Article

Welcome to a New Generation of Entertainment: Amazon Web Services and the Normalization of Big Data Analytics and RFID Tracking

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Abstract

The 2017 partnership between the National Football League (NFL) and Amazon Web Services (AWS) promises novel forms of cutting-edge real-time statistical analysis through the use of both radio frequency identification (RFID) chips and Amazon's cloud-based machine learning and data-analytics tools. This use of RFID is heralded for its possibilities: for broadcasters, who are now capable of providing more thorough analysis; for fans, who can experience the game on a deeper analytical level using the NFL's Next Gen Stats; and for coaches, who can capitalize on data-driven pattern recognition to gain a statistical edge over their competitors in real-time. In this paper, we respond to calls for further examination of the discursive positionings of RFID and big data technologies (Frith 2015; Kitchin and Dodge 2011). Specifically, this synthesis of RFID and cloud computing infrastructure via corporate partnership provides an alternative discursive positioning of two technologies that are often part of asymmetrical relations of power (Andrejevic 2014). Consequently, it is critical to examine the efforts of Amazon and the NFL to normalize pervasive spatial data collection and analytics to a mass audience by presenting these surveillance technologies as helpful tools for accessing new forms of data-driven knowing and analysis.

Introduction

A weekly fixture of 2018 Sunday Night Football broadcasts was a 30-second spot for Amazon Web Services' (AWS) partnership with the NFL. In the advertisement, video footage of a game-changing touchdown from the 2017 Super Bowl Championship is interspersed with "fans" watching the events from a sports bar. The voiceover for the ad notes the improbability of the event, noting that during this play, "With each tick of the clock, AI from Amazon Web Services processed thousands of data points to generate real-time insights, proving that a 19% chance was all Foles [the quarterback] needed to change the course of history." As the actors quasi fans celebrate the (now mathematically quantified) pivotal score, the voiceover ends with a pointed provocation underscoring the gravitas of these new data-driven analytics: "Welcome to the next generation of football."

This "next generation" collaboration between the NFL and Amazon Web Services promises novel forms of cutting-edge real-time statistical analysis through the use of both radio frequency identification (RFID) chips and Amazon's cloud-based machine learning and data-analytics tools. Such experimental use of

spatial tracking and data analytics is heralded for its possibilities: for broadcasters, now capable of providing more thorough analysis; for fans, who can experience the game on a deeper analytical level using the NFL's Next Gen Stats; and for coaches, who can capitalize on data-driven pattern recognition to gain a statistical edge over their competitors in real-time. This partnership, however, raises new questions about the use of mobile technologies, the normalization of spatial tracking and big data through entertainment, and the desire for data-driven ways of overcoming the limitations of human perception.

This paper responds to calls for further examination of the discursive positionings of RFID and big data technologies (Frith 2014; Kitchin and Dodge 2011). Specifically, this synthesis of RFID and cloud computing infrastructure via corporate partnership provides an alternative discursive positioning of two technologies that are often part of asymmetrical relations of power (Andrejevic 2014). Consequently, it is critical to examine efforts by Amazon and the NFL to normalize pervasive spatial data collection and analytics to a mass audience by presenting these surveillance technologies instead as helpful tools for accessing new forms of data-driven knowing and analysis.

Discursively [Re]positioning Big Data and RFID

Professional sports leagues are inexorably intertwined with the technological where cameras, microphones, lights, and scoreboards structure the contemporary game space. Broadcast and cable television, radio and, more recently, streaming infrastructures deliver this content to viewers. Other forms of fan engagement, such as fantasy sports, online forums, and video games, promote continuous liveness, sharedness, and co-presence with professional sports for fans (Hanson 2008; Otto, Metz, and Ensmenger 2011). More recently still, moves to legalize sports betting in various US states, along with online betting via fantasy sites, like Draft Kings and Fan Duel, promote both entertainment and a monetization of expertise. Even though professional sports teams only play for a few months each year, the NFL and other professional sports leagues have increasingly become "365-day leagues" through attempts at capturing fans' desire for entertainment. Nevertheless, ceaseless engagement with organizations like the NFL requires more and more content to engage with. Put more theoretically, professional sports leagues are part of a capitalist social structure that functions by continually surpassing its own limits (Deleuze and Guattari 1972). Here, analytical and spatial tracking technologies provide yet another contemporary answer to the desire for engagement with professional sports.

The NFL began experimental RFID data collection with Zebra Technologies in 2015 and provided the initial data dump to teams in 2016 (Seifert 2016). Preliminary experiments tracked player movement by placing an RFID chip in each players' shoulder pads. The year 2017 marked not only a new data analysis collaboration with Amazon but also the use RFID chips in the footballs themselves. This partnership between AWS and the NFL was accompanied by the attendant promise of novel forms of cutting-edge real-time statistical analysis utilizing Amazon's cloud-based machine learning and data-analytics tools (Miller 2017). While Amazon's infrastructure is critical in expanding upon the NFL's efforts to track gameplay via RFID chips, just as significant are the strategies used by these corporate interests to discursively promote big data and spatial tracking as part of new forms of knowing, perception, and engagement.

It is impossible to discuss discursive positionings of RFID and big data without referencing Foucault's canonical *The Archaeology of Knowledge*, in which he defines discursive formations as "a system of dispersion, whenever, between objects, types of statement, concepts, or thematic choices, one can define a regularity (an order, correlations, positions and functions, transformations)" (Foucault 1972: 38). Clarified further by Huhtamo and Parikka (2011), Foucault's archaeology "emphasized the role of discourses as loci where knowledge is tied with cultural and social power. Material, bodies, events, and institutions are all conditioned by discursive formations" (8). Certainly, technical media arise out of distributed discursive networks (bodies of knowledge, objects, techniques) but then crystalize, cut their roots, become mobile, intermix, and recombine "to the point where their original frame of reference holds explanatory power for their functioning" (Monea and Packer 2016: 3147). Consequently, understanding the discursive positionings of a technology allows interrogation into the construction of knowledge and relationships of power. From

this critical perspective, issues of privacy have been central to discussions of RFID (Weis 2004; Juels 2006; Albrecht and McIntyre 2005), including the way companies can manage public concerns of RFID product rollouts (Thiesse 2007). Certainly, forms of data collection have often been associated with the metaphor of “Big Brother” and other positionings of “top-down” surveillance (Solove 2004). Due to this negative connotation, corporations like Amazon face the challenge of re-positioning data collection technologies to make the AWS platform more palatable and marketable to the public.

Amazon’s partnership with the NFL is often situated in historical context by figureheads of both organizations. Even before the AWS collaboration, Matt Swensson, senior director of Emerging Products and Technology at the NFL, stated, “We’ve always had these traditional NFL stats. The league has been very interested in trying to broaden that and bring new statistics to the fans. Along the way, there’s been more realization about how the data can be leveraged to make workflow more efficient around the game” (Olavsrud 2015). The NFL has collected statistics since its inaugural season in 1920, and such numerical quantification of the game has long been circumvolved with other forms of capturing the experience. At the same time, there are repeated efforts by the NFL, Zebra Technologies, and Amazon to situate this new analysis as a significant improvement upon historical antecedents. For example, vice president and general manager of Zebra Technologies Jill Stelfox emphasized the “endless possibilities” of RFID tracking data (Olavsrud 2015). Three years later, Swensson remarked that the AWS partnership was part of “turning a corner on creating metrics that are more advanced and do a better job of telling the story of the game” (Hiner 2018). Amazon itself is no stranger to grandiose proclamations; in a similar 2015 partnership with Major League Baseball, the company framed AWS analytics as “[t]urning baseball into rocket science” (Soper 2017). Taken together, continued discursive positionings about this collaboration emphasize both the historical lineage and transformative potentiality of RFID and data-driven analytics.

This discursive lineage is critical in re-characterizing both RFID and big data technologies. Academic work often examines RFID developments as part of the Internet of Things—the pervasive presence of mobile devices and sensors (Aztori, Iera, and Morabito 2010; Sterling 2005; Bleeker 2006). Moreover, Frith’s (2014) work calls for analysis of RFID as mobile technology, and RFID within the confines of professional sporting events complicates the common assumptions of mobile media. The NFL is fundamentally a game based on mobility; some of the world’s top athletes run great distances over the course of 60 minutes of game time. Furthermore, the yearly evolution of offensive and defensive game plans, the need for team owners to deliver a competitive product for fans, and the capitalistic desire for an ever-increasing revenue stream means that all 32 teams are constantly searching for an advantage over their competition. While scholarship often notes the social, cultural, and spatial anxieties of RFID tracking individuals’ movements through space (Galloway 2004; Allen-Robertson and Beer 2010), RFID use by the NFL, by contrast, is framed as a positive and dynamic development that is the natural historical accretion of a statistical capture of game spaces. Put another way, RFID and big data analytics are framed not as a departure from the norm, nor as connected to social and cultural apprehensions of data capture; instead, the NFL and AWS both emphasize the way quantitative capture is imbricated with sports—big data and RFID are an inevitable evolution of the game.

The “Next Gen Experience”

In addition to this historical lineage, Amazon emphasizes the way AWS impacts the fan experience, in that data are used to “enhance” both broadcasts and post-game analysis and that the attendant “Next Gen Stats” change the way fans both understand and experience football (Amazon Web Services NFL 2018). In the initial announcement of Next Gen Stats, Vishal Shah, former VP of Media Strategy & Business Development at the NFL, explained “[s]tatistics are core to the fan experience, and being able to broadly deliver new, differentiated viewpoints is compelling” (Wallace 2016). For fans, advanced stats are part what has been discursively framed as education. This includes the possibility of displaying new types of information during a broadcast so as to give fans more information (Olavsrud 2015). Moreover, Swensson contended, “There’s some very complicated parts of football that can be really fascinating to die-hard fans. A lot of times you watch a game and maybe you don’t realize some of the decisions and why they are made,

or even some of the intricacies of the game such as why players line up a certain way. My hope is that [Next Gen Stats] continues to educate fans and help them understand more and more of our game” (Hiner 2018). As Hayles (2009) explains, RFID forces us to reconsider ontological and epistemological questions of meaning making, knowledge construction, and human agency (66). Viewed through the lens of the NFL-AWS partnership, the question of what counts as knowledge and engagement for fans is complicated. Specifically, only by embracing computational and data-driven analysis can one truly “comprehend” the complexity of the game space.

Each week of RFID tracking of NFL games produces three terabytes of raw data (Hiner 2018); yet, these data are meaningless without concomitant analytics. Here, Amazon Web Services cloud computing analytics platform is critical in storing, processing, and analyzing this data in real time. Big data itself has become somewhat of a buzzword, but key to this process are the characteristics of digitization, unprecedented data storage capacity, and new modes of algorithmic analysis (Andrejevic and Gates 2014: 186). Mayer-Schönberger and Cukier (2013) similarly focus on big data, as “the ability of society to harness information in novel ways to produce useful insights or goods and services of significant value” (2). This includes the major shifts of the ability to analyze enormous amounts of data instead of smaller (likely randomized) sets; a willingness to embrace data messiness instead of the exact; and a growing respect for correlations (Mayer-Schönberger and Cukier, 2013: 19). As defined by Andrejevic (2014), “Big data denotes the moment when automated forms of pattern recognition known as data analytics can catch up with automated forms of data collection” (Andrejevic 2014: 1674-1675). More important still is that big data is fundamentally asymmetrical—not only in terms of the massive amount of resources required to construct and maintain the infrastructure of servers and the computational power required for big data analytics but also through the opacity of big data output (Andrejevic and Gates 2014). This asymmetry of power in terms of *who* has access to big data, as well as *what* the correlative and predictive output of big data is utilized for situates big data analytics as a massively important issue for the contemporary world. In the case of this NFL partnership, AWS machine learning and artificial intelligence are framed as able to “predict formations, play outcomes, routes, and key events in a game” (Amazon Web Services NFL 2018). Consequently, the use of spatial tracking and data analysis in the context of professional sports represents a popular intersection in which these surveillance technologies are discursively packaged to the public. Predictive capacity within the confines of an entertainment is relevant to the aforementioned fan experience, whether the fan wants to engage in either expert-level or mere dilettantish analysis. Just as importantly, mastery of the predictive power of big data has monetary ramifications, whether in the world of sports consulting firms hired by teams to gain an edge over their competition, for fans hoping to win money on daily sports betting events, or for betting platforms themselves in setting odds and predicting outcomes. The reliance on what is framed as the preternatural predictive capabilities of big data increasingly means that to engage with America’s most popular sport is to rely on the expertise of opaque data-driven computational analysis.

Despite these framings of big data analytics by Amazon and the NFL, discursive positionings can bifurcate in both positive and negative directions. Recently re-hired Oakland Raiders coach and former broadcaster/commentator Jon Gruden expressed opprobrium toward big data early in 2018, stating the following:

Man, I’m trying to throw the game back to 1998. Really, as a broadcaster, I went around and tried to observe every team. Asked a lot of questions. Took a look at the facilities, how they’re doing business. There’s a stack of analytical da-ta, or day-ta, however you want to say that word, that people don’t even know how to read it. It’s one thing to have the da-ta or day-ta. It’s another thing to know how to read the damn thing. So I’m not going to rely on GPS’s and all the modern technology...I still think doing things the old fashioned way is a good way. (Henderson 2018)

The NFL is not the only major American sports league to embrace Amazon Web Services and big data analytics. Gruden’s askance toward big data was echoed by former Major League Baseball pitcher Jayson

Werth, who fumed, “They’ve got all these super nerds, as I call them, in the front office that know nothing about baseball, but they like to project numbers and project players...I think it’s killing the game. It’s to the point where just put computers out there. Just put laptops and what have you, just put them out there and let them play. We don’t even need to go out there anymore. It’s a joke.” This excoriation of big data analytics is certainly a minority opinion—Gruden was quickly lambasted by media outlets for his antiquated attitude toward an evolving game (Dubin 2018). Whether Gruden and Werth have a point is itself beside the point. Instead, what matters is the relationship between the contemporary computational glut of information and the demise of symbolic efficiency, which is accompanied by a renewed focus on affect and emotion as alternative ways of making sense of reality in an era of new communications technologies (Andrejevic 2013). As big data becomes increasingly prevalent in myriad fields, it is critical to consider the reconfiguration of knowledge/power relationships with particular attention paid to the asymmetries of access and understanding of big data infrastructures (Andrejevic 2013: 17). One such alternative to the issue of too much information and the asymmetry of big data is the affective solution of “going with one’s gut”, better explained as a pre-personal and “non-conscious experience of intensity” (Shouse 2005). The tension between these affective forms and decision-making and analytics has wide-reaching impacts; yet, what is key in these examples is the changing notion of expertise. The use of spatial-based data analytics in professional sports is still in its nascent stage, but such analytics are already framed as an inevitable data revolution capable of unlocking new levels of analysis. Simply stated—coaches and organizations must either get ahead by embracing creative uses of AWS analytics or be left behind by those who do.

A Most Trusted Institution...

Taken together, the use of RFID and big data analytics via the NFL-AWS partnership marks a novel experiment in the computational capture of game spaces. The mobile technology of RFID and its accompanying analytics promises to engage viewers by providing a previously impossible machinic perception of the game of football. By automating the visual assessment of professional sports, RFID and big data allow new forms of knowing and formerly inconceivable efficiency analysis. The ever-present mobile data collection, moreover, reconstructs the space of the football field as a computational socio-technical assemblage. Perhaps most importantly, for companies like Amazon and Zebra Analytics, the partnership with the NFL provides an opportunity to position RFID and big data discursively—not as an invasive disruption of privacy but as a technology that assists in overcoming the limitations of human cognition to provide previously unimaginable analysis.

This specific example of a partnership with Amazon Web Services is depicted as an exciting, future-oriented approach to watching, experiencing, and engaging with a popular American entertainment form. Such big data dynamism stands in stark contrast to the more banal, quotidian, and hidden infrastructural uses of the AWS platform by the more than one million active customers boasted by Amazon. Moreover, these everyday (and often useful) employments of AWS are contrasted by recent events, such as Amazon’s work in selling their facial recognition system called Rekognition—part of the AWS cloud—to police departments and law enforcement agencies (Brandom 2018). In marketing materials obtained by the American Civil Liberties Union, Amazon notes that Rekognition can provide “easy and accurate” “person tracking” to identify “people of interest” (Cagle and Ozer 2018). Despite these problematic uses of AWS, a recent survey conducted by researchers at Georgetown and New York Universities found that Amazon was the second-most-trusted institution by self-identifying Democrats and Republicans (ranked above government agencies, colleges and universities, Facebook, banks, the press, and religious institutions), as the most trusted institution by Democrats, and the third most trusted institution by Republicans (Ladd, Tucker and Kates 2018). While it is impossible to know just how much the AWS-NFL partnership influences institutional confidence, spatial tracking and analytics in relation to professional sports provides far more positive coverage than the darker aspects of Amazon’s technologies. This is not to make the case that big data technologies, RFID, or Amazon itself, are inherently good/evil. However, the larger assemblages in which AWS is utilized can quickly work toward problematic and authoritarian ends.

At stake, then, is more than engagement with the most popular American sports league, more than computational versus affective forms of expertise, and more than new forms of knowing and engagement. What is most critical is the way technologies that are increasingly used for surveillance and control have been repackaged—discursively positioned not as omnipresent big brother, but instead as a helpful friend who gives fans an edge in their fantasy football leagues. As scholars, we cannot ignore the work being done by Amazon and other corporate interests in promoting big data analytics to the public, even if the context appears trivial. Issues of big data surveillance, control, spatial tracking, asymmetrical access, and platform recentralization are increasingly relevant; yet, these issues will quickly become obfuscated as big data becomes synonymous with the far more sociable face of Next Gen Stats.

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