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PANEL: TECHNOLOGIES OF THE IMAGINATION

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This panel takes as its starting point the double role of software in the social imagination: as a technical artifact it fulfills particular computational functions, yet software also serves as a powerful site through which stories are told about the meaning of technology and its relation to bodies, data, memory, knowledge, power, labor, and history.

Beginning with narratives of empowerment through personal computing and the borderless nature of cyberspace, the imagination of digital media has long held popular appeal. The 1990s fascination with the distinction between the virtual and the real may have subsided, but new imaginaries that seem to capture the character and promise of digital media continue to find their way into hyperbolic news headlines. The social graph, the quantified self and other abstract notions evoke a technological present that was previously impossible. Such widely-publicized imaginations have been routinely criticized: in the early 1990s, Phil Agre, Vivianne Sobchack and others began cautioning against the transcendentalism, political naiveté and escapism that pervaded much of the utopian rhetoric around digital media. Like digital utopianism itself, such criticism has hardly slowed down, as evidenced by the critical and popular success of reformed cyberutopians Evgeny Morozov and Jaron Lanier.

What goes missing during the back-and-forth between digital utopians and their debunkers, though, is the more general importance of imagination to our experience of new media: it is not (just) the utopian and transcendental associations of digital technology that is worthy of study, but the interplay of materiality and abstraction that occurs at a variety of levels and registers in digital culture. In their own ways, each of the papers in this panel explores this liminal space of imagination and technology and

demonstrates how this tension is productive for the study of how digital media are produced and used.

The first paper uses the contemporary turn to web nostalgia as a way to investigate the relationship between web archives, the popular imagination, and the construction of historical narratives. Exploring the history of the Internet Archive's WayBack Machine as simultaneously a technical artifact, a trove for mining (algorithmically generated) images of the past, and a cultural reference to a subversive Cold War cartoon ("Peabody's Improbable History"), this paper considers how the discourse of "time travel" as historical method taps into desires for capturing and stabilizing an ephemeral past, thereby producing collective memory through a process of collaborative filtering.

The second paper considers counting as a technology of the imagination, interrogating how today's opportunities to self quantify are grounded in the longer history of counting in computing culture and also driven by an imagined future of digital self-actualization. This new iteration of what Weber calls the "spirit of calculation" materializes on the body through the connected technologies of activity tracking, productivity apps, and the aggregation of "body data".

The third paper explores a peculiar computer science project that began in the 1990s: computer vision-based pornography filtering (CVPF). CVPF takes on a difficult problem: how can we teach a computer to "see" pornography, and to distinguish pornographic images from non-pornographic ones? Since its advent in 1996, 102 CVPF papers have been published. This project closely reads them all and finds that the field of CVPF have a particular imaginary about what constitutes a pornographic image: a single, non-tattooed, light-skinned, fully nude woman standing centered against a flat background. The paper argues that this extremely limited pornographic imagination reflects larger gender and sexual inequalities in the field of computer science.

The final paper asks how one technology may be imagined in another. It takes as its starting point the Perl programming language, which was considered crucial to web development in the 1990s but has arguably been superseded today. What is the status of Perl in web history, and how was it implicated in early imaginings of the web's identity? The paper examines the histories of two Perl libraries, identifying a number of ways in which the language and its developers helped articulate the new medium.

PAPER 1: THE IMPROBABLE HISTORY OF 'WEB 1.0': DIGITAL NOSTALGIA, TIME MACHINES, AND THE COLLABORATIVE FILTERING OF CULTURAL MEMORY

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March 12, 2014 marked the “official” 25th anniversary of the World Wide Web. The occasion was promoted by the international web standards setting consortium, W3C, and the World Wide Web Foundation, which celebrated by launching an anniversary website (www.webat25.org) urging visitors to share their web memories and tweet birthday greetings using the hashtag #web25. Hailed as an opportunity to reflect on the history and future of the web, the event was perhaps equally remarkable for revealing both the web’s profound significance as an everyday media and information technology as well as the overwhelming confusion by many users in understanding what, precisely, was being celebrated. Some tweeted greetings using a new hashtag, #Happy25thInternet, while others seemed to assume that on this date 25 years ago, the web suddenly appeared fully formed and ready to use. Does it even matter that most people wishing it a happy birthday had no idea that they were celebrating a proposal (a rejected one, at that!) for global hypertext? Or that the internet and the World Wide Web are actually different things?

This paper situates the uncertainty and confusion surrounding popular understandings of web history alongside the recent surge in web nostalgia. Described in media coverage as “the great Web 1.0 revival” (Chayka, 2014) nostalgia for the early web is expressed in popular technology blogs and the personal sites of web users who mine the Internet Archive for screenshots of early websites. Web nostalgia has also been linked to the launch of recent apps like Facebook’s *Rooms* and the ad-free stripped down social networking site *Ello*. But while the relationship between media and collective memory has been an ongoing topic of interest in communication and media studies, little work addresses web history and the specific nature of web archives as software tools and machine-generated digital artifacts that are created through the archival process (Brügger, 2008) To examine the relationship between nostalgia, social imaginaries, and the material-semiotic dimensions of web archiving, this paper follows two lines of inquiry.

First, the mediation of anniversary celebrations plays a crucial role in public understandings of the past. Typically, media institutions and authorized spokespeople serve as gatekeepers that interpret a common recollection of the event (Kitch, 2002). But resources like the Internet Archive’s WayBack Machine have opened the “archive” (traditionally the domain of researchers) to the curious amateur. In this section, I examine how users mine the web archive as an instrument for nostalgia. What kind of stories about the web’s past do they use it to tell? How do users of web archives understand the material and technical affordances of the archive? From a sample of twenty-four blogs that highlight archived snapshots from the WayBack machine, I examine the screenshots and discursive framing that strategically position representations of the past. In these contexts, I argue, the WayBack Machine figures as a device to fix and smooth an unstable past into a version of web history known as “Web 1.0.”

Second, I consider these representations alongside the WayBack Machine’s reliance on a discourse of “time travel,” which promises users the ability to “browse the web as it was.” This promise of unfettered access to the ephemeral past underscores Wendy Chun’s observation about the persistent “conflation of memory and storage that both underlies and undermines digital media’s archival promise” (2011, p. 184). The constant

degeneration and regeneration of the digital that Chun terms the “eternal ephemeral,” can be illuminated through the intertextual connections that situate the WayBack Machine’s legacy in American popular culture. The “WayBack machine” was named after a segment that appeared in *The Rocky and Bullwinkle Show*, a children’s cartoon that aired in the 1950s and 60s. “Peabody’s Improbable History” features a genius dog, Mr. Peabody, who built a time machine called the “WAYBAC machine” for his pet boy, Sherman. Filled with role reversals, anachronisms, and historical adventures that require Peabody and Sherman to constantly “fix” an unstable past, the show is a satirical Cold War text that pokes fun at the narrative construction of history. The public discourse of the Internet Archive, however, modulates these subversive references to the instability of the past with powerful testimonials that promise “universal access to all knowledge.” By framing nostalgic uses of the WayBack Machine alongside these conflicting discourses surrounding knowledge, instability, ephemerality, and time travel, this paper argues that we might best understand the popular work of web history as a process of collaborative filtering that takes place on the semiotic level and through the technical/algorithmic process through which the web is crawled.

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PAPER 2: TECHNOLOGIES OF FUTURITY, TECHNOLOGIES OF FUTURE ME: THE CULTURAL IMAGINARY OF COMPUTING

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As a fundamental component of computing culture, counting has long factored into software’s usability. It is no surprise, then, that personal counting software infiltrates a contemporary mobile and “appified” world. A digital self-actualizing culture of calculation proliferates in everything from productivity software (word counts, goal counts) to preventative health apps and self-quantification (step counts, calorie counts, cell counts). Following Appadurai’s notion of “cultures of calculation,” indebted to Weber’s “spirit of calculation,” this paper investigates the embodied structuration of counting on which technologies embedded in a self-improvement-driven social world are dependent. Counting is a technology of an imagined future self: the work of envisioning a self-actualized “future me,” is materialized as technologies and bodies interface through personal counting software and the social practice of self-quantification.

The history of calculation in computing culture, as both process and imaginary, has been a gradual shift from the industrial practice of government-led mass calculation and the high skill wage work of human processors to the individualization and customization of counting as an important action in today’s culture of activity trackers, productivity

apps, easy-to-use data visualization programs, and measures of personal accountability and organization embedded in smart products, smart homes, and the Internet of Things (Friedman, 2005; Ceruzzi, 1991). Given the integral nature of calculation to the history of computing, how do we make sense of calculation's utility in today's neoliberal economy of counting bodies, a contemporary movement toward biotech counting software, wearables, and the quantified self movement?

Max Weber identified the "spirit of calculation" as a defining characteristic of modernity: counting was a process of rationalization that led to mastery. Arjun Appadurai picks up Weber's use of calculation to investigate how counting is integral to capitalism's dependence on technologies embedded in a future productive social world. In doing so, Appadurai calls for more work that merges the technique of calculation (markets) and the ideology of calculation that infiltrates the everyday world. I use this dual conception of calculation – as economic mode and cultural imaginary – to make sense of a contemporary moment where technologies, bodies, and counting software interface with imagination to produce a future self. I consider a number of connected counting cultures – the social practice of self-quantification made visible in the Quantified Self movement, the functionality of wearable tech like activity trackers, and the popularity of apps dependent on personal counting software. I argue that these devices and social practices fit with and onto the body in ways that activate an imagined future self.

First, the quantified self movement is a recently popularized trend toward the daily practice of utilizing technologies that collect and make legible data on a personal level for self-evaluative purposes in an effort toward self-betterment. Ground zero for the QS movement is the Bay Area QS meetup group, a group of about 4,000 self-quantifiers that organize "regular show and tell" for personal accounts of lifelogging, digitizing body info, chemical body load counts, and computer-assisted on-the-body data collection. While the Bay Area QS meetup group is an outlier in its level of devotion, self-quantifiers have recently garnered attention for their fascination with data collection through personal tracking. Self-quantifiers serve as a useful case study because of their insistence that the computational gathering of body data leads to better lives. Through interviews with self-quantifiers and discourse analysis of the popular representation of the QS movement, I consider how bodies, data, and the social converge at the site of counting as an economic and cultural imaginary.

Second, the advent of what Morris and Elkins call "mundane software" – software that is easily incorporated into everyday routines through its "appification" – fosters the accessibility of personal counting software embedded in connected computing devices like Fitbits and word count apps. Through the usability of mundane software that is grounded in self-tracking, counting becomes a liminal space of imagined futurity wherein participants try to simultaneously manage the threat of the failure and fragility of the body and the threat of the automated, semi-conscious, semi-intuitive promises of tech. The imagined futures of bettered lives is a built-in mechanism of personalized counting, as self-evaluation is literally affixed to the body in a daily practice of collection, assessment, and resetting of goals for tomorrow. Although counting for a host of moral, social, and economic imperatives is nothing new, its closer proximity to the body has implications for how we understand software, futurity, and shifting definitions of the

knowledge economy. What is technology's cultural role in the continued scientific management of the body?

Ultimately, counting pushes us toward new definitions of the knowledge economy and how . The knowledge economy is usually understood as the capitalistic mode of utilizing knowledge as extracted, generative use-value from labor. How might we understand the knowledge economy differently if we start to consider it as not extracted, but "kept close" (to the body) as generative of use-value? This paper brings calculation into contemporary conversations about media economy informed by neoliberalism, immaterial labor, and affect (Terranova, 2004; Curtis 2013; Hearn, 2010; Lazzarato, 2006; Harvey, 2005; Apple & Aasen, 2003). At the same time, I suggest that counting and wearables are connected to specific cultural imaginaries? histories – the consistency of the American dream; the history of digital flaneur; and, the history of popular curation – all of which inform today's knowledge economy.

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PAPER 3: WHEN COMPUTERS IMAGINE INTERNET PORN: GENDER AND SEXUAL DISCRIMINATION IN COMPUTER VISION ALGORITHMS

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When it came to Internet porn in the 1990s, imaginations ran wild. The now-infamous 1995 Time cover story on cyberporn claimed that online porn was ubiquitous and that children couldn't avoid clicking on it. Although the porn panics of the 1990s have largely subsided, echoes of this digital imaginary can still be found in a special field of computer science: computer vision-based pornography filtering (CVPF). CVPF is an approach to training computers to solve a tough problem: to distinguish pornographic images from non-pornographic ones and to filter out the former.

This paper is based on a review of 102 academic papers in CVPF from 1996 to the present. Based on this body of knowledge, the paper argues that CVPF has as a whole

trained computers to "see" a very specific, idealized form of pornography: pictures of lone, thin, light-skinned naked women. The paper supports this argument by closely reading the algorithms proposed in the CVPF literature and by quantitatively analyzing the images included as illustrations of these algorithms. Specifically, the CVPF field breaks bodies down into parts: skin, faces, nipples, and breasts, and it constructs algorithms to find each of these parts. It also includes significantly more images of females than males to illustrate this process. Moreover, the field treats bodies that don't fit its ideal as "noise." In other words, fat, pierced, hairy, tattooed, or trans* bodies don't fit into the CVPF pornographic imagination. Ultimately, the paper argues that this very narrow imagination of porn in CVPF reflects larger gender and sexual inequalities in the computer science field as a whole. Human sexuality exceeds computer vision-based attempts to train computers to see pornography in the same way that humanity itself currently exceeds the contemporary computer technology industry.

PAPER 4: READING THE EARLY WEB IN PERL

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Although the Perl programming language preceded the World Wide Web by a few years, their respective histories are inextricably linked. Perl's rise to prominence has long been associated with the rise of interactive content for the web in the mid-1990s, while less visible uses such as automated system administration were equally important to the emerging web industry. This paper serves as an initial exploration into this shared past, focusing in particular on how uses and users of the early web were imagined in and facilitated by Perl.

The paper has two main sections. First, I discuss Perl as a transitional object in web history, one that, similar to other objects of media archeological investigation (Gitelman, 2006), evokes larger processes of transformation and suggests paths not taken. Second, I focus on the histories of two Perl libraries (CGI.pm and LWP) to argue that Perl developers and the language itself were important actors in establishing two key understandings of the web - as an experimental publishing environment on the one hand, and what noted developer Roy Fielding (1994) called a "living infostructure" on the other. The paper thus seeks to contribute to web histories that investigate the relationship between software and the discursive, economic and political contexts that govern production technology and practice (Ankerson, 2010).

Perl's importance to the web was widely recognized in the mid- to late-1990s, with its flexibility and usefulness often expressed in metaphor: the language was the 'glue' holding the web together, and a 'swiss army chainsaw' for tackling a variety of tasks faced by webmasters (O'Reilly and Smith, 1999). Its flexibility and perceived ease-of-use (compared to lower-level languages like C) - together with such eccentricities as lectures on postmodernism by its founder (Wall, 1999) and obfuscated code contests held by its most devoted followers - helped Perl maintain a reputation as a playful alternative to supposedly staid system languages (Leonard, 1999). This reputation

suited an era of web development marked by fast-paced innovation and an expanding base of amateur developers. However Perl was also considered robust enough to depend on, as evidenced by its heavy use at such icons of the early web as Yahoo!, IMDB, Amazon, Slashdot and HotWired. Most importantly, perhaps, it was instrumental in instituting new media forms: Perl was central to “infoware,” Tim O’Reilly’s (1998) term for data-rich media products that allowed (and prefigured O’Reilly’s more famous concept, “Web 2.0” [2005]).

By the early 2000s, however, Perl’s influence and relative popularity had likely peaked, and by 2005 the first claims of its death surfaced (Schwern, 2008). Whatever the merits of the argument that Perl has been superseded in web development (and such claims are hotly contested by the Perl community, which continues to grow in absolute terms), the perception that the language is outdated raises the question of how it ‘fit’ the development practices and media forms of the early web (and by extension, why it does not fit the contemporary web). Perl appears as a transitional object in the history of web development: the language and its developers featured heavily in key attempts to explore and determine the identity of the new medium, and eventually this interdependence was severed. It was *through* Perl that potential uses of the early web became clearer; at the same time, imagining the web was both a necessary precondition and an outcome of tailoring the programming language to the new medium.

To begin to understand Perl’s role in articulating the web’s identity in the 1990s I turn to a range of reference works, tutorials, archived communications, existing interviews and other media to analyze the imagined uses and users of two Perl libraries, or collections of existing code. The first is CGI.pm, widely used in the mid- to late-1990s to build interactive websites. Named for the Common Gateway Interface protocol that allows servers to call on executable scripts, CGI.pm greatly eased the work of dealing with web forms (and thus user interactivity) and generating dynamic content. CGI.pm was thus created to contribute to a more lively and programmable web, one that was in some ways at odds with the web’s original design (in particular the ‘stateless’ nature of the Hypertext Transfer Protocol, which is more suited to delivering static content). By contrast, LWP (short for “The World Wide Web Library for Perl”) had its roots in a tool for automatically indexing broken hyperlinks (Burke, 2002; Fielding, 1994) and in this way was closely aligned with Tim Berner’s Lee’s (1989) original vision of a highly sophisticated form of “information management.” In other words, if CGI.pm represented an exploration of the web’s limits as a publishing medium, LWP sought to expand the web’s capacities for referencing and information retrieval.

By uncovering assumptions, rationales and use scenarios underlying these two libraries, this paper seeks to contribute specifically to a better understanding of the relationship between Perl and the early web, and more generally to a form of media archeological investigation suited to studying computational media forms.

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