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Undergraduate

“CORRUPTED BLOOD” AND PUBLIC HEALTH

*What epidemiologists can learn
from massively multiplayer video games*



BY NACHIKET GIRISH

September 13, 2005: Explorers traversing a newly discovered land, an ancient ruin of a once-powerful people, encountered a theretofore unknown virus. Dismissing the disease as a slight inconvenience, they continued with their journey. The pathogen they had summarily dismissed, however, was not as innocuous as they had first assumed. Within a week, the disease had evolved into a plague, killing off entire cities and districts all over the world. The establishment of quarantines and the selfless work of healers were fruitless in the face of its relentless onslaught. It was only after the world’s creators themselves intervened and set things right that civilization could continue.

The above story describes neither modern science fiction nor ancient myth. It is a true account of the terrible times that befell the land of Azeroth—the virtual world of the Massively Multiplayer Online Role-Playing Game (MMORPG), *World of Warcraft*.¹

World of Warcraft is among the most popular MMORPGs worldwide, historically peaking at over 10 million active players. Released in 2004 by Blizzard Entertainment, the game has since seen several new playable regions added. In one such

update, Blizzard released a new mission known as the Zul’Gurub raid, whose final boss possessed a spell causing some players battling the boss to lose health points over time. What turned this mildly interesting boss ability into a devastating plague was a programming oversight—the developers had failed to confine the spell’s effects to the raid area. When infected players headed back to more crowded playing areas, such as cities or trading centres, they carried the infection with them. Lower level players, in contrast to the higher level Zul’Gurub raiders, died almost instantly upon contracting the disease. So deadly was this disease that the big virtual cities of Azeroth were quickly rendered desolate, with literal carpets of white skeletons leaving reminders of the characters who once frequented its roads. One week of chaos, confusion, and an untold number of deaths later, Blizzard reset their servers to finally purge the infection from the game.

THE ROLE OF SIMULATIONS IN EPIDEMIOLOGY

Epidemiology is a branch of science which deals with the spread and control of

infectious diseases. This field is crucially important during virulent outbreaks and epidemics, when governments must rely on the predictions and recommendations of epidemiologists to contain and defeat deadly pathogens. While epidemiological modeling goes as far back as 1766, when Daniel Bernoulli created a mathematical model to argue for inoculation against smallpox, the predictive power of epidemiology has grown manifold over the last few decades with the rise of the powerful new field of computational epidemiology, which harnesses the power of computers to model the spread of diseases.²

Computer-generated disease spread models, as complex and comprehensive as they may be, will always have limitations—human behavior can often be unpredictable, irrational, and impossible to model. The question on epidemiologists’ minds then, is how to introduce the human factor into behavioral models.³ We would need a controlled experiment where a large number of people participate, interact as they would in real life, and react to a precisely-characterized simulated disease as if their lives were at stake, without any actual risk to their lives—a set of seemingly paradoxical requirements.

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ENTER MMORPGS

It was while playing World of Warcraft and having just endured the Corrupted Blood outbreak that epidemiology student Eric Logfren realized the scientific value of the game’s virtual world. World of Warcraft supports complex mechanics such as in-game trading and long-distance travel, making it a surprisingly close substitute to real-world interactions. Players often spend several hours a day playing the game, ensuring that they are invested in their characters and care about their well-being. Along with his adviser, Dr. Nina Fefferman, Logfren published a paper in the journal *Lancet Infectious Diseases*, outlining the major lessons that could be learned from the virtual outbreak. And just as they suspected, the in-game pandemic offered

them hints about possible human behavior in a contemporary real-world pandemic they would not have gained from mathematical models.⁴

In particular, there were fascinating similarities between Corrupted Blood and real-life outbreaks of diseases such as severe acute respiratory syndrome (SARS) and avian flu. For instance, the 2003 SARS outbreak originated in China but spread rapidly throughout the globe due to air travel.⁵ Corrupted Blood likewise became a global pandemic only when infected players teleported into densely populated centers. And just like with avian flu, non-human carriers played a crucial role in the survival and continued propagation of the disease, with players’ virtual pets analogous to birds such as ducks, which acted as animal vectors for the avian flu.⁶

An analysis of the virtual epidemic also revealed puzzling, often inexplicable human behavioral tendencies. These ranged from the nobly well-intentioned to the bafflingly hostile. For instance, many players whose characters had healing powers rushed to the disease epicenters to heal infected players and revive dead ones at the risk of getting infected themselves. Unbeknownst to them, however, their seemingly benevolent action contributed to the spread of the epidemic, as characters whose death would have killed the infection with them were brought back to life and were hence free to continue to spread the disease. The healers themselves, moreover, became carriers of the disease once they got infected.⁷

During the initial phases of the epidemic, players, and later Blizzard Entertainment itself, established quarantines for characters to wait out the infection. Many players simply refused to obey the quarantine. Part of this may be attributed to curiosity: Fefferman talks of instances in which players, who had logged out upon hearing news of the outbreak, logged back in just to see what was going on, while some tried to sneak a peek into the infected cities—both types immediately got infected. This might seem like trivial thrill-seeking, but William Sims Bainbridge, director of the Human-Centered Computing Cluster at the National Science Foundation (NSF), believes that similar scenarios might be observed in real life, although with different motivations. “If you believe, like I do, that the federal government can’t succeed in containing [a hypothetical smallpox outbreak], you would rush to the place where they were giving immunizations, knowing that the smallpox was going to get everywhere pretty soon. It goes well beyond curiosity seeking.”

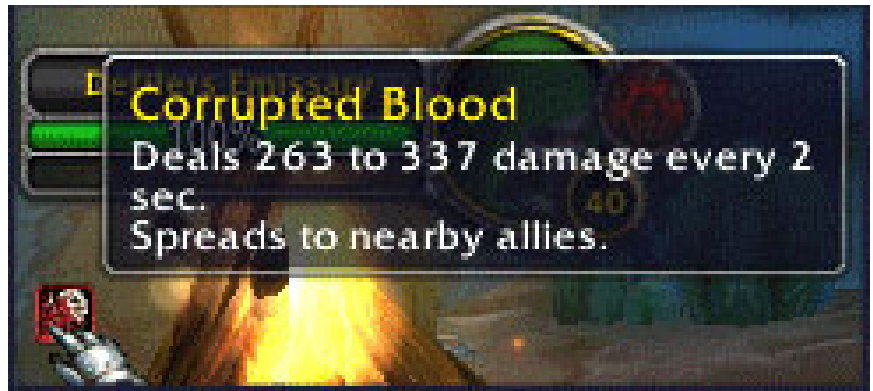


NEXT STEPS

Some have proposed that a study of these virtual communities might help bridge the gap between real-world epidemiological studies and large-scale computer simulations. And indeed, several new projects into the social dynamics of MMORPGs have been undertaken, motivated by the Corrupted Blood outbreak. For instance, the NSF has provided a \$200,000 grant to the associate professor at the Annenberg School for Communication at the University of Southern California, Dmitri Williams, to study the social dynamics and economics of the MMO EverQuest 2. There have been many other attempts to create a virtual world dedicated to social science and epidemiology research, with mixed success. Most manufactured worlds cannot hope to match the success of commercial MMOs, and most commercial MMOs do not have the time or motivation to work with epidemiologists without incentive.

“There were fascinating similarities between Corrupted Blood and real-life outbreaks of diseases such as severe acute respiratory syndrome (SARS) and avian flu.”

The applicability of online multiplayer role-playing games to epidemiology and the social sciences must be viewed with some caution, however. Even if the characters are being controlled by real players, they are still playing a game, and will thus not always treat their lives as they would in reality. Acts of “trolling” should likewise not be naively extrapolated to real terrorism, since acts of virtual violence are only seldom symptomatic of real violence.¹⁰ The virtual world is evidently not the perfect epidemiological tool. The growing acknowledgment of its merits, however, can open new doors and reveal greater insights in humanity’s quest for better public health.



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