deep gameplay as Reach for the Stars, [7][67] with its simple yet deep gamepla
[68] and is considered a classic game that sets a new standard for the genre.[34][50] In a preview of Master of Orion, Emrich coined the term "XXXX" to describe the emerging genre.[7] Eventually, the "4X" label was adopted by the game industry, and is now applied to several earlier game releases.[69] Following the success of Civilization and Masterian and Masterian and Emrica and Industry, and is now applied to several earlier game releases.
of Orion, other developers began releasing their own 4X games. In 1994, Stardock launched its first version of the Galactic Civilizations series for OS/2,[70] and the long-standing Space Empires series began as shareware. Ascendancy and Stars! were released in 1995, and both continued the genre's emphasis on strategic depth and empire
 management.[69] Meanwhile, the Civilization[71] and Master of Orion[72] franchises expanded their market with versions for the Macintosh. Sid Meier's team also produced Colonization II in 1996,[73] while Simtex released Master of Orion in 1994 and Master of Orion II in 1996.[74] By the late
 1990s, real-time strategy games began outselling turn-based games.[75] As they surged in popularity, major 4X developers fell into difficulties. Sid Meier's Firaxis Games released Sid Meier's Alpha Centauri in 1999 to critical acclaim, but the game fell short of commercial expectations.[76] Civilization III encountered development problems followed
 by a rushed release in 2001.[77] Despite the excitement over Master of Orion III, its release in 2003 was met with criticism for its lack of player control, poor interface, and weak AI.[57] Game publishers eventually became risk-averse to financing the development of 4X games.[6] Firaxis has continued to develop the Civilization series, with Civilization
 IV (2005), Civilization V (2010),[78] Civilization VI (2016), and Civilization VI (2025),[79] along with expansion packs for each. Among major changes to the series have been new victory conditions, switching from a square to a hex-based grid, de-stacking military units to encourage more strategic battles, and more customizable options for
 governance and culture. Firaxis also developed Civilization Revolution (2008) and its sequel (2014) as lightweight, console-friendly versions of 4X games, [80] but brought the full Civilization experience to consoles with Civilization vI. Firaxis also developed a spiritual sequel to Sid Meier's Alpha Centauri with Civilization: Beyond Earth (2014). As of
 2021, the Civilization series has sold more than 57 million units.[81] The Total War series remains in development, with the latest title, Total War: Pharaoh released in 2023. Stardock entered the market through a remake of the 1993 OS/2 game, Galactic Civilizations (2003), a space-themed 4X game. The game was successful and was compared
favorably to Master of Orion, and led Stardock to continue the series with Galactic Civilizations II: Dread Lords (2007), Galactic Civilizations III (2015), and Galactic Civilizations IV (2022).[82][83] Paradox Interactive is a company that was spun out from developing video game adaptions of board games from Target Games. Through 2000 and 2003
the company began producing their own grand strategy video games, which included the Europa Universalis series set in the Wictoria series set in the Victoria period, and the Hearts of Iron series involving World War II. These series, as of 2023, remain under
active development at Paradox, along with Stellaris (2016), a grand strategy title based on space conflict.[58] Paradox also acquired the Age of Wonders series, which is a 4X series based on a high fantasy world that includes elements of magic.[84] Amplitude Studios entered the 4X venue with Endless Space (2012) and its sequel (2017),[85] Endless
 Legend (2014),[86] and Humankind (2021),[87][88] The 4X genre has also been extended by gamers who have supported free software releases such as Freeciv,[89] FreeCol,[90] Freeciv,[89] FreeCol,[90] Freeciv,[89] FreeCol,[90] Freeciv,[80] FreeCol,[90] Freeciv,[80] FreeCol,[90] Freeciv,[80] FreeCol,[90] Fre
games, such as Hearts of Iron, Crusader Kings, or Stellaris, are a sub-genre or sister genre of 4X that typically require even more detailed planning where grand strategy games originate, they are conventionally defined as those games in which the
 player governs all the capacities of a nation-state, including its economy, diplomacy, and internal politics, with a focus on grand strategy (a nation-state player mostly commands the military during wartime. In computer gaming, this
 definition holds considerable overlap with that of 4X games, thus a more restrictive set of defining traits are usually used. Grand strategy games are typically more strategically open than 4X games, which often have well-defined, instantaneous victory conditions such as "conquer everyone" or "win the space race". Grand strategy games typically lack
such victory conditions and instead scope themselves over a definite period of time, with specific starting and ending dates. As in 4X games, players are usually ranked on their overall achievements at the end of a campaign, and in grand strategies this is usually the only factor accounted for in victory. This results in longer, more complex and free-
form campaigns structured largely by player-driven goals. Grand strategy games can also differ from traditional 4X games in being "asymmetrical", meaning that players are bound to play out specific (often historical) starting conditions, rather than play as a set of equally free factions exploring and progressing in an open world. For example, 4X
Civilization starts all players on equal footing, as small tribes in a largely ahistoric wilderness, while some grand strategies seek to at least approximately represent the actual conditions of their time period, even when those are not fairly balanced toward all players. The open-ended, sprawling, and convoluted nature of grand strategy campaigns
makes even major asymmetries strategically tractable: with no hard victory conditions, players to "rush" toward instant victory thresholds (military or otherwise), and thus no simple way for any one player to credibly brandish the threat
of imminent and irremediable defeat against the others, contest in grand strategies typically emerges more organically than in 4X games, when and where it is geopolitically meaningful, rather than as the inevitable outcome of a game's initial configuration as a battle royal.[93] Eventually real-time 4X games were released, such as Imperium Galactically meaningful, rather than as the inevitable outcome of a game's initial configuration as a battle royal.[93] Eventually real-time 4X games were released, such as Imperium Galactically meaningful, rather than as the inevitable outcome of a game's initial configuration as a battle royal.[93] Eventually real-time 4X games were released, such as Imperium Galactically meaningful, rather than as the inevitable outcome of a game's initial configuration as a battle royal.[93] Eventually real-time 4X games were released, such as Imperium Galactically meaningful, rather than as the inevitable outcome of a game's initial configuration as a battle royal.[93] Eventually real-time 4X games were released, such as Imperium Galactically meaningful, rather than as the inevitable outcome of a game's initial configuration as a battle royal.[93] Eventually real-time 4X games were released, such as Imperium Galactically meaningful, rather than a such as Imperium Galactically meaningful as Imperium Galactically meani
in 1997,[4] Starships Unlimited in 2001,[5] and Sword of the Stars in 2006, featuring a combination of turn-based strategy and real-time tactical combat. The blend of 4X and real-time strategy game,[2][94] This combination of features earned the game a
mention as one of the top games from 2008, including GameSpot's award for best strategy game, and IGN's award for best PC game. [95][96][97][98] The Total War series, debuting in 2000 with Shogun: Total War, combines a turn-based campaign map and real-time tactical battles. Cross-fertilization between board games and video games continued
For example, some aspects of Master of Orion III were drawn from the first edition of the board game Twilight Imperium.[99] Even Sins of a Solar Empire was inspired by the idea of adapting the board game Buck Rogers Battle for the 25th Century into a real-time video game.[100] Going in the opposite direction, in 2002 Eagle Games made a board
game adaptation of Sid Meier's Civilization, entitled simply Sid Meier's Civilization: The Board game that had inspired the computer game in the first place. [101] Another remake based on that series, under a very similar title, Sid Meier's Civilization: The Board game that had inspired the computer game in the first place. [101] Another remake based on that series, under a very similar title, Sid Meier's Civilization: The Board game that had inspired the computer game in the first place. [101] Another remake based on that series, under a very similar title, Sid Meier's Civilization and the first place. [101] Another remake based on that series are series as a series of the first place. [101] Another remake based on that series are series as a series a
 Games, followed by Civilization: A New Dawn in 2017.[102][103] Through the Ages: A Story of Civilization is a board game for 2-4 players designed by Vlaada Chvatil and published by Czech Board Games in 2006. Its theme is the development of human civilization and the players determine the progress of their own civilization in different fields
 including culture, government, leadership, religion and science.[104] The game won multiple awards including the International Gamers Awards in 2007 and Game for one to five players designed by Jamey Stegmaier and published by
Stonemaier Games in 2016. Set in an alternate history version of 1920s Europe, players control factions that produce resources, develop economic infrastructure, and use dieselpunk war machines, called "mechs", to engage in combat and control factions that produce resources, develop economic infrastructure, and use dieselpunk war machines, called "mechs", to engage in combat and control factions that produce resources, develop economic infrastructure, and use dieselpunk war machines, called "mechs", to engage in combat and control factions that produce resources, develop economic infrastructure, and use dieselpunk war machines, called "mechs", to engage in combat and control factions that produce resources, develop economic infrastructure, and use dieselpunk war machines, called "mechs", to engage in combat and control factions that produce resources, develop economic infrastructure, and use dieselpunk war machines, called "mechs", to engage in combat and control factions that produce resources, develop economic infrastructure, and use dieselpunk war machines, called "mechs", to engage in combat and control factions are develop economic infrastructure, and use dieselpunk war machines, called "mechs", to engage in combat and control factions are develop economic infrastructure, and use dieselpunk war machines, called "mechs", to engage in combat and control factions are developed by the control faction of the control faction o
proceeds until one player has earned six achievements. At this point, the players receive coins for the achievements they have attained and the territories they control, and the player with the most coins is declared the winner. [107] As of June 2023 [update], Board Game Geek listed slightly over 200 board games classified under 4X type, including titles
such as Eclipse (2011) and Heroes of Land, Air & Sea (2018).[108] List of 4X video games a b c d Habib, J. "PyroFalkon" (2006-08-17). "Civilization IV: Warlords Guide". IGN. Archived from the original on December 17,
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