For the Love of (Game) Physics:
Deprivileging the Developer-Player Relationship with the Speedrunning Research Community

Speedrunning - the act of playing a game in the fastest possible time, often using glitches - is beginning to enjoy mainstream popularity as a gaming practice. Originally starting out as a niche Quake machinima project in 1997 (Lowood 2014), speedrunning is now regularly covered in gaming news media (Grant 2016) (Lee 2015), with the Games Done Quick speedrunning marathons raising over $2.5 million for charity in 2016 alone ("Awesome Games Done Quick 2016 -- Index" 2016)("Donation Index -- Summer Games Done Quick 2016" 2016). However, scholarly research on speedrunning remains limited. Although many have noted how speedruns are a clear example of emergent play in video games (Franklin 2010) (Scully-Blaker 2014) (Ashton and Newman 2010), few have fully attempted to understand speedrunning nor how it fits with existing game studies work on glitch-hunting and cheating.

To fill this gap, we will be using Rainforest Scully-Barker's thesis, the most thorough academic overview of speedrunning to-date. By expanding on his model of curation / re-curation (Scully-Blaker 2016), we are able to draw connections between the speedrunning community and the academic research community at large. This research community-based model gives us a better framework to understand how speedrunners deprivilege developers in favor of the artifact of "game design" itself, a co-creative process which further blurs the lines between player and developer and introduces questions about how video game development, quality assurance (QA) testers, and glitches should be treated overall.

To make this research community analogy, we first need to understand how the speedrunning community works. From Scully-Blaker's work and speedrunner self-analysis on

the Internet, we find that despite the surface-level competitiveness of trying to achieve

world-record times, speedrunners are actually quite collaborative, sharing strategies or glitches

almost immediately upon discovery. Unlike e-sports, where hiding a strategy may be necessary

to maintain an edge over other players, speedrunners need group assistance to puzzle out and

understand the game mechanics in order to form strategies, especially as the game becomes

better understood (Scully-Blaker 2016). This need for teamwork is partially because the

speedrunners are working with the explicit rules of the game (i.e. the code) instead of the implicit

rules (i.e. what the designer lays down as expectations). By deliberately ignoring the designer's

expectations in the pursuit of playing the game faster, speedrunners are faced with a complicated

optimization problem to get from the start of the game to the end of the game with any

mechanism that is not forbidden by the game's explicit code (Omnigamer 2014). The sheer

complexity of this problem forces the speedrunners to work together, oftentimes surpassing the

developer's knowledge as well (Scully-Blaker 2016) (Grant 2016) .

Scully-Blaker notices this disconnect between developers and speedrunners and claims

that speedrunners are performing "curatorial play", a new framework of play that expands on the

idea of emergent play and expansive play. Curatorial play is play which is intentionally preserved

and organized with a view to being shared" (Scully-Blaker 2016). To Scully-Blaker, the

developer's vision of the game is the first curation, while the speedrunner's rewriting of the

game is a re-curation of this model. Speedrunners take the artifact of the game and juxtaposes the

game elements and rules of the game in new and interesting ways to create a new game that is

against the original intention of the developers. This subversive reading is important, as it creates

something akin to Virilio's "museum of accidents". Virilio's museum was a place that would

showcase failures in engineering and science, such as the Challenger disaster, that would attack the common narrative of science / society as constant progression in a way visible to the common public, not just the scientific elite. In a similar way, the re-curatorial play of the speedrunners challenges the common narrative of how games should follow the developer-designed implicit rules by creating and sharing an archive of both a speedrun (which follows the developer's implicit curation of play by trying to get from the developer-intended start point and end point) and the glitches that arise in play (which are the "accidents" that demonstrate a new curation than the developer's implicit rule structure) (Scully-Blaker 2016) .

Although this framework is compelling, there are still many issues that it does not address. First, the curatorial / museum of accidents model only fits deconstructive speedruns well and does not match finesse speedruns or the glitchless category of speedruns. As defined by Scully-Blaker, finesse speedruns are those which largely follow the implicit rules of a game, either because the explicit and implicit rules are quite similar with no large sequence breaking glitches (ex. Super Mario Bros' simplistic rule set) or because the speedrunning community for that game has created standards that only allow certain kinds of glitches, which often fall under the confusingly named "glitchless" category. Meanwhile, deconstructive speedruns are those that break away from the implicit rules significantly through the use of glitches that allow clipping through "solid" surfaces, that skip large chunks of the narrative or in extreme cases, even allow arbitrary code execution to rewrite the game entirely (Scully-Blaker 2014) (Scully-Blaker 2016). Even though finesse speedruns do sometimes use glitches, these glitches are not the same transgressive magnitude as the "museum of artifacts" model would suggest. The recently discovered "flagpole glitch" for Super Mario Bros. which helps shave a few milliseconds off of

the world record time by preventing the flag animation from occurring is hardly part of a distinct curation (Roeder 2016) . However, finesse speedruns are still distinct from developer-approved play as the same dedication to finding and sharing strategies beyond what's implicitly given still applies. A more expanded model of the curatorial play framework is clearly needed to better incorporate finesse speedruns.

The "museum of artifacts" model also doesn't characterize the subcommunities within speedrunning who either solely focus on finding glitches instead of doing runs ("glitch-hunters") or who use specialized tools like game emulators and hex editors to reverse engineer the game itself ("tool-assisted speedruns"or TAS). Although in the past, glitch-hunters gained social capital for finding glitches, most notably seen for walkthrough writers (Ashton and Newman 2010) , these glitch-hunters tend to stay in the background, with their efforts usually becoming mainstream / gaining social capital only when they are used in a traditional speedrun[1]. As one illustration of this, note that in the Summer GDQ 2016, TAS runs were only featured for 90 minutes of a week-long speedrunning event. These runs were also presented as"TASBot plays X", again minimizing the potential social capital gains that the runners behind TASBot would stand to achieve ("2016 Schedule – Summer Games Done Quick (SGDQ)" 2016). Despite their perceived second-fiddle position, TAS speedrunnerss and glitch-hunters remain essential parts for the speedrunning community to exist. Although many speedrunners personally discover the strategies that they execute, the work that these subcommunities do is essential for traditional speedrunners (Sayer 2016). Although Scully-Blaker states that speedrunners "re-curate a game

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[1] A notable exception to this is pannenkoek2012, who achieved memetic appeal for finding a TAS way to get a star in Super Mario 64 using half an A-press (Messner 2016) ("0.5x A Presses / But First We Need to Talk About Parallel Universes" 2016) . However, much of the popularity came about from mocking the time it took to achieve and the extreme technical nature of how to achieve this. Given the amount of sarcastic scorn, I claim that this is actually an exception that proves the backgrounding of TAS / glitch-hunters in favor of traditional speedruns.

through its play experience" instead of how mods "re-curate a game through the code itself", this isn't quite a fair distinction (Scully-Blaker 2016). Traditional speedrunners actually have a pretty in-depth understanding of how the code works, even if they don't see it directly like modders do. For example, in Legend of Zelda: Ocarina of Time, the "damage-storing" strategy of the crouch stab is able to be performed due to programmer negligence of setting a value for how much damage a crouch stab should have, causing the technique to simply carry over the damage of the last used attack (Dragonair and Jbop 2016) . TAS speedrunners thus offer traditional speedrunners the same guidance on code elements through their in-depth reverse-engineering of the game's code. Indeed, as an introductory document on SpeedDemosArchives (the hosting organization for GDQ and a community site for speedrunners) states, "watching TAS is essential to understanding the game you are attempting to speed run." ("Speed Demos Archive - Recording FAQ" 2016). Although we could shoehorn these glitch-hunters as the Indiana Jones to our "museum of accidents" analogy or cast aside TAS speedruns as "a related but distinct practice from speedrunning proper" (Scully-Blaker 2016), further thought needs to be given on to how these subcommunities fit in with an academic reading of speedrunners since they definitely seem to fit within the community.

Incorporating glitch-hunters into our model of reading speedrunners also has interesting implications for understanding the industrial video game development process itself. QA testers are often marginalized within the video game industry and have been little analyzed within games research itself. Yet, these QA testers are doing the exact same work as glitch-hunters are doing: manually looking through the game, searching for glitches in service of a higher goal - whether it be a faster world record time or a game that is actually playable for the casual user Of

special note is that QA testers are also being a part of and responding to speedrunning community culture, with one interview reporting that the QA tester "got so mad because they use a bug to get outside the level and automatically move forward [...] I SHOULD HAVE CAUGHT IT!" (Schreier 2015). It would be nice if our new framework to think about speedrunning could also incorporate further observations and insights into the QA testing dynamic.

So, in order to address these concerns of how to better fit finesse speedruns, glitch-hunters, TAS speedrunners and QA testers into our understanding of speedrunning as a community and practice, we expand on the idea of curatorial play to a more research-community-based model. This is a logical extension of the role of a museum curator - someone who needs to not only understand the framing decisions required by curation, but also know the research and history behind the artifacts to the level of a graduate degree. We thus are placing a greater emphasis on this research quality to form our new framework.

Amplifying this research angle reveals a community structure very similar to the physics research community which is comprised of theorists and experimentalists[2]. In physics, the theorists are the ones who note patterns and come up with grand predictions - think Einstein and relativity or Newton and gravity. These predictions are ultimately tested by experimentalists, like the large teams who verified the existence of the Higgs Boson at the Large Hadron Collider or who measured gravity waves with the LIGO experiment. In much the same way, the glitch hunters and TAS speedrunners are the theorists, helping expose glitches and other potential

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[2] Although, the similarities between a science research community and the speedrunning community has been noted before, including by the speedrunning community themselves (Roeder 2016)(*Pannenkoek2012 in a Nutshell* 2016) ("What Are the Most Important 'Open Problems' in Speedrunning? • /r/speedrun" 2016) , to the best of my knowledge, no one has previously made the connection to speedrunners with their professional counterparts nor explored the ramifications of the research community model deeper than just passively noticing the similarities.

mechanisms for the experimentalist traditional speedrunners to demonstrate the viability of these techniques in real life. In other words, TAS speedrunners and glitch-hunters demonstrate the upper limit of human capability ("theoretical limit") while the traditional speedrunners experimentally approach these limits, looking to verify and confirm the theories. Unlike physics, the boundaries between theorists and experimentalists are much fuzzier, as many traditional speedrunners discover "theory"/ glitches without the help of TAS or glitch-hunters, but creating this division helps us understand the spectrum of play. Now, we can fit finesse / glitchless speedruns back into our speedrunning framework - these are just examples of pure experimentalists who are empirically verifying what human limits are without using theory. As some speedrunners point out on a Reddit thread on /r/speedrunning asking for "speedrunning's open problems" (already a research terminology), we get quotes confirming this division of speedrunning ("What Are the Most Important 'Open Problems' in Speedrunning? • /r/speedrun" 2016).

> *most games have pretty optimized routes - people have already worked out the ideal sequence of actions to get the fastest time, and all that's left is the execution*

> *It is much more difficult to scrounge a game for bugs (people behind the scenes) than perfect what we know (the runners themselves).*

We even get the peer-review aspect of research communities within speedrunning as well. While Scully-Blaker saw Twitch and the Speed Demos Archives as "museums of accidents" (Scully-Blaker 2016), I see these sites as peer-reviewed journals with different criteria for publication. While Speed Demos Archives has a very high bar for publication, requiring high quality video that is closely checked for splicing and other cheating mechanisms (Scully-Blaker 2016) ("Rules - SDA Knowledge Base" 2016), other sites like speedrun.com serve as more open

"pre-print" journals with laxer rules, where a simple link to a Twitch video is sufficient proof for the moderators and most speedrunners. This is incredibly similar to the arXiv.org format for physicists and mathematicians. While ultimately publication in a journal with heavy standards is important for further academic success, sharing tentative pre-prints in arXiv are usually taken as just as fair of a mechanism for sharing papers and results, even though the work in arXiv is not peer-reviewed.

This research-based framework also helps explain many of the qualitative observations made by Scully-Blaker about the speedrunning community. The intense collaboration and aversion to secrecy make sense when viewed under the lens of collaborative research, while speedrunners' tendency to focus on extremely specialized categories within a few games is also reminiscent of the laser-like focus of academic subfields. Framing speedrunning as active research also helps explain why large speedrunning events chose to follow the money-raising telethon model instead of the capitalist e-sports model. Just as the themes of scientific investigation and collaboration cause research to be viewed as a public good that should be freely accessible, so too did speedrunning more logically decide to promote itself using fundraising models reminiscent of public television and other charities. Likewise, the fear highlighted by Scully-Blaker among speedrunners that GDQ was becoming too formalized and "more like e-sports" is actually the fear of privatization of research in the pursuit of money (Scully-Blaker 2016), sacrificing the original spirit of community and research integrity. Truly, the similarities between the speedrunning and physics research communities goes beyond just the simple pun that "both like mechanics".

In addition, this model extends beyond the speedrunning community and also helps frame the video game industry itself as industrial research scientists who are doing the exact same work as speedrunners are doing, just with the added power of being able to change the system. In Olli Tapio Leino's analysis on having his Fallout: New Vegas avatar being stuck in inevitable death due to unfortunate applications of the autosave feature, he notes that "Any notion of "rules" in the description of a single-player computer game as played is a result of a benevolent inquiry into the software's behaviour", even if this inquiry is performed by the designer of the game itself ("Game Studies - Death Loop as a Feature" 2016). This not only lends credence to the research community framework we have established ("benevolent inquiry"), but that developers do not occupy a special position of analysis distinct from other investigators, including speedrunners. Indeed, Leino continues and notes that the rules that the designers come up with to help them refine their vision of the game are often "lost in translation", whether by slips in QA testing or just by the very impossibility of translating intent into code ("Game Studies - Death Loop as a Feature" 2016) . Even though developers have the luxury of not having to treat a game as a static cultural object and instead are able to manipulate it at will, they are still forced to perform the same investigation and interrogation of their own digital artifact, just like anyone else. The key difference that QA testers and developers have with speedrunners is that instead of celebrating and experimenting with any glitches that they find, they attempt to isolate and fix the bugs. This is similar to how research scientists in pharamceutical labs are focused less on abstract synthesis of compounds ("what are some innovative ways I can use to make compound X?") and more focused on the bottom line ("I need to make compound X in the cheapest, most efficient way possible"). If we continue our punning analogies, if the speedrunners care about the

mechanics of the game universe, then the developers are "quantum mechanical engineers"- people who are studying the universe that they are simultaneously creating but without any position of privileged understanding.

By noting that developers are actually conducting the same research that speedrunners are doing, this deprivileges the developer and instead prioritizes the cultural object of "game design" itself. The usual binary narrative of "speedrunners are degenerate cheaters, messing up the developer's sanctified implicit rules" into a more collaborative one of "both speedrunners and developers are working together to understand the mechanics behind this digital artifact, the video game". The research into reverse-engineering the design of a game is what unites the developer and the speedrunner. Indeed, as Scully-Blaker paraphrases Casey O'Donnell, "game developers cultivate a central desire to understand how games tick" similar to - or perhaps identical - to the speedrunner's desire (Scully-Blaker 2016).

Indeed, some game developers have become aware of this shared goal and incorporated it into their design process, acknowledging their level playing field role with the player in the process. The Hitbox Team's game Dustforce has been highlighted by many Internet commentators as being "designed for speedrunning" because of its many speedrunning friendly features (Lee 2015) (Correspondent 2016) (Matosis 2014) , from small design decisions like leaderboards and replay systems to to the slightly more sophisticated checkpoint enable/disable system, to the extremely technical move set which offered a high skill ceiling that could be combined in new and interesting ways. Although these Internet commentators guessed that the game was designed with speedrunners in mind from these features, but I was able to confirm the design intentions through personal communication with the Hitbox team (Lee, Terrence, Hitbox

Team 2016). Not only did they confirm that they had designed the game with speedrunners in mind, but they also highlighted the inquiry process highlighted by Leino and made connections between their own research investigation process during development as well. (emphasis added below is my own)

> [How we designed for speedrunners] is encapsulated by our core design philosophy for the game: that the most optimal way to play should also be the most beautiful and fun way to play. We accomplished this by **thinking about the game from the perspective of its top players**, and what they would find the most enjoyment doing (maintaining flow, **discovering and mastering advanced techniques**, having many options for each situation, finding ways to creatively express their own playstyle)

> During development, we would keep making levels for ourselves to play, and as we got better at the game, **we'd design harder levels and find/create new techniques**.

This feedback loop that the Hitbox Team highlights underscores that the investigative process toe exploring a game is one that the developer and player must both reconcile and can celebrate.

Also of note is that they made an equivalence between "the speedrunner" and "top players", a clear appeal to the finesse speedrunners rather than the game-breaking deconstructive speedrunners. However, despite this focus, the Hitbox team was not averse to the "glitch techniques" revealed by deconstructive speedrunners, showing the more collaborative player-developer dynamic our research model suggests. Other Q&A's with the team (amusingly done while in the middle of a Dustforce speedrun) revealed the willingness to accept and welcome glitches as they came to extend the purview of the game beyond what was originally intended ("Website" 2016). (Emphasis added is my own)

> If they knew about slopeboosting during development
>> yeah, we found out about it on downhill, we were all racing for the best time, i think it was like 15-17 seconds with out slope boosting, then when we figured out how to do the slope boosts we started putting them in all the levels **it was an unintended mechanic that we adopted into the levels later on in development**

> <u>If there were any techniques they didn't know about during development</u>
>
> *didnt know about spike jumping till after release. we didnt patch it because it doesnt really help that much in the normal maps and **it made level design more interesting for the harder levels we added in later***

These can definitely be viewed as Scully-Blaker's "compromise" developer reaction to speedrunners, but to me, this feels more like an "endorsement" of speedrunning principles, especially the second quotes commentary of using the spike jumping technique in later level packs, even when it wasn't intentionally designed at first (Scully-Blaker 2016). Here is an example of successful game developers who are both cognizant of the research community of speedrunners and do not feel challenged by their potentially subversive readings.

Outside of speedrunning, this framework has implications for many other directions of possible studies. Further scrutiny of this research community - speedrunning community equivalence would definitely be welcome, whether by looking at the results of sociological studies of existing science research communities and applying them to the speedrunning community or by flipping the equivalence and seeing what elements of fandom and player-game relationships can be applied to research communities as a whole. As speedrunning becomes more popular, it'll also be curious to see which models of co-creativity get adopted - whether speedrunners' investigative nature will result in "validation of the glitch", leading to more exploratory / rough play and more acceptance of other forms of investigative play, such as ROM hacking and fan translations (Asthon and Newman 2011), or if developers will feel more vulnerable by being depriveliged as the sole authority on rules / game investigation and crack down on speedrunners via IP claims and other censoring methods. James Newman has already noted that conflicts are coming up between Super Mario Maker and Kaizo Mario ROM hacks about which one reflects the "sanctified" game design experience (Newman 2016) . This has

direct relevance to speedrunners as prominent speedrunner / ROM hacker PangeaPanga has had all of their Kaizo Mario videos removed due to IP violations (Hernandez 2016) . The same research-oriented spirit that the speedrunning community displays that leads to a great understanding of a game's mechanics is the same knowledge that allows PangeaPanga to create extremely difficult non-Nintendo approved ROM hacked Mario levels. One could easily see Nintnedo being threatened by the large display of glitches in a speedrun and censoring those videos as well.

On a more positive note, perhaps the more mainstream appeal of speedrunning will result in more collaboration between developers and QA testers. Although we've seen from Dustforce that having the glitch-hunters and developers be in close contact and communication is beneficial thanks to the shared research goals, QA testers (the industry equivalents of the theorist glitch-hunters) in large AAA studios are typically not allowed to directly talk to developers, often only communicating through bug reports (Schreier 2015) . Opening up those channels of communication could result in better and more interesting games and more equitable conditions for QA testers, as well.

In conclusion, we were able to expand on Scully-Blaker's excellent work on speedrunning and analysis of curatorial play into constructing a framework which casts the speedrunning community as like a research community at large, complete with theorists, experimentalists and a peer review process. This framework not only helped us to explain qualitative observations about the speedrunning community, but also gave us new insights into the developer-speedrunner relationship, putting both parties on an equal playing field as colleagues in the study of the game artifact itself. We then highlighted how this framework has

new potential for description and collaboration, as exemplified by the Dustforce developers and speedrunners. As speedrunning becomes more mainstream, it will be absolutely fascinating to see what other examples of co-creativity arise from this collaborative research community.

Bibliography

"0.5x A Presses / But First We Need to Talk About Parallel Universes." 2016. *Know Your Meme*. Accessed December 26. http://knowyourmeme.com/memes/0-5x-a-presses-but-first-we-need-to-talk-about-parallel-universes.

"2016 Schedule – Summer Games Done Quick (SGDQ)." 2016. Accessed December 26. https://horaro.org/sgdq/2016.

Ashton, Daniel, and James Newman. 2010. "FCJ-110 Relations of Control: Walkthroughs and the Structuring of Player Agency." *The Fibreculture Journal*, no. 16. The Fibreculture Journal. http://sixteen.fibreculturejournal.org/relations-of-control-walkthroughs-and-the-structuring-of-player-agency/.

Asthon, Daniel, and James Newman. 2011. "Slow Play Strategies: Digital Games Walkthroughs and the Perpetual Upgrade Economy." *Transformations*, no. 20. http://www.transformationsjournal.org/issues/20/PDF/Ashton-Newman_Trans20.pdf.

"Awesome Games Done Quick 2016 -- Index." 2016. Accessed December 25. https://gamesdonequick.com/tracker/index/agdq2016.

Correspondent, Garrett Martin. 2016. "Combining 'Risk' and 'Scrabble.'" *Sarasota Herald*. Accessed December 26. http://www.heraldtribune.com/article/20120202/News/605192602.

"Donation Index -- Summer Games Done Quick 2016." 2016. Accessed December 25. https://gamesdonequick.com/tracker/donations/sgdq2016.

Dragonair, Amn Lens, and Jbop. 2016. "Power Crouch Stabbing - ZeldaSpeedRuns." *ZeldaSpeedRuns*. Accessed December 26. http://www.zeldaspeedruns.com/oot/tech/power-crouch-stabbing.

Franklin, Seb. 2010. "'We Need Radical Gameplay, Not Just Radical Graphics': Towards a Contemporary Minor Practice in Computer Gaming." *Symploke* 17 (1). University of Nebraska Press: 163–80.

"Game Studies - Death Loop as a Feature." 2016. Accessed December 26. http://gamestudies.org/1202/articles/death_loop_as_a_feature.

Grant, Chris Daniel. 2016. "What's It like for a Developer to Watch Speedrunners Break Their Game?" *Polygon*. January 29. http://www.polygon.com/2016/1/29/10868888/speedrunners-glitch-agdq-2016-snapshot.

Hernandez, Patricia. 2016. "Creator of 'Hardest Super Mario World Level Ever' Says Copyright Crackdown Gutted His YouTube Channel." *Kotaku*. Accessed December 26.

http://kotaku.com/creator-of-hardest-super-mario-world-level-ever-says-co-1729624158.

Lee, Joel. 2015. "Speedrunning Culture: The Future of Single-Player Gaming." *MakeUseOf*. June 18. http://www.makeuseof.com/tag/speedrunning-culture-future-single-player-gaming/.

Lee, Terrence, Hitbox Team. Letter to Lilly Chin. 2016, December 7.

Lowood, Henry. 2014. "High-Performance Play: The Making of Machinima." *Journal of Media Practice* 7 (1): 25–42.

Matosis, Matthew. 2014. *Underrated Games - Dustforce*. https://www.youtube.com/watch?v=1CVMGUjREdg.

Messner, Steven. 2016. "How Tool-Assisted Speedrunning Reveals The Inner-Life Of Video Games." *Rock Paper Shotgun*. January 27. https://www.rockpapershotgun.com/2016/01/27/how-tool-assisted-speedrunning-works/.

Newman, James. 2016. "Kaizo Mario Maker: ROM Hacking, Abusive Game Design and Nintendo's Super Mario Maker." *Convergence*, November, 1–18.

Omnigamer. 2014. "What Is a Speedrun? - SDA Knowledge Base." *Speed Demos Archive*. May 13. https://kb.speeddemosarchive.com/What_is_a_speedrun%3F.

Pannenkoek2012 in a Nutshell. 2016. https://www.youtube.com/watch?v=H6zs_-HCdp0.

Roeder, Oliver. 2016. "People Are Making Super Mario Go Faster Than Ever." *FiveThirtyEight*. October 19. http://fivethirtyeight.com/features/people-are-making-super-mario-go-faster-than-ever/.

"Rules - SDA Knowledge Base." 2016. Accessed December 26. https://kb.speeddemosarchive.com/Rules.

Sayer, Matt. 2016. "Routers Are the Pros Who Make Speedrunning Possible - Waypoint." *Waypoint*. August 5. http://waypoint.vice.com/en_us/article/routers-are-the-pros-who-make-speedrunning-possible.

Schreier, Jason. 2015. "Quality Assured: What It's Really Like To Test Games For A Living." *Kotaku*. July 27. http://kotaku.com/quality-assured-what-it-s-really-like-to-play-games-fo-1720053842.

Scully-Blaker, Rainforest. 2014. "Game Studies - A Practiced Practice: Speedrunning Through Space With de Certeau and Virilio." *Game Studies* 14 (1). http://gamestudies.org/1401/articles/scullyblaker.

———. 2016. "Re-Curating the Accident: Speedrunning as Community and Practice." Edited by Mia Consalvo. MA, Concordia University.

http://spectrum.library.concordia.ca/981745/1/Scully-Blaker_MA_F2016.pdf.

"Speed Demos Archive - Recording FAQ." 2016. *Speed Demos Archive*. Accessed December 26. http://speeddemosarchive.com/TAS.html.

"Website." 2016. *Dustforce Q&A : Dustforce*. Accessed December 26. https://www.reddit.com/r/dustforce/comments/38q2c2/dustforce_q_a/?st=ix6mm963&sh=a706d406.

"What Are the Most Important 'Open Problems' in Speedrunning? • /r/speedrun." 2016. *Reddit*. Accessed December 26. https://www.reddit.com/r/speedrun/comments/2f8oho/what_are_the_most_important_open_problems_in/.