Article

Critical technocultural discourse analysis

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Abstract

Critical Technocultural Discourse Analysis (CTDA) is a multimodal analytic technique for the investigation of Internet and digital phenomena, artifacts, and culture. It integrates an analysis of the technological artifact and user discourse, framed by cultural theory, to unpack semiotic and material connections between form, function, belief, and meaning of information and communication technologies (ICTs). CTDA requires the incorporation of critical theory—critical race, feminism, queer theory, and so on—to incorporate the epistemological standpoint of underserved ICT users so as to avoid deficit-based models of underrepresented populations' technology use. This article describes in detail the formulation and execution of the technique, using the author's research on Black Twitter as an exemplar. Utilizing CTDA, the author found that Black discursive identity interpellated Twitter's mechanics to produce explicit cultural technocultural digital practices—defined by one investor as "the use case for Twitter." Researchers interested in using this technique will find it an intervention into normative and analytic technology analyses, as CTDA formulates technology as cultural representations and social structures in order to simultaneously interrogate culture and technology as intertwined concepts.

Keywords

African American, Black, critical discourse analysis, cyberculture studies, discourse analysis, information studies, Internet research, race, technoculture

> For those of us in cross cultural research—indigenous cultures, marginalized peoples, native Americans—rationalist universals are totally inappropriate.
>
> Christians (2007)

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Introduction

> Critical textual analysis offers interpretations of how a text can become polysemous and effective when placed in the public domain of cyberspace. (Mitra and Cohen, 1999)

Even as the Internet has matured to become our cultural communicative infrastructure, social sciences and humanities research continues to address this multifaceted medium from either an instrumental or theoretical approach. Freelon (2010) noted that Internet scholars either examine "characteristics relative to [their chosen theory] at the expense of other equally compelling conversational phenomena" or "acknowledge[s] the existence of multiple types of discussion environments, but fail to formalize the characteristics of these divergent spaces in ways that are *systematic, commensurable and tailored specifically to online discussion* [emphasis mine]" (p. 1173). Accordingly, research into Internet phenomena often focuses on specific, characteristic communicative functions of the technology or, alternatively, as theorized "discourse" from a disciplinary perspective. This article argues instead for a critical cultural approach to the Internet and new media technologies, one that interrogates their material and semiotic complexities, framed by the extant offline cultural and social practices its users engage in as they use these digital artifacts.

This critical cultural approach, which I am calling "Critical Technocultural Discourse Analysis" (CTDA), combines analyses of information technology material and virtual design with an inquiry into the production of meaning through information technology practice and the articulations of information technology users in situ. CTDA offers the opportunity to think about all three in parallel, using a conceptual framework interrogating power relations, in order to tease out the connections between them. This approach provides a holistic analysis of the interactions between technology, cultural ideology, and technology practice.

CTDA is designed to be open to any critical cultural theoretical framework, as long as the same critical cultural approach is applied to the semiotics of the information and communication technology (ICT) hardware and software under examination *and* the discourses of its users. For example, my research stream draws upon critical race theory, racial ideology, and Western technocultural studies. This conceptual framework is then applied twice: once to the material, practical, and discursive properties of blogs, websites, and video games, and a second time to examine the cultural practices that take place in these digital spaces. The dialectic and dynamics of Black and White American racial ideology inflect the framing of the technology, the cultural discourses that shape our use of the technology, and the societal expectations about those technocultural practices.

For clarity, recent research (Brock, 2012) into African American Twitter usage ("Black Twitter") is introduced to illustrate CTDA in action. Black Twitter refers to the recently uncovered phenomenon of African Americans using Twitter in numbers exceeding their demographic representation. By employing CTDA, I found that Twitter's adoption of the Short Messaging Service (SMS; "texting") protocol played into the increasing numbers of African Americans buying smartphones with broadband access; these users were already literate in computer-mediated communication thanks to early adoption of alphanumeric two-way pagers and Push-To-Talk mobile telephony. I also used CTDA to illustrate how

Black Twitter (digital) practice draws upon cultural referents and discourse conventions ("signifyin") drawing from African American culture. Finally, I found that reactions to Black Twitter use signaled differing technocultural expectations of effective or productive uses of information technologies. Where some viewed Black Twitter as "play" or framed Black Twitter discourse through racial stereotypes, others argued for it as legitimate technical discourse as well as implicit political action. Thus, CTDA's emphasis on evaluating technologies as an assemblage of artifacts, practices, and cultural beliefs helped to provide a complex, critical analysis of Black Twitter.

A note: CTDA is most useful to critical cultural researchers who have an inquiry into digital media discourse utilizing qualitative or quantitative content analysis. Moreover, those who have made preliminary observations of specific digital practices and have access to a relevant corpus of data (Herring, 2004) will find CTDA quite powerful. However (borrowing again from Herring, 2004), I would suggest to those interested in utilizing CTDA:

> This [article] is not intended as a step-by-step "how to" guide, but rather as an overview of how a [CTDA] researcher might conceptualize, design, and interpret a research project … for details regarding the implementation of specific analytic methods, readers should refer to the example research cited [here].

CTDA, like computer-mediated discourse analysis (CMDA), provides a methodological toolkit and a conceptual framework "through which to make observations and interpret the results of empirical analysis" (Herring, 2004).

Background

CTDA is a problem-oriented analytical approach to digital (née internet) objects and phenomena. It was born of my frustrations with digital divide research, which operates from the technodeterministic premise that access to the "digital" improves the lives of underrepresented groups.[1] In brief, I find that academic and public discourses about underrepresented groups' ICT use are inextricable from the larger cloth of cultural (*not* technical) beliefs about the deficiencies of underrepresented groups when compared to the "norm": White, middle class, Christian, heterosexual, patriarchal men.

Digital divide research, a field characterized by innumerable instrumental/quantitative ICT analyses, serves as an example of the cultural limitations of social science ICT studies. Selwyn (2004) points out that digital divide research employs a "deficit model," where the non-use of ICTs is due to shortfalls in the measured group's cognition, personality, knowledge, resourcing, social situation, or personal ideology (p. 107). My personal frustrations with digital divide research stemmed from my awareness of the "discourses of material and cognitive deficiency" (Selwyn, 2004) applied wholesale to my natal African American community. These studies reduce the cultural aspects of ICT use to a technologically limited "social" aspect (e.g. "user") while privileging ICT usage of elites as a "norm," leaving unspoken the environmental, social, or cultural ideologies shaping ICT design, expectations, or use. I would expand Selwyn's charge against digital divide research to include most social scientific research about ICTs and underrepresented groups.

Much of the myopia inducing social science's uncritical perspective on technology-in-society research can be laid at the feet of their instrumentalist approach to technology. By instrumentalist, I mean that technology is seen as extrinsic to a person's being and to society's character (Christians, 2014). As a result, a fair amount of social science Internet/new media research is concerned with what people do, rather than why people do digital practice. In my quest to incorporate a cultural perspective on empirical technology use, I turned to social informatics (SI) which shares intellectual space with sociology, science and technology studies, and organizational studies, as the

> systematic, interdisciplinary study of the design, uses, and consequences of information technologies that takes into account their interaction with institutional and cultural contexts. (Kling, 1999)

Specifically, I was drawn to Day (2007), who argues for "critical informatics/critical information studies" as an under-appreciated interpretive and ideological analyses in SI research. Where the normative and analytic traditions of SI investigate "problems" of ICT and society, critical SI is more interested in the conceptual *problematics* of ICT use, design, and dissemination. Day (2007) notes that conceptual problematics can *only possibly be resolved*—rather than solved—because cultural materials (e.g. "information") are not causal. As an example, racism is a conceptual problematic, rather than a "problem" to be "solved." Cultural materials are affordances of expressions and involve "hermeneutic circles (i.e., their objects of analysis are bound up with their conditions and tools of analysis and judgments)" (p. 577). Day's argument for the discourse hermeneutic analysis of ICT problematics has been incredibly influential in my formulation of CTDA, where the interpretive aspects of technology artifacts are examined in concert with the interpretations of technology discourses.

While critical of quantitative social science, I do not mean to imply that qualitative (e.g. cyberculture or information society) ICT and new media research is free from criticism. Webster (2006: 264) points out that within these theoretical approaches, there still exist subtle forms of technological determinism, presuming that technology exists outside of the social realm. Early approaches valorized (or demonized) technology's possible effects on society while eliding the specific mediations that such technologies engender in everyday use. More recent research has evolved to more thoroughly describe (rather than interrogate) ICT interfaces and texts, but the theorizations have shifted to analyses of ICT's oppression, resistance, labor, or commodification of the social. Webster (2006) concluded that the concept of "information society" is unsatisfactory partially due to the "conviction that quantitative changes in information are bringing into being a qualitatively new sort of social system" (p. 8). Moreover, many qualitative analyses normalize a Western cultural ICT context as the "social," while other cultural ICT usages (especially, but not limited to, within a US context) are "ethnic" or "niche" (Lanier, 2010; Rheingold, 2007; Turkle, 2011).

Christians (2014) argues, "rooting our understanding of media technology in culture is a significant advance, but the rooting itself begs the question whether our cultural approaches account for technology adequately" (p. 527). To counter the epistemological drawbacks of qualitative/theoretical approaches to new media research, CTDA draws from Pacey's (1983)

formulation of technology as a construct of technical artifacts (e.g. knowledge, skills, tools, and resources), technology practices, organizations, actors (e.g. users, consumers, and professional organizations), and technology beliefs. CTDA reduces this formulation to a triad of *artifact*, *practice*, and *belief*, becoming essentially a hermeneutic empirical analysis integrating interface analysis (semiosis of the material and virtual aspects of the artifact) and critical discourse analysis (focusing on representations within and of technology) framed by rhetorics of information technology and critical race theory. In particular, CTDA is keenly interested in the technological artifact, here theorized as a "set of rules and resources built into the technology by designers during its development which are then appropriated by users as they interact with the technology" (Orlikowski and Iacono, 2001). From this perspective, CTDA's examination of computational artifacts, the ways their interfaces create users through metaphor and practices, and the beliefs expressed by users of those interfaces/artifacts integrate symbolic, material, and discursive aspects of the ICT under examination. As a result, CTDA offers a critical approach to technology artifacts that reorients technocultural practice to the cultural context in which the artifact is being used.

To avoid the normative turn, CTDA focuses on the ways that technology users perceive, articulate, and ultimately define the technocultural space in which they operate and exist. These discourses of technocultural ideology are contingent upon the contexts in which they are enacted. CTDA follows Hutchby (2001)'s exhortation to

> pay more attention to the material substratum which underpins the very possibility of different courses of action in relation to an artifact … when people interact through, around or with technologies, it is necessary for them to find ways of managing the constraints on their possibilities for action that emerge from those artefact's affordances. (p. 450)

CTDA melds critical cultural theory—as a way of unveiling cultural constraints on technology use—with the above ruminations on the social construction of technology, focusing specifically on ICTs.

My version of CTDA incorporates Omi and Winant's (1994) contention that race is a sociocultural construction, one that derives energy from the ideological tensions between social structure and cultural representation. For example, the association of Whiteness with the role of "default Internet identity" works as an electronic and ideological reification of the practices and beliefs of the White, male, middle-class actors who designed and initially dominated the social structure of the Internet. Using the works of W.E.B. Du Bois (1940), Henry Louis Gates (1988), and other African Americanists as CTDA theoretical frameworks to illuminate Black cultural philosophies and attitudes, I have consistently found that articulations of digital/online Blackness draw from offline understandings of racial identity (Black and non-Black), technocultural representations of Whiteness in code, and beliefs about "appropriate" technological use.

Conceptual framework

Culture as technological artifact

While I employ critical race theory for my CTDA research, CTDA's theoretical application was intended to work as a "plug-and-play" mindset. There are two requirements:

1. The theory should draw directly from the perspective of the group under examination;
2. Critical technoculture should be integrated with the above cultural continuity (Christians, 2007) perspective.

For Christians, "cultural continuity" in technology studies is meant to decenter theories of technological determinism premised upon the beliefs of a dominant culture or modernist technological enterprises. Instead, Christian proposes that analysts investigate historically and geographically constituted people as the value-laden creators of technological enterprise. Accordingly, my intent for CTDA was to move ICT research (specifically SI, but Internet and new media research in general) away from normative and analytic traditions, which draw upon instrumentalist ICT formulations incorporating (without acknowledgement) rationalist normative racial ideologies centering Whiteness as "human." The original version of CTDA employed critical readings on American racial ideology, incorporating writings about African Americans from African American authors. CTDA's approach is open to other cultural and critical theories and philosophies such as queer theory, critical feminism, Latin@ studies, intersectionality, pan-Africanist, postcolonial, or gender and women's studies.

CTDA is specific to inquiries into computer/digital mediation of discourse, focusing on structure, meaning, interaction, and cultural/social behavior. It broadly follows the tenets of linguistic discourse analysis, incorporating the assumption that digitally mediated discourse may be, but is not inevitably, shaped by the technological features of computer-mediated communication systems (Herring, 2004).

For example, my CTDA approach to Black Twitter began with philosophies of Black discursive identity. W.E.B. Du Bois' (1903) *Souls of Black Folk* as well as his second autobiography, *Dusk of Dawn* (1940), provided articulations of Black racial identity. I then incorporated research on Black discursive identity (Gates (1988); Smitherman (1977); Walcott (1972)), focusing specifically on signifyin' discourse. Signifyin' is a marker of Black cultural identity operating through articulations and performances of shared referents, and most importantly for the study, a stylistic format of invention and delivery. Signifyin' performance reinvigorates the classical rhetorical trope of invention; successful performances trade on wordplay, humor, a critical eye, timeliness, and cultural referents, all encapsulated in a variety of ritual forms. Signifyin' draws upon de Saussure's (1974) sign/signifier/signified, but purposefully reformulates that definition to draw attention to the signifier as the playfully multivalent interlocutor while the signified evolves from form to object. Thus, signifyin' becomes a digital practice where the interlocutor inventively redefines an object using Black cultural commonplaces and philosophy and in the process authenticating their cultural identity (Brock, 2012).

While examining Black Twitter, I found that Black signifying discourse practices such as performance, audience, ritual, and catharsis map closely onto Twitter's discourse features of addressivity, concision, and networks.[2] This conceptual framework allowed me to define, describe, and analyze the use of Black discourse on Twitter from the perspective of those who employ it to articulate their identity and the structures of everyday life. Critically, Smitherman's contention that signifyin' discourse serves as an identity marker for Black culture and community reoriented my perspective on Black Twitter

from an idiosyncratic use of an "efficient" communication service to a deeper inquiry into *why* Twitter and Black discursive culture. The question became, "Is language use alone what made Black Twitter different from other uses of the service?"

Technocultural theory: technology as cultural artifact

As mentioned earlier, CTDA reformulates Pacey's (1983) triadic technology definition for Internet studies: transposing technical to "artifact," organizational to "practice," and cultural to "belief." There are two reasons for this; the first is epistemological. Pacey's original formulation defines "technical" as "knowledge, skill, and technique; tools, machines, chemicals, liveware; resources, products and wastes" (p. 6), while organizational" is the "economic and industrial activity, professional activity, users and consumers, trade unions" (p. 6). This is a powerful construct but underplays the role of technocultural ideology, or beliefs and practices about the appropriate use of technology, "reproducing the existing relations of production" (Althusser, 1970) in both categories. Sweeney (2014) argues that Pacey doesn't go far enough in unpacking the influence of ideology on technology design, organization, and dissemination, noting that racial and gender ideologies are at play in all categories, not just culture. In response, CTDA's hermeneutic approach interrogates ideology at every point on Pacey's triangle. Dinerstein's (2006) articulation of technocultural ideology has proven invaluable to CTDA, as he writes that technoculture is a matrix of six beliefs shaping technology design and use: progress, religion, the future, modernity, masculinity, and Whiteness.

The second reason for reformulation relates to conceptual efficiency; given the complexity of culture, of ICTs, and of CTDA's hermeneutics, this goal seems improbable. Culture is paradoxically the easiest to reduce: CTDA follows the maxim "make it strange," adapted from Dyer's (1997) exhortation to decenter Western culture as a "norm" for human culture. By reorienting "social" as cultural practices and beliefs, CTDA narrows and deepens the milieu in which a technological artifact is deployed.

The reach, malleability, and ubiquity of ICTs resist specificity and efficient operationalization: Is Twitter a service, a tweet, an app, a network, or a broadcast platform? In other words, which particular configuration of Internet/digital/computational technologies and users should be selected for further examination? One manner in which Internet research addresses specificity rests upon functional descriptions of the artifact—partially because of the newness of the artifact under study (e.g. Facebook is 10 years old; Twitter is 7; Vine is 2) but also because researchers are typically more interested in the means of the artifact than the ends.

CTDA's SI origins, on the other hand, lead to a structured inquiry based on empirical examinations of the computational artifact in an organizational setting (e.g. where is the artifact located when it is used?). CTDA prefers "institution" to "organization," however, because organization connotes formal structure, while institution" allows the cultural activities of groups—formal or informal—mentioned previously to frame the empirical investigation. By institution, CTDA co-opts G.H. Mead's (1934) definition, where he wrote that "institutions … are organized forms of group or social activity—forms so organized that the individual members of society can act adequately and socially by taking the attitudes of others toward these activities" (p. 261). For example, American

racism is an institution with clearly defined activities, actors, spaces, behaviors, and beliefs—for the racist, for the abstainer, and for the person being discriminated against.

For ICT and new media research, then, CTDA reframes Mead's "institutional activity" as "information technology-practice." Viewed in this way, CTDA's conceptual efficiency is achieved by limiting the examination of ICTs to discourse in context (online) and interface use in context. A CTDA analysis examines how actors shape technologies and themselves in response to the technologies they use; these technologies in turn are shaped by those who design and market them.

Technique

Discourse analysis

CTDA is strongly influenced by Wodak's (2001) discourse-historical approach (DHA) to critical discourse analysis. Both share an appreciation of hermeneutics as a major analytical tool. For Wodak, this means integrating information about the sociocultural contexts within which the discourse and texts are generated. CTDA integrates critical theory—specifically critical race theory and technology studies in my own work—with the intent of examining the cultural, social, and historical contexts within which ICTs are developed.

There are differences, however. Both approaches examine "discourse," but where DHA examines written and spoken discourse, CTDA has the additional task of operationalizing the computational object as discourse (cf. "technology as text" in Grint and Woolgar, 1997). Where the discourse-historical method explores the sociohistorical dimensions of discourses and texts, CTDA explores the technocultural mediation of discursive actions embodied as online discourse and digital interfaces. Both approaches attempt to integrate "a large quantity of available knowledge about the available sources and the background of the social and political fields in which discursive events are embedded" (Wodak, 2001: 65). CTDA is particularly keen on interrogating the influence of beliefs about the world that mediate "appropriate" uses of and discourses about ICTs.

CTDA is heavily indebted to December's (1996) units of computer-mediated communication and Herring's (2004) CMDA. December's work is integral to CTDA's empirical analysis of the discursive mediation of Internet-connected devices, as he defines computer-mediated communication as operating as a triad of "Server/Client/Content." This formulation highlights the need for Internet and new media researchers to examine not only the texts generated by their human subjects but also the artifact and the program (or protocol) through which these texts are generated. This is where many studies falter: They resort to generalities about "the Internet" without unpacking the ideological content of those generalities (e.g. the Internet as a "democratic," or "cool" medium); they conflate "community" with a group's use of a particular ICT; or they cursorily explore the specific mediations of the device(s) their subjects use to create their discourses.[3] CTDA addresses these shortcomings by conducting a close reading of the user interfaces of the ICT artifacts in question, examining elements such as graphical user interface (GUI) design, narrative, context of use, and the cultural background of the designers or intended users.

Herring describes CMDA as an analysis of logs of verbal interaction, specifically those engendered through computer-mediated communication. CMDA works on a loose set of discourse-analytic principles, plus a rejection of a priori technological determinism (Herring, 2004: 4). These principles are as follows:

- Discourse exhibits recurrent patterns;
- Discourse involves speaker choices;
- Computer-mediated discourse may be, but is not inevitably, shaped by the technological features of computer-mediated communication systems.

Like Herring, I insist that CTDA is a methodological toolkit and a set of theoretical lenses. CTDA builds upon Herring's application of her technique to language as social behavior, that is, "linguistic expressions of play, conflict, power, and group membership over multiple exchanges." CTDA reframes and interrogates "social behavior" by drawing upon critical race theory and technology studies. This is similar to Kellner's (1995) proposal that critical cultural studies should conduct "a multi-perspectival approach that (a) discusses production and political economy, (b) engages in textual analysis, and (c) studies the reception and use of cultural texts." Applying these concepts to the ICT artifact, CTDA redirects Kellner's claim to apply to ICTs by arguing as follows:

- ICTs are not neutral artifacts outside of society; they are shaped by the sociocultural context of their design and use.
- Society organizes itself through the artifacts, ideologies, and discourses of ICT-based technoculture.
- Technocultural discourses *must* be framed from the cultural perspectives of the user AND of the designer.

The above premises work to implement Couch's (1995) assertion that information technologies must be analyzed via a framework examining "the forms of relatedness that prevail among those who develop and use information technologies and the forms of connectedness that prevail between information technologies and their users" (p. 223). In response, CTDA implements a critical discursive approach that frames the ICT interface as a "text" to be read against the discourses of its users.

Interface analysis

Couch (1995) also argued that information technologies either have an "evocative or referential" (p. 238) bias, and thus, communication scholars studying information technologies should pay close attention to the "the **formatting qualities of information technologies**" (p. 223; emphasis mine). Interfaces, rather than programming languages or physical design, are the medium through which humans primarily interact with ICT algorithms, symbols, and practices. Accordingly, CTDA is keenly interested in the interface's symbolic articulation/accretion of meaning. "Interface" is a complex concept with multiple considerations: Is the screen the interface? Is the "app" the interface? Is the material form the interface? CTDA says "yes" to all of these, depending upon context. A

CTDA analysis should consider not only the symbols and text displayed on any screen but also input and output contrivances mediating activity. This includes physical keyboards, digitized touch screens, multimedia capabilities, form factor, screen size, graphics capabilities, bandwidth, and a myriad of other factors shaping ICT experiences.

For example, the CTDA analysis of Black Twitter considered the many incarnations of Twitter-as-interface. At best, Twitter research interested in cultural specificity categorizes usage by geolocation, language, or topical exigency; the device or application originating those tweets usually gets short shrift even when the research is specifically about mobile ICTs. These approaches make sense from an instrumental and resource allocation perspective. Twitter's application programming interface (API) standardizes the way each device and user communicates with the service, while there are just far too many devices and apps available to a Twitter user for a researcher to isolate and focus upon one device. To illustrate: In 2010, nearly 50% of Tweets originated from the website Twitter.com, while the remaining percentage originated from a staggering number of sources: over 800 smartphone and mobile devices,[4] over 100 different mobile applications, and through Twitter's original protocol, the SMS ("Twitter Clients," 2010). Those numbers are on the rise, even as Twitter's growth begins to slow; in Twitter's Securities and Exchange Commission (SEC) filing for an Initial Public Offering last year, the company noted that nearly 75% of Monthly Access Users (their name for active users) access Twitter from mobile devices (Registration Statement, 2013).

It's tempting to operationalize Twitter-the-interface as the content and presentation of a user's home page feed. From there, inductive reasoning leads to the belief that all users see the same interface. It's a fair assumption, as Twitter's API for third-party clients (which can be understood here as the algorithm behind the homepage's visual interface, display of content, and syntax (boyd et al., 2010)) standardizes how information can be sent to the service. A second possibility for analytic simplification stems from cultural connotations (from which researchers are unfortunately not exempt) of "computer"—much like "internet"—as a generic term for the diversity of hardware, software, and practices that actually comprise a computing experience. This is unfortunate since touch-enabled mobile devices have considerably altered computing design and practices.[5] Mobile's smaller display size, network connectivity, and touch-enabled interfaces, combined with near-instantaneous visual feedback,[6] all contribute to a different computational paradigm than browser-based websites (the "beige box" paradigm) offered previous generations of computer users. The perceptual difference in computational prowess between mobile and desktop/laptop computers becomes obvious when a technocultural analysis is applied; mobile devices are routinely denigrated in the popular press and in digital divide research for their inability to enable the user to be "productive."

Returning to Twitter's complexity, limiting "Twitter" to the form and content of the home page falls afoul of *analytic interruptus* (Lofland, 1970), where the concept under consideration is only considered vaguely. Aside from being instrumentalist, operationalizing Twitter-as-homepage glosses Twitter's diverse ecosystem (device, app, design, practice) and user diversity. Even with the API, each client offers unique features afforded by the design constraints of the material, informational, environmental, and social contexts of use.

Twitter's data provide a stellar example of the interpellation of a user's chosen client/app and the service, as each tweet provides the device and client from which the message was sent. A recent cellphone marketing practice has been to tap celebrities to be "brand spokespersons," using the manufacturer's flagship device at promotional events. Twitter's social ubiquity and low barrier of participation mean that celebrities can register their presence at such events by sending a tweet; Twitter's material ubiquity allows for it to be installed at the operating system level as a messaging option,[7] a common feature for flagship smartphones. Inevitably, however, in the rush to participate, the celebrity will tweet from his or her personal handset, which is *not* the sponsored device.[8] This highlights a weakness of the instrumentalist perspective on Twitter use: It has no real answer for why people prefer a specific device if every Twitter client is the same.

Finally, linking interface analysis, technoculture, and African American culture (or other critical cultural frameworks) necessitates a historical materialist approach. For Black Twitter, CTDA employed Du Bois' (1940) observation that Black culture is suffused with aspirations to American citizenship and personhood—and the rights and privileges accruing thereto—while hyperaware of the Black community's position at the nadir of White American racial culture. In material terms, this can be most clearly seen in the historical environmental and economic segregation of Black communities and the corresponding lower rates of home ownership, Internet (née telephone) access, and educational attainment (Straubhaar et al., 2012). These three factors figure heavily in digital divide research, which often finds Blacks trailing Whites in Internet access and literacy. Hoffman and Novak (1998), however, argued that a possible reason for differences in Black and White Internet use could rest upon the exponentially smaller amount of content published for and by Black online sources of information. They predicted that as content for Blacks increased, the numbers of Blacks online would increase; I contend that thanks to the user-generated content of Web 2.0, social networks, and the adoption of mobile Internet devices, Hoffman and Novak's predictions have borne fruit.

In a related vein, consolidation and deregulation in telecom policy and practice augured changes in Black mobile Internet use. Last-mile regulations and a "universal service" mandate by the 1986 Telecommunications Act failed to spur telecom development in segregated Black communities, leaving them struggling to connect to the nascent World Wide Web. In the meantime, cable companies and cellular phone providers provided these communities with alternate means of Internet access. When examining mobile phone access, Smith (2010) found that nearly 60% of African Americans accessed the Internet through smartphones or mobile devices; indeed, for many of them, it was their only connection to the Internet, broadband, or otherwise. Also, Android is overwhelmingly the platform of choice because of its deployment on lower end smartphones and feature phone. These surprisingly full-featured phones are affordable and available, especially on pre-paid smartphone plans, and are thus a factor in Black smartphone adoption. Twitter's ubiquity comes into focus here: Even on the lowest end phones,[9] Twitter can be accessed legibly through SMS (or "texting"), use of which has exploded over the last decade thanks to bundled and "unlimited" text messaging plans deployed by cellular service providers.

In sum, CTDA's interface analysis is the process of approaching the "speed, size, and character of technology" (Christians, 2014) from a critical cultural perspective. While

ICT users are often interpellated primarily through their interactions with computationally rendered interfaces, CTDA's interface analysis asks that researchers also include the material, economic, historical, and cultural factors leading to the design and use of a given ICT artifact.

Data and the collection thereof

CTDA's approach to materiality, discourse, and ideology gives it considerable flexibility for approaching Internet and new media objects. There are three primary expectations for any CTDA analysis:

1. Multimodal data operationalization;
2. Multimodal interpretive research methods;
3. Critical cultural framework applied equally to all data modes.

Multimodality reflects the Internet's simultaneity as infrastructure, service, platform, application, object, subject, action, and discourse. CTDA opts for a multimodal—as opposed to mixed-methods—study of the ICT-as-object alongside the ICT-as-text to capture what Silverstone calls the "double articulation" of technology (Silverstone et al., 1989). This effects a simultaneous recognition of the ICT's stature as both artifact and medium, grounded by the active reciprocal constitution of "user" through interface design and discourse.

For those interested in utilizing a CTDA approach, be warned: Its interpretive and critical approach is complex, unwieldy, and often necessitates verbosity. Neither interface analysis nor critical discourse analysis can be done succinctly. The former demands interpretive analysis based on deep description, while the latter requires extensive sociocultural context for validity and intelligibility. Livingtone (2007) admits as much in her recounting of her work with a similar approach—Roger Silverstone's "double articulation"—which demanded an integrated analysis of ICT-as-material-object while incorporating an analysis of the same ICT-as-text "located in the flow of particular sociocultural discourse." Livingstone contends (and I concur) that this integration of online and offline ICT use is surprisingly difficult; the goal is to sustain a subtle analysis of both the domestic context of use and the semiotic richness of the online world people engage in. CTDA analyses strive to maintain a balance between studying context and studying text—but it is not an easy task.

Multimodal data

Data multimodality is the praxis of CTDA's conceptualization of technology as a troika of artifact, practice, and belief. CTDA is multimodal, rather than mixed-methods, because it considers both ICTs and online discourses as "texts" (Grint and Woolgar, 1997). This position works particularly well for research into online artifacts, such as blogs and social networks, where the artifact directly shapes the discourses available. However, CTDA has also proven adept at analyzing ICTs that do not directly mediate online discourse, such as video games and web browsers; this is only possible because of CTDA's emphasis on interface analysis.

For example, the Black Twitter study operationalized Twitter as a service (artifact), as interface and mechanics (practice), and as the discourses of its users and observers (belief). Twitter-as-service was examined through historical contextualization and a brief look at Twitter's modes of production (e.g. web and mobile protocols), while Twitter-as-interface underwent a user interface analysis examining how meaning and the construction of the "user" were generated through interface symbols and conventions (or "ideology-in-practice"). For Twitter-as-discourse, I analyzed the content Black Twitter users generated from a Black linguistic identity framework, as well as responses to those tweets from in-group (Black) and out-group (White) observers. CTDA's multimodal approach ensured that a critical cultural framework drawing upon technocultural and racial ideology united my discourse analysis of Twitter users and interface analysis of Twitter's mediation of discourse.

Interface analysis

CTDA's flexibility is a blessing and a curse for data collection. Because CTDA was intended to study Internet/new media artifacts, the analyst's first challenge is to delimit the artifact. Method is one way of delimitation; choosing to study Twitter in terms of "interactions per second" will reveal a different Twitter than a study examining hash-tagged social justice campaigns. CTDA's move to classify the ICT artifact as "text" is reductive, but only marginally. This textual approach retains Hutchby's (2001) argument for affordances as enabling and constraining factors while also considering that said affordances do not necessarily derive from the "natural" features of the artifact's material, but also can be designed within the artifact (p. 449). The reduction comes to light by pre-emptively acknowledging cultural influences providing possibilities for interpretation. Doing so asks that the analyst unpack specific (rather than general, "human") cultural, ideological, and historical contexts shaping design and use while relieving her from formal exegesis of the entire technical complexity of an ICT. The analyst must then focus on specific features of the ICT artifact by delving deeply into their interpretation, execution, and representation based upon their conceptual framework.

The CTDA analysis of Black Twitter considered Twitter's protocol and interface as part of Twitter's "discourse," a move distinct from defining Twitter simply as its lexical and social features. Isolating Twitter to one interface, however, is nearly impossible given its multiple incarnations on various platforms and hundreds of applications. In unpacking the multiplicity of Twitter, the study discovered instead that Twitter-the-interface is nearly as singular as the user, even before examining the personalization allowed when creating a profile. A second finding was of Twitter's repurposing of the SMS protocol, which has become a highly popular communicative medium in the scant 10 years since its introduction. While SMS is standardized[10] and brief, its functionality in the mobile phone communicative suite deriving from its deep integration with the phone's contact list augments SMS emotive and performative qualities. Rising trends of smartphone adoption in the Black community, correlating with the exponential growth of messaging services, led the CTDA analysis to argue for Twitter's decision to embrace the SMS protocol as a seminal factor in the rise of Black Twitter. Thanks to Twitter's availability in an Internet-enabled communitarian device, alongside the lowered barrier of

adoption, thanks to familiarity with a pre-existing ritual mode of computer-mediated, community-oriented communication, the CTDA analysis used inductive reasoning to argue that Blacks were able to retrofit Twitter's brevity, ephemerality, and performativity to signifyin' discourse.

Critical discourse analysis

> Critical textual analysis offers interpretations of how a text can become polysemous and effective when placed in the public domain of cyberspace. (Mitra and Cohen, 1999)

CTDA's critical discourse analysis is easier to operationalize, but the sheer proliferation of online text on any given blog is enough to give any seasoned analyst pause. While Big Data" approaches suggest that algorithmic explorations of large corpora are the best way to learn of sociocultural discourse patterns, CTDA follows the tradition of critical discourse analysis by isolating and examining topical and/or site-based online discourses. Where CTDA differs from traditional critical discourse analysis is in its adherence to Herring's (2004) exhortation that any analysis of computer-mediated communication must contextualize the mediation of said discourse by the enclosing technology. For example, a WordPress blog will mediate discourse differently than YouTube comments or Tumblr notes,[11] and as such should be noted in the analysis. A CTDA discourse analysis, then, is critical not only of the content that people deploy as they use ICTs to write themselves into being but also of the ways that the medium "hails" them into being as "users."

Using the Black Twitter online discourse analysis as an example, there were two pressing questions to be addressed. First, how does Twitter serve as and mediate discourse? Second, how do cultural referents and discursive strategies shape Twitter use? The interface analysis conducted on Twitter earlier in the process provided some clues to Twitter's discursive properties. The CTDA analysis found that Twitter mediated discourse through brevity, ritual, performativity, and ephemerality, while social proximity[12] and cultural referents served as semantic reference points encouraging conversational form and coherence. Meanwhile, CTDA's theoretical framework provided warrants for the argument that discourse conventions in Black Twitter tweets and hashtags drew upon the African American discursive practice of signifyin'. Taken together, the CTDA analysis argued that that Black Twitter could be understood as online signifyin' practice—a discursive articulation of Black identity mapped onto and mediated by Twitter's computational, network, and semantic qualities.

Conclusion

CTDA provides a holistic analysis of the interactions between technology, cultural ideology, and technology practice. While my own future research excavates how and why Blackness is a "normal" online identity, other practitioners have successfully infused CTDA with critical feminist, intersectional, race and labor, and other conceptual frameworks to examine avatars, weblogs, podcasts, Twitter, and gaming. Still, CTDA is not

necessarily the easiest way to approach Internet research, given its emphasis on evaluating the complex interaction between technology, technology practice, and beliefs about how technology shapes us is a complex endeavor. CTDA was initially devised as a counter to rationalist and functionalist critiques of information technology in my home discipline of SI/information science. It retains SI's empirical orientation, but eschews formalism to apply an interpretive analysis to ICTs and to those using them. CTDA's orientation to technology draws upon Carey's formulation of communication as ritual and the subsequent transmission of belief, as opposed to "rational, objective" information. CTDA analysts should conceptualize ICT as a communicative process, by unpacking what a specific ICT artifact is based upon what it is designed to "do" and critically, how users articulate themselves in and about the artifact.

I began this article by discussing my disciplinary influences from SI and information studies, leading to CTDA's emphasis on empirical and interpretive approaches to computational and digital artifacts. I believe that CTDA's emphasis on the materiality of virtual semiosis could also be valuable to digital scholars from other disciplines, such as new media, gender and women's studies, film and television studies, sociology, anthropology, and information science. While the examples of CTDA in this article are Internet-enabled artifacts and discourses, the technique is flexible enough to examine any digital artifact or exigency.

For example, technically, any application with Internet access is "on" the Internet. In a previous work, I described the web browser as a synecdoche for the Internet itself, as many people "get on" the Internet by starting their web browser, which opens to a default "home page." The definition, then, of "internet," could be understood as "content framed by the web browser." It is a testament to the web browser's ascension to communicative infrastructure that the browser is rendered invisible as the frame for Internet content access—at least until the connection fails to load properly. That turned out to be the case with the Blackbird browser, which was designed to deliver content targeted to African American Internet users. Black users didn't appreciate the browser's "mechanization" of Black culture, while understandably wary of being segregated from the wider Internet. Non-Black users derided the browser; Blackbird was panned not only for its relatively unsophisticated design but also because it identified web content as "cultural" (Brock, 2011). This last finding illustrates the power of Whiteness to be unmarked as "culture," an aspect of White technoculture structuring Internet representations. It is this precise moment—where users interpellate themselves through their interactions with digital technologies—that CTDA was designed to examine.

While it is possible to conceive of one person using an ICT in isolation, CTDA argues that even a solo act of engaging with ICTs is in and of itself a discursive construction of self in dialogue with an "other." This draws upon Couch's (1995) argument: "the smallest unit of analysis for students of information technologies is two parties using an information technology" (p. 233). While this perspective may seem to elide the design stages of technology, I insist that design ideologies are "written" into technologies for legibility by users. Thus, solo ICT users are responding to external mediations of self proffered by ICT design and an interface intended to rhetorically shape the actions of the user while navigating offline cultural and social influences on identity and the self.

Validity and replication

CTDA is meant to be reflective; that is, as Woolgar (1991) writes, "readings of the technology text are accomplished both by technologist subjects *and by the analyst* [original emphasis] in the course of sociological argument" (p. 39). While textual analyses of complex technological artifacts should be reductive, the reflexivity needed to situate ICTs in historical, material, and ideological context necessitates near-narrative exposition and analysis. As a result, empiricists and quantitative scholars alike may be concerned about whether CTDA studies can be replicated by other researchers using the same data. In response, I contend that CTDA is precisely formulated to expose that validity and replicability are false constructs of positivism, that each researcher brings their disciplinary, cultural, and social perspectives to the research they conduct. If the next researcher employs a CTDA analysis on the same data, using the same theoretical framework, their findings will differ because of their positionality to the framework and the data. I speculated as much in the conclusion to my Black Twitter research that it was my hope to reexamine the data to unpack how Twitter's design and use by White people are evocative of White cultural referents and technocultural discourses.

This speculation leads to one of my final concerns. As a critical race scholar in a time of increased racial unrest and outright racism, I am often concerned with the *praxis* of my research. That is, having done the critical work, how does my research influence research into social and new media use? Returning to the premise of conceptual problematics, I contend CTDA is not intended to solve structural inequalities, prejudice, or biases inherent in information technology, but rather to decenter normative discourses about all three and their influence on ICTs. This is in and of itself valuable work, as technocultural attitudes toward ICTs work very hard to obscure the costs incurred by adopting technological solutions to social problems. CTDA's existence came about because of my need to examine how race engaged with information technology; its uptake by young scholars shows that it has promise for feminist, queer, disability, and other critical scholars. Eventually, CTDA will find purchase with scholars interested in analyzing how White masculine heterosexuality inflects and even overdetermines ICT use and design. I can't wait.

Notes

1. In the United States, government research into the digital divide began with examinations of telephone connectivity and computer service subscriptions, moved to material access to computers, and eventually landed on broadband access and "digital equity".
2. The use of the "@" symbol to identify interlocutors, the ritualistic abbreviation of complex meaning into 140 characters, and the technosocial formation of a group of like-minded users (Brock, 2012).
3. For example, the material differences between mobile, desktop, and cellphone access to the Internet or the differences between a mobile browser and a desktop browser.

4. Android, iOS, Windows Phone, Blackberry, Symbian
5. Although perhaps not on the same scale that the graphical user interface or the computer mouse changed computing.
6. Premised on our pre-existing cognition regarding the tactility of touch.
7. As opposed to requiring a separate app install. HTC's Sense OS, Samsung's TouchWiz, and Apple's iOS offer Twitter integration.
8. http://www.mycustomer.com/feature/marketing/biggest-celebrity-pr-fails/166666, http://www.techhog.com/windows-phone-spokesperson-jessica-alba-busted-using-an-iphone-at-fashion-week/
9. For example, phones using Wireless Access Protocol (text-only) browsers for Internet access; also those lacking alphanumeric keyboards, advanced graphical capabilities, computational power, or broadband-capable connectivity.
10. Across multiple wireless protocols.
11. There is also diversity within blogging services—Wordpress differs from Drupal, which differs from Blogger.
12. Follower and followees; also Twitter groups and the use of the phone's contact list to encourage social sharing between affiliates.

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Author biography

André Brock's work bridges science and technology studies and critical discourse analysis, showing how the communicative affordances of online media align with those of Black communication practices. He is one of the pre-eminent scholars of Black cyberculture; his research on Black Twitter is the most-cited research on the phenomenon. He is currently a Visiting Researcher with the Social Media Collective at Microsoft Research New England, working on his book manuscript "Distributed Blackness: African American Online Technoculture."