

Between Learning and Opportunity: A Study of African American Coders' Networks of Support

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KEYWORDS

ecological writing studies; critical race theory; coding literacy; ego network analysis;
racially marginalized digital literacies

Despite the ubiquity of digital technologies in the United States, racially marginalized adults are still less likely to develop high quality digital literacy skills for meaningful problem-solving practices (Reder 16). Racial disparities between Whites and African Americans in health, education, income, and mass incarceration (Geronimus et al. 826, 833; Sentencing Project; M. Jones 150–51; Martin, Fasching-Varner, and Pulley) can exacerbate the unequal use of these technologies and prevent racially marginalized people from accessing the multiple resources that may ensure that their learning digital literacies afford “full participation” in life opportunities” (Warschauer and Tate 69).

The expected benefits of digital literacy echo the historical ideological belief that reading and writing are necessary to accrue progress both for civilization and individuals, what Harvey Graff calls the literacy myth (Graff, *The Literacy Myth*; Graff and Duffy 41). The literacy myth interprets literacy as a useful skill free of the messiness of political and cultural ideology. This myth persists and extends into digital technology: the digital divide is a dichotomy between those who have access to the Internet and those who do not. The digital version of the literacy myth suggests that if given physical access to digital technology, racially marginalized people can overcome inequality and have full participation in life.

However, scholars in writing studies have found literacy a socially constructed practice whose consequences vary among people as a result of cultural and political interests (Street 2; Graff, “The Literacy Myth at Thirty”). Understanding literacy as a social practice, a range of scholars in composition and rhetoric have called for a more nuanced discussion on digital divide rhetoric and education policy (Banks 41; Selfe; Moran 206). Annette Powell, for example, argues that we look deeper than mere physical access to digital technology and “recognize [the] social, political, and economic factors implicated in the literacies individuals bring to technology and the circumstances under which these literacies are deployed” (17). How racially marginalized people access and use digital technologies is an *on-going process* deeply affected by their social conditions (Powell 17). Virginia Eubanks notes that we consider that digital technology “an assembly of practices for organizing the world that encode some norms, values, and ways of life at the expense of others”

(25). Rather than teaching a skill set, digital literacy education should build awareness of how social location, citizenship, and surveillance play a role in how marginalized people interact with technological systems (Eubanks 25, 30).

Computer code bootcamps offer a unique context for further research on the social and material conditions that influence marginalized communities' access to emerging technologies and the realistic, complicated consequences of those processes of access. These bootcamps emerged from an ongoing nationwide campaign for giving all youth, especially underrepresented youth, opportunities to learn programming in public schools, as coding may be the new necessary literacy for everyday life (Smith; Treene; Bramson; McGowan; Bruckman et al. 86; Guzdial 10). Assisting in this goal to make coding literacy more accessible, computer code bootcamps offer rapid and short-term (approximately twelve weeks or less) training courses in web or app development for, in some cases, low-income racially marginalized people. Some bootcamps that meet in person require students to dedicate thirty-two to forty hours per week to learning coding, leaving students with less time for tending to other life responsibilities such as work and taking care of loved ones. The results of this intense training present a new coding literacy myth: an imagined future in which coding literacy education addresses digital racial inequality, helps low-income people of color have a lucrative career in software development, and evolves the tech industry into a more culturally inclusive space.

However, my qualitative study shows how conditions on the ground actually play out as twelve African American adults attend a code bootcamp in the Midwest and become educated under the regimes of white supremacy. I asked participants to draw detailed maps of support illustrating the various kinds of internal and external support that they relied on as they progressed through the bootcamp. I then conducted one-on-one interviews about their maps of support, asking participants to explain how those kinds of support assisted in their learning coding literacy. Using principles of ego network analysis (ENA) to analyze these maps and interviews about these maps, I was able to learn that participants called on these various clusters of support in their network to provide the personal resources coders need to code and what is hard to come by in situations of racial injustice. Because participants learned coding literacy under drastically different sociomaterial conditions, each participant seemed to follow a unique process of gathering their resources. For this reason, I describe in this article three loosely connected example resources that shaped participants' learning of coding: emotional investment, temporary time and space, and mind/body preparation.

INTEGRATING ECOLOGICAL WRITING AND CRITICAL RACE THEORY

This study is grounded in ecological theories of writing and critical race theory. Ecological theories of writing seek to "understand how networked people experience multiple encounters with a variety of other people, texts, and objects over time" (Laquintano and Vee 53). In this new materialist formulation, writers are enmeshed in, and not the center of, a complex, constantly evolving system of relationships between the social and the material (Cooper 371–72; Alexis 84–85; Syverson 23). Qualitative studies have investigated writing ecologies from a variety of angles. For

example, Cydney Alexis conducted a qualitative study on writing habitats and how objects in writers' preferred locations for writing mediate those writers' literate activity. And, more recently, Yvonne Teems teased out the ways we can learn about how older adults' writing ecologies shape their literacy practices for accommodating aging.

However, writing ecologies can implicate large macro-level forces that bring materials into our literate lives. In her chapter describing writing habitats, Alexis writes, "These habitats are constructed *for us* when we are young . . . we construct our own spaces in which to work that often echo the spaces of our early learning" (84–85). Jumping off from writing habitats, I'm curious about how the space and objects that make up habitats where one learns literacy indicate privilege; in other words, how have economic disparities among racial groups helped to construct the places where learning happens? For example, in his digital literacy life history interview, twenty-seven-year-old Kevin, one of the participants in my study, explained he had spent part of his childhood moving from one place to the next in the South and the Southwest regions of the United States. During his travels, Kevin saw his family go from owning a home to renting apartments due to financial stress. Kevin said he enjoyed tinkering with the family desktop as one way to learn problem-solving; this experience played some role in his digital literacy learning. However, the kinds of materials for literacy learning Kevin owned and interacted with depended on his family's mobility. How might have Kevin's digital literacy learning be different had his family sold the desktop for extra money?

Critical race theory offers directions for studying the ways structural racism influences the construction of writing ecologies. A method for uncovering and challenging systemic racism, critical race theory, in part, shows that "anti-black attitudes and practices" (Ture and Hamilton 5) fuse into institutional policies and norms that create "inherited disadvantages" in "access to the goods, services, and opportunities of society" (C. P. Jones 10). However, literacy studies has not sufficiently integrated critical race theory into its scholarship. Carmen Kynard observes that considerations of the

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social context of literacy have involved methods from other disciplines, such as anthropology and history. But literacy studies has not adopted a racial perspective that explains how "deep political and ideological shifts . . . have left structured inequalities and violence" in place (Kynard 64). In her review on critical race theory and literacy, Arlette Ingram Willis also notes that literacy studies has neglected adopting a race-conscious method of analysis to have "adequate discussions that address economic and social inequities, historically and in contemporary contexts that give rise to unequal access and opportunities for literacy learning: homelessness, immigrant and citizenship status, and poverty" (23).

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for writing studies scholars, as this intersection might direct our attention to how marginalized communities' interactions with people and the materials of writing systems are also interactions with white supremacy. When literacy scholars use a race-conscious lens to study the writing ecologies of Black communities, they can consider that the materials available to these and other marginalized communities are not mere givens but rather the products of well-thought out historical formulas of institutional oppression. For example, the abundance of white and male software developers in the tech industry, I would argue, can be partly linked to the observation that white children and their families can access better resources to computer science education than Black/African American children (Margolis 81). In the Coding for All movement, many afterschool programs rectify this unequal access and use of coding literacy. Black Girls Code and Maydm both introduce youth of color and girls to computer science in hopes of inspiring and cultivating their interest in seeing themselves as coders. Meanwhile, for young racially marginalized adults, computer code bootcamps such as Yes We Code and Hack the Hood offer direct access to the material and social resources of coding literacy and possible careers in software development.

Taking critical race theory and ecological writing ecologies together, I understand that adults in computer code bootcamps learn a new prestigious literacy practice in the midst of a complicated system of inherited disadvantages that shape how they learn computer programming. I uncover in this article how the *learning practices* of participants are embedded in material and nonmaterial systems that they have devised for themselves. I analyze how the space, time, objects, and bodies that participants name as part of their networks, even if mentioned in passing, cohere as a *necessary response* to generational racial disparities that may impact how they learn coding literacy.

CONTEXT

Clearwater Academy is a career training program attached to a larger non-profit organization that offers to the local community a variety of services to end racism and economic disparities. As a method for achieving these goals, Clearwater teaches low-income people of color and women web development (HTML, CSS, and JavaScript).¹ For three and a half months, students attend classes four days a week, eight hours a day, learning how to design and code websites individually, in pairs programming, and in teams. Two-thirds of the class teaches soft skills: students write and workshop cover letters and resumés, present elevator pitches, and practice mock job interviews. They also listen to invited speakers and have one-on-one conferences with industry mentors on a variety of job-, finance-, and tech-related topics. This extensive training may help adults gain paid internships or fulltime employment in the local tech industry.

Students at Clearwater Academy do not pay tuition, but they do have emotional and physical challenges that determine how well they learn programming. Learning coding literacy is a long process for students as they juggle many burdens, so Clearwater offers to help students with life challenges: passing out free bus passes and gas cards, paying one month's rent, and referring students to social services that can help with other concerns. However, Clearwater has these resources in limited supply. One study participant, Patricia, noted in an interview conducted later in the Fall 2017

semester that Clearwater no longer had “any funds to help you with rent, utilities, stuff like that.” Clearwater is an incomplete sponsor for participants living *between* the realities of their everyday lives and a possibly equitable future; *between* the systemic racial stratification that governs their lives and the opportunity to achieve social mobility using coding literacy. Because Clearwater has limited resources to help students in this “between space,” participants find other resources to stay in the code bootcamp while managing life challenges associated with oppression.

To understand life between learning and opportunity, I conducted a year-long IRB- approved ethnographic study at Clearwater, beginning in Spring 2017, that included participant observation and interviews. I recruited twelve participants ranging in ages twenty-one to fifty-six between the spring and fall semesters. Six students identified as female and six as male. Seven of the twelve participants self-identified as African American; two participants were biracial but identified themselves African American. One participant explained that he was Afro-Latinx, but his life experiences, he noted, grounded him in the everyday lives of the Black diaspora. Unfortunately, at the halfway point of the spring semester, one participant left Clearwater due to poverty and childcare needs. Thus, I present data based on eleven out of twelve study participants.

To return participants’ generosity, I offered to tutor all students, not just study participants, with job-related writing assignments. Richard, the coding instructor, and Janet, the soft skills instructor, welcomed my helping students write elevator pitches and cover letters and judge their final presentations and portfolios. To learn programing, students completed exercises in HTML, CSS, and JavaScript on an interactive website. I myself completed several exercises on this website to get a sense of what the students experienced. I later helped students work through some of these coding challenges. In this way, I built rapport with participants and their classmates.

METHODS

Data Collection and Analysis

In order to understand the broader literacy contexts participants inhabited, I asked participants to draw a map of their support,² the people and objects in their lives that helped them keep learning coding literacy despite racial disparities. Studies of literacies may concern themselves with the direct interaction with literacy practice and its context. In this article, however, a network of support asks that we stretch even further back before literacy practice happens, to the combination of interactions with people, objects, thoughts, and emotions that may jumpstart literate activity. I use ego network analysis as a tool for understanding how these interactions and relationships participate and make possible this leap into coding literacy. In the context of a computer code bootcamp training low-income people of color, then, I asked participants to document and tell stories about the people, emotions, objects, and past experiences that circulate in their personal lives that helped them *approach* Clearwater as a literacy sponsor possessing the social (e.g. tech industry mentors) and physical (e.g. laptops) materials used for learning coding literacy. Analysis of the interviews and maps considers the quality of the participants’ interactions and how those interactions impact other pieces in the networks in pursuit of supporting their learning.

Using maps to understand networks of support traces back to previous studies that used drawing to help researchers understand literacy practices (Brooke and McIntosh 134–41; Prior and Shipka 182–86; Mason 96–102). For a computer code bootcamp that moves quickly through content, maps allowed me to see more clearly what events, objects, and people impact code bootcamp students' learning coding literacy. They also provided a response to the time constraints of participant observation and interviews. Because both methods of data collection are confined to place and a time limit, depending on the responsibilities participants in my study had, details maybe limited or

details maybe difficult to follow up on.

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In these interviews and maps,

participants provided rich details on how these networks created useful resources for them.

Frequently used across disciplines such as sociology, communication, and economics, ego network analysis (ENA) understands “network” as a complex web of social interactions and social relations. ENA looks at an “individual’s social environment” rather than their specific attributions (e.g. race, class, gender) for “explanations, whether through influence processes (e.g., individuals adopting their friends’ occupational choices) or leveraging processes (e.g., an individual can get certain things done because of the connections she has to powerful others)” (Borgatti et al. 894). The interviewees named in their network are called “alters.”³ Areas for analysis include the number of people in an individual’s network, how those people relate to one another, and the strength of the relationship among the individual and people (Prell 8). These areas are often visualized quantitatively (e.g. charts, digraphs, or Bernoulli graphs) (Prell 9 –18; Marin and Wellman 21–22; Provan and Milward 4–12). In this way, researchers understand macro-level patterns based on the kinds of behaviors, knowledge, and resources that arise out of the networks (Marin and Wellman 13).

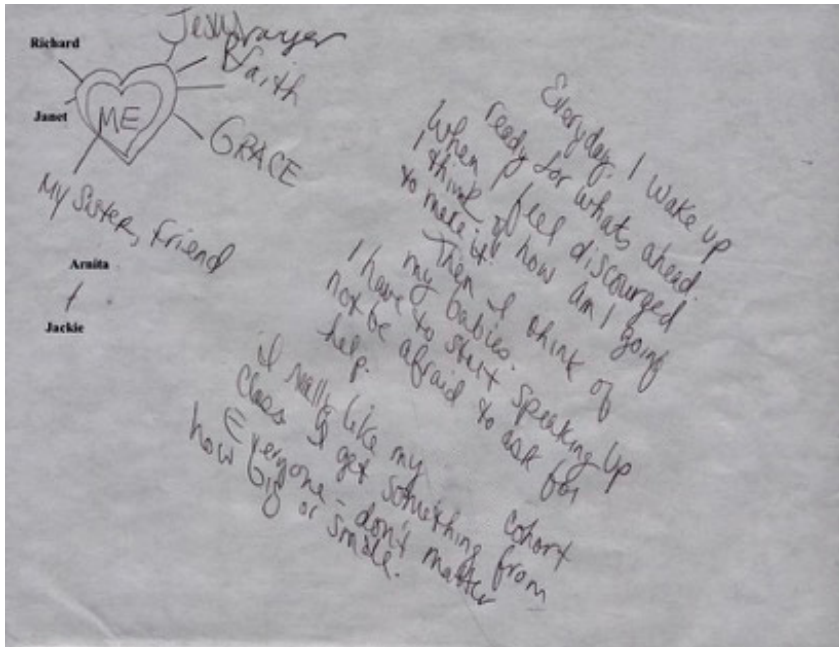


Figure 1. Patricia's heart-shaped network and reflection.

Patricia's map (Figure 1) serves as a useful example. When asked to discuss her network of support and the ways they assisted in her learning coding, Patricia drew one heart inside the other; the outer heart represents a layer of protection made of several essential people: Richard, the class's technical skills instructor; Janet, the class's soft skills instructor; Jesus; Patricia's "sister" and "friend" Arnita; and Jackie, another friend from church, and Jesus. Notice that Patricia's network also includes two abstract concepts—faith and grace. As an extension of her map, Patricia reflects in writing, "Every day I wake up ready for what's ahead. When I feel discouraged, I think of how I am going to make it. Then I think of my [grandchildren]. I have to start speaking up [and] not be afraid to ask for help. I really like my . . . cohort class. I get something from everyone—don't matter how big or small." As with other participants, Patricia drew her map as she saw fit and included her reflection unprompted. Patricia was given the agency to interpret "network of support" in a way that made sense to her, and she was given the agency to name the boundaries of her social reality and the actors within it. And through writing and the interview, Patricia authored the values and resources that comes out of that network.

ENA provides a systematic analytical approach that expands ways of studying writing systems. However, it often relies on participants naming *specific people*. This anthropocentrism is the antithesis of ecological writing, which decenters the writer from literacy practice and sees them participating in the circulation of material (e.g. desks, pencils, writing) and non-material (e.g. emotion) objects. ENA and ecological writing theory address one another's limitations and help include the total

sociomaterial experiences of study participants. I extend “network,” as understood in ego network analysis, to further include the objects and places participants noted in their interview.

After drawing their maps, each participant explained the person, object, or pet on the map that helped them with coding. Follow-up questions during our conversations deepened the specificity of those answers. I conducted and recorded these thirty-five to sixty minutes interviews on the Clearwater Academy campus during lunch or extended breaks; one interview was conducted over video chat. Although this participant, Alice, drew her map during the video chat, I was unable to collect the map. However, I took copious notes during our conversation. In my first round of analysis, I did open coding, which involved creating a chart that listed each participant’s set of named alters and then assigning each alter to a support type (cognitive, affective, financial, or physical). These types arose from how participants discussed each alter on their map. Frequently, participants named how and what kinds of resources the different alters provided, which helped avoid any ambiguity in categorizing the different support types. In moments when participants were not more direct, I inferred from the transcripts the potential resources alters provided. I briefly summarized the interactions participants had with each alter, extracting sample comments from the transcriptions as evidence. In a final category, I described in one or two sentences the resources that resulted from that interaction.

During the second round of analysis, I revisited the initial descriptions of the resources and the type of support they provided for accuracy and refining the language based on reexamination of the maps and interviews. Finally, in the third round of analysis, I conducted closed coding, examining how alters in each network related to one another based on the resources provided. Alters that provided similar resources and had the most influence on participants’ learning of programming and their relationships with others, according to the interviews, became the core theme of each network. I used the support types and resource descriptions to create names that summarized the most dominant kind of resource (see “Resources from Networks” in Table 1). I also counted the number of possible connections in each participant’s network see “Number of Alters” and “Number of Possible Relations” in Table 1). The number of alters identified and the number possible interactions suggest the strength of participants’ networks of support (Hanneman and Riddle 341-44) to address the possible consequences (e.g. homelessness, fewer work hours, loss of wages) of attending a computer code bootcamp full time. These numbers underscore how each participant address shared life challenges resulting from racial inequality in various ways depending on their sociomaterial circumstances.

I resisted comparing participants’ themes to establish a theory, following ecological writing theory’s argument that systems are so complex and unique that comparing systems does not help us accurately understand writing. I applied the same principle to this ecological view of literacy learning. Moreover, the comparison would flatten the unique experiences each study participant described on their maps and in their interviews. Although we see similar resources across participant maps in Table 1, the interactions described in each network varied. Thus, I provide a discussion of three individual networks as a result of those individuals’ interviews and maps. Keisha, Kevin, and DeAndre’s stories offer rich details on how they interacted with their networks and the resources

those interactions generated. These participants also serve as example of similar networks for other participants as well. Keisha's network is an example of the emotional investment that Paul, Isaiah, and Alex gather from their networks while Kevin's detailed explanation of how negotiating for time and space to practice computer coding mirrors the experiences of Alice and Rosie's ways of getting time to work on coding. Finally, DeAndre's use of marijuana and music typifies the ways networks help the body prepare for activating coding literacy learning, as seen in Zelda, Patricia, and Zeus' similar efforts to deal with the physical demands of coding.

Table 1. Participants' Quantified Network Strengths and Description of Network Resources.

Participants	Number of Alters Identified	Number of Possible Relations	Resources from Networks
Keisha	11	13	Emotional Investment
Paul	7	11	Emotional Investment
Alex	7	10	Stability
Kevin	7	9	Temporary Space and Time
Zeus	8	9	Embodied Self-Discipline
Isaiah	5	8	Emotional Investment
DeAndre	6	8	Body/Mind Preparation
Alice	7	8	Temporary Space and Time
Zelda	8	8	Body/Mind Preparation
Patricia	6	7	Strength in Body to Work
Rosie	8	7	Secure Time

FINDINGS AND DISCUSSION

In this section I discuss and analyze three case studies—Keisha, Kevin, and DeAndre. I describe the sociomaterial risks that may have forced them to quit Clearwater Academy, ending their efforts to learn coding literacy. I offer detailed analysis on how participants interacted with various actors (e.g. people, objects, and institutions) to continue learning coding in response to these risks. The collection of interactions, I argue, develop into personal resources coders need to code and what is

hard to come by in situations of racial injustice.

Keisha: Emotional Investment

In her map (Figure 2), Keisha, a thirty-four-year-old certified nursing assistant, demonstrated during the interview that her most important alters for emotional investment were her daughter

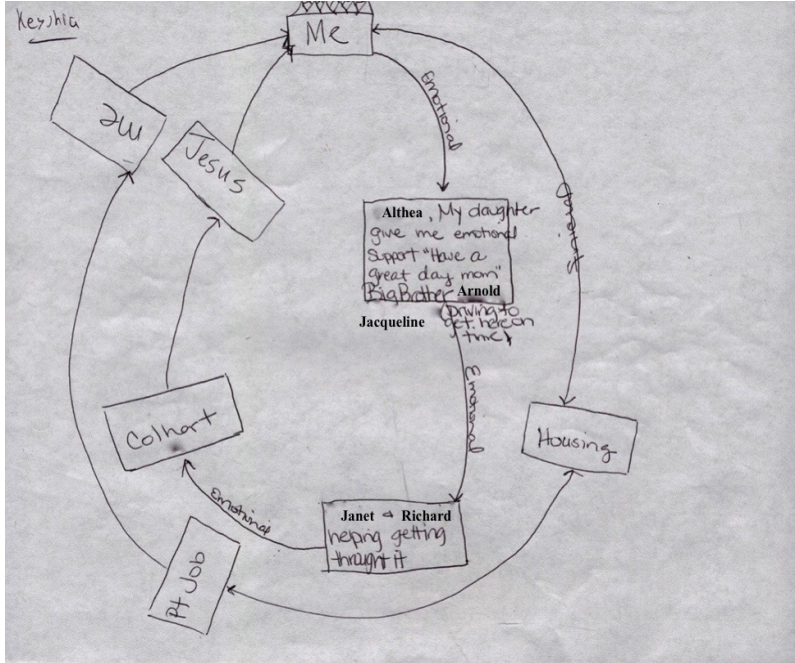


Figure 2. Keisha's network as two spirals.

and siblings, Clearwater's technical skills and soft skills instructors, classmates, and, finally, Jesus. She wrote these alters on a circle, suggesting that she rotates among them for different kinds of emotional support before returning to Clearwater prepared to learn programming. The outer ring names material conditions that assist in stabilizing the inner ring of the map. In other words, living in an affordable home and having a part-time job set a strong foundation for accessing emotional resources from Keisha's most important alters. She could not receive inspiration from her daughter, for example, if she could not use government assistance and a salary from her reduced hours to protect her daughter's own well-being.

Keisha drew herself at the top ("Me") because she had control over many decisions in her own life before attending Clearwater. She "lived at work" as a certified nursing assistant, working from 6am to 8pm throughout the week. Keisha works this hard for two reasons: First, she had been homeless before, and "it was not pretty. They [homelessness and poverty] are the most ugliest things I saw." In fact, Keisha explained, that experience had given her "a fear of being broke" again. Second, Keisha uses most of her income for her daughter, Althea, a lesson she had learned from her mother, who also spent all her money on Keisha and her siblings, especially during Christmas. Thus, Keisha

relies on herself to stay afloat.

However, Keisha's decision to attend Clearwater Academy endangers her position as the central person of her network. Participants must attend class Monday through Thursday for eight hours a day. Because most of her weekdays are spent at the code bootcamp, Keisha has less time to work. Reducing her work hours impacts her ability to pay rent, utilities, and food. The consequences of this could be severe for her emotionally: While coding a tribute webpage to Althea in HTML and CSS, Keisha explained that she "had never been this broke before" and began to cry. In addition, Keisha's family disagrees with her choice to attend Clearwater Academy. They believe Keisha is irresponsible for reducing her work hours to learn web development. For example, Keisha's mother also believes trading work for a literacy that may never reap rewards is dangerous. How will she support herself and her daughter? At the beginning of the semester, Keisha's boyfriend offered to help pay bills and other expenses; however, he later wanted her to leave Clearwater, finding it a waste of time and financially risky. When she refused, he stopped helping pay rent and blocked Keisha from using his credit cards. Keisha explained during our interview that other family members *expect* her to quit the code bootcamp because they know her to be "a starter but not a finisher." With financial difficulties on one side and a reticent family on the other, Keisha is always at risk of losing emotional and material control over her life. Nevertheless, emotional investment as a personal resource helps Keisha maintain her motivation to learn coding despite the anxiety and stress of family and work, which I will now detail below.

To keep herself grounded in her pursuit of coding literacy, Keisha draws on different kinds of emotional labor. For example, Keisha admitted that she "puts on a front" in class—she smiles and jokes with her classmates, pretending that her life is okay. "And ninety percent of the time," she thinks going to Clearwater is the right decision for her. However, "some days I be pissed off that I'm here. But a lot of days, I don't. A lot of days I definitely don't be pissed off that I'm here. Cause it gives me a purpose." Not graduating is "when I would [feel] like all of this was for nothing. And I refuse to start over because then I get that look [from family]." Keisha demonstrates the emotional labor required to navigate life circumstances and stay committed to coding in a computer code bootcamp. She isn't so much proving her family wrong to avoid more comments on leaving yet another project unfinished; instead, Keisha seems to draw on her family's doubts and the potential negative consequences of failure as a source of motivation for learning coding literacy. This redirection helps Keisha maintain the control she once had over her life since before attending Clearwater.

Keisha uses the other alters in her network to ground her emotional investment in learning coding. For example, her daughter Althea reminds Keisha of her Christian faith to supplement the emotional labor of learning coding despite the temptation to return to work and fix her financial problems. "She tells me every morning, 'Have a great day.' And she's proud of me." Althea also plays the same gospel song every morning on a speaker. During our interview, Keisha could not remember the song and searched frantically for it on YouTube, a sign that she valued her daughter's presence each morning. While her daughter wishes Keisha well every day, Keisha herself prays every morning, "'God, let me be great today.' No matter what it is. Whatever I decide to do, even if I decide to go back to my job or Lord, please let me get a job offer, I'm bound to be great." Althea reminds Keisha

why learning coding matters. From her well wishes and music, Keisha gathers the strength and resolve to attend Clearwater every day. She also builds confidence that Clearwater is a right decision: God provided the coding bootcamp as a blessing, and despite the challenges while learning coding, God planned to provide Keisha something. This faith in God strengthens Keisha's commitment to learning programming.

Despite drawing on her Christian faith and her daughter to help stabilize her emotional life, Keisha cannot stave off doubt completely, and for that Richard, Clearwater's technical instructor, and Janet, the project coordinator, work to convince Keisha that she *is the great person* she had prays to be. Three days into the code bootcamp, Keisha explained, "I would've been gone. I know me. I wouldn't've stayed this long." In the first three weeks, Keisha wanted to return to a livable wage, a path out of coding and back to some stability. But Richard and Janet suggested that Keisha not downplay herself. Making herself less important has always been Keisha's default attitude, even when she was growing up. Keisha's mother went on trips with boyfriends, leaving Keisha to look after her younger brothers and sisters. As an adult, she still supported her younger siblings, sacrificing her own needs to see that they succeeded in their own education and careers. What made Keisha stay despite these experiences and desires? For the first two weeks at Clearwater, Richard and Janet insisted that learning coding was worth her time and reduced wages. She didn't believe them. But then the three-week review of her academic progress came. "[The review] said 'You are encouraging. You make people worth coming to this class.' So I stayed." Richard and Janet had acknowledged that she made a positive impact on her classmates, recognition that, as Keisha had noted, she rarely received from family.

Government assistance brought some stability to Keisha's finances, as well which helps Keisha recover her self-sufficient. Keisha pays \$600 in rent each month, but because Clearwater Academy requires so much of her time during the week, Keisha can only work nine hours a month, making about \$400. She later received a five-day notice for not paying full rent. But "by the grace of God [the landlord] took the letter that Janet had wrote for my acceptance letter" and got a section 8 voucher from the federal government that "dropped my rent down to zero." Keisha still pays for food and other utilities; nevertheless, that government assistance further protects her will to learn coding. Although Keisha had written "Housing" underneath financial support in her map, having the voucher offers her emotional relief from the burden of not having enough money to pay rent. Like the three-week review from Richard and Janet, the voucher gives Keisha less of a reason to delay or end her attempt at learning coding.

Keisha named other alters in her network, like her sister who drives her to Clearwater and her older brother who encourages her to keep going to class. But most significant are the ways resources from other alters allows Keisha to claim greater emotional investment in learning programming. The combination of faith in God's provision, the presence of her daughter, the encouraging observations about her personality and contribution to the academic and emotional well-being of her classmates, and even doubts that she wouldn't finish, leads to securing the motivation to learn programming. Keisha's experience shows that learning coding at a bootcamp involves a great deal of emotional labor. Frequently, the emotions of African Americans, especially Black women, can be misinterpreted,

disrespected, oversimplified, or ignored (Richardson; Carey), as if Black women do not have a right to complex feelings in a world of white supremacy. A curriculum that centers coding literacy as a skill rather than the holistic well-being of its students runs the risk of perpetuating disrespect of Black bodies. However, as I mentioned earlier, a coding program that tends to the affect of its adult students may help support student learning and provide a pathway to staying on track with coding literacy learning. Instructors and other support staff unknowingly operate alongside a host of other alters within students' lives. To be further aware of these other pieces allows for deeper, more meaningful efforts to balance the demands of a computer code bootcamp with the burdens of its adult students.

Kevin: Temporary Time and Space

Twenty-nine-year-old Kevin's map (Figure 3) shows that his support produces two resources: emotional well-being from family, friends, and his dogs in the Southwest region of the United States where Kevin is from; and accumulating temporary time and space, from housemates and a non-profit he volunteers for. Emotional well-being is a long-distance personal resource as it travels across the country to Kevin through telecommunication, his fond memories of his dogs, and his own goals to return home and find a good job after graduating from Clearwater. However, Kevin's alters in the Midwest offers the most help to his accessing ways of learning coding literacy. While Kevin wrote on his map that he receives assistance, encouragement, and friendship from his classmates, "work around school and homework" from his housemates and the youth program Kevin volunteers for are especially essential to his learning coding. Taken together, these two types of alters helped "bend reality" and offer him more time and space. Gathering extra time and temporary space leads to Kevin getting a brief reprieve from life responsibilities that might have prevented him from doing well in Clearwater Academy. I explore this point in-depth in the following section.

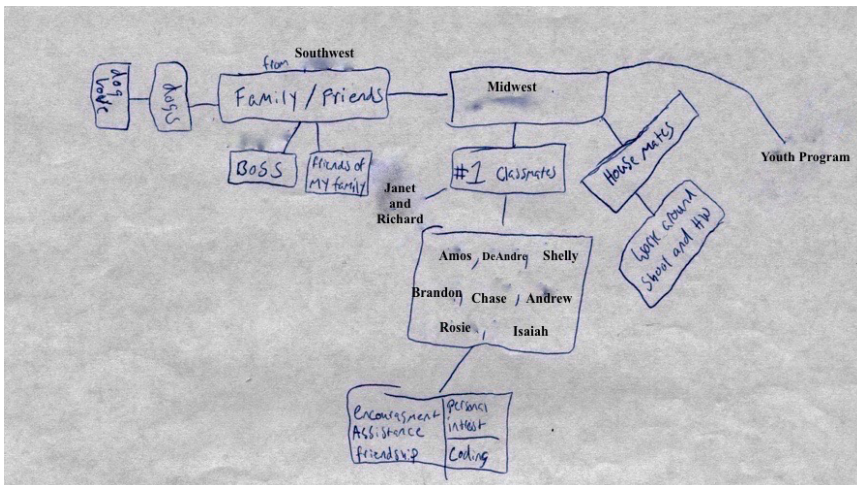


Figure 3. Kevin's network of support comes from two regions of the United States.

To understand the value of getting more time and space for coding literacy, it's important to first

envision the circumstances in which Kevin learns programming. When he arrived in the Midwest, Kevin moved into cooperative housing, where he and his housemates shared chores, food, and bills. Because co-ops serve low-income residents, Kevin's expenses total at most 40 dollars each month. Nevertheless, Kevin works as a deli chef and as a bouncer to get a little extra income. On top of these two jobs, he fit into his schedule volunteering at a non-profit organization. Kevin attends Clearwater 32 hours a week, but classwork often follows him home, taking up time he could use for work, family, friends, and self-care. Thus, coding became the center of Kevin's life, and other responsibilities circulated around coding. Despite these challenges, Kevin's classmates and instructors get the impression that learning coding comes easy for him. They didn't realize that understanding coding isn't a snap for Kevin. Much of what he learns from them at Clearwater Academy he later refines elsewhere. "Dude, no I don't [learn web development quick]," he said during our interview. "Everything we did in class is what I do when I go home . . . I work on this shit. And I do it the whole time . . . And I'm doing this until 11 and then I go to bed."

At home, Kevin negotiates for time and space to make his success at coding possible. For example, asking his housemates to "[let] me work around my school schedule and school work, with household chores, so long as I actually do stuff" is the best way to work many hours at home. Kevin called his housemates his "helpmeet," partly because they often ask if they could do anything for him and sometimes connect Kevin to potential clients for freelance web design jobs. When Kevin has too many assignments to do, but it's also his turn to clean the bathroom, housemates volunteer to do his chores for him. "They be like, 'This time I'll do it and you'll just take mine next week, or something, *when you have more time*' . . . Obviously, I have to do it but I don't have to do it at that second."

His housemates, then, are not just a helpmeet but partners in his coding work. They sacrifice time they could use for their own responsibilities to give more time to Kevin. He can then keep up with Clearwater Academy's work and also execute the lessons he learns from his classmates. With work at the grocery store and the downtown bar encroaching even further on Kevin's ability to commit to deep, sustained practice on coding, his housemates are even more essential to time accumulation. Kevin quite literally soaks up his housemates' time for himself, so he has a different relationship with the evening hours after returning from Clearwater Academy.

Finding additional spaces from his network to learning coding overlaps with accumulating additional time. During the interview, Kevin describe his bedroom as "a little Japanese room" with a bed, a night stand, a hamper for clothes. But he "literally [has] one walkway. Two people in there would be way too much." Kevin is tall and muscular. Because his room has space for one person, trying to work on coding over long stretches of time can be uncomfortable. He needs isolation to focus, so the house's living room or kitchen would not help either. Recognizing the discomfort of Kevin's small bedroom and the need for isolation, his housemates offer him their bedrooms as workspaces. "They're just like, 'Hey, I'm going to be gone for the weekend. If you need to use my room, you can. Like it's cool,'" Kevin explained. The housemate would then put clean sheets and pillow cases on their bed. For the rest of the weekend, Kevin would sit at his housemate's desk and work on coding and writing assignments, stopping only for "bathroom breaks and food." When the housemate returns at the end of the weekend, Kevin would "just take off and leave their bed fresh

[remove the dirty sheets], and they put on the new sheets when they get back.”

Creating contracts for borrowing spaces continued with the non-profit organization that Kevin volunteered for throughout the week and sometimes on weekends. The non-profit offers programs and services for low-income LGBTQ youth. Kevin tutored youth in algebra, but the organization was interested in his experiences at Clearwater Academy, too. “So, they’re also kinda like the housemates,” explained Kevin. “They’re always and constantly asking me how I’m doing in class.” The non-profit also offered him a room to study. Typically, Kevin would spend two hours tutoring, but his working as a bouncer and as a grocer squeezed on his available time for coding. The non-profit works around his schedule, switching his two hours of tutoring with two hours of coding instead. Kevin notes, “With the amount of work that I’ve had recently, they’ve had someone fill my void. Fill the fact that I’m not there [to tutor].”

Utilizing this time and space relates back to Kevin learning from classmates and instructors. Classmates like DeAndre and Addie share common interests in music and anime, so Kevin bonds with them throughout the semester. Most importantly, however, they assist Kevin with difficult coding exercises from the interactive website. Alongside his classmates, Kevin explained, the technical instructor Richard played a significant role in helping him figure out if he should be a web designer and improving Kevin’s soft skills, like designing his resume and pitching ideas to investors. Thanks to them, “I’m definitely better at talking about myself in a professional sense. I’m not good at it, but I’m getting there . . . Coming to this class, with their assistance, and my classmates, too.” Thus, ways of learning coding in class wasn’t lost outside Clearwater. As explained before, the work of the code bootcamp followed Kevin to his home and to his non-profit where he gathered time and space to continue his productivity. Kevin’s stories about his network of support bring into sharper focus the role time and space may play in learning programming from a computer code bootcamp. Not only time and space in and of themselves but what happens within time and space. In this context, time and space are hot commodities that Kevin isn’t privileged enough to possess. Despite his limited sociomaterial conditions, Kevin pulls from a network of people and institutions additional time and space. The non-profit provides two hours of tutoring so Kevin can work on code; his housemates can use what time they had for their own responsibilities, but they are willing to switch chore duties with Kevin. Both the non-profit and housemates gave up their classrooms and bedrooms to Kevin. Most telling, however, is how adding these resources to his own schedule also allows Kevin to step away from life responsibilities briefly; he doesn’t have to attend to money or relationships, because others take on that work for him. This siphoning of time and space, and respite from other responsibilities, help him keep pace with coding literacy.

DeAndre: Body and Mind Preparation

DeAndre’s map (Figure 4) emphasizes the relationship between people and different external stimuli. The twenty-one-year-old drew an arrow from “Lots and lots of [weed]”⁴ to his friends while “Music” hovers nearby. Yet the other alters occupy a space of their own: two classmates at the bottom, “YouTube” on the right-hand side, and “Best Friend” near the top. This suggests that the other alters “free float,” that they independently offer resources but are not explicitly related to one another in

the same way as friends, weed, and music. These other alters appeared to supplement the heavy work that weed, friends, and music do for DeAndre as he learned coding literacy. This section unpacks how these three pieces shape DeAndre's behavior and thinking to help him prepare his body and mind for the demands of coding.

As he learned coding literacy, DeAndre said, he grappled with racist readings of his body based on the color of his skin and wardrobe. He wears hoodies, sweats, and sneakers, and long dreadlocks dangle from underneath a black baseball cap. Having dropped out of high school and feeling stuck in life, DeAndre decided to get his GED. The test proctor looked at DeAndre and assumed that he couldn't pass the required math exam. But DeAndre later surprised the proctor by answering nineteen of the twenty test questions correctly. DeAndre ran into similar issues when he interviewed for a spot in Clearwater Academy. Richard, the technical instructor, assumed that DeAndre wouldn't survive Clearwater's rigorous, fast-paced curriculum "based on [his] looks, everything."



Figure 4. DeAndre's "free floating" support.

Being misread occurred outside of school, too. In Chicago, DeAndre's default expression was "mean-mugging." This posture was a defense against anyone thinking of jumping him. However, living in the majority-white communities around Clearwater, DeAndre noticed that people seemed embarrassed by his facial expression, as if he were "crazy." This taught him that he "ain't got nothing to worry about up here." Feeling no sense of danger, unlike in Chicago, DeAndre chose to have a calm demeanor. DeAndre is aware of how race and place shape readings of his body and so adapts his behavior to match the expectations of that atmosphere. Weed seems to play a significant role in maintaining this calm demeanor so that misbehavior in class doesn't derail DeAndre learn coding

literacy.

To better understand DeAndre's testimony on how weed contributes to his learning and behavior, I want to place his experience in the context of current marijuana policy and research. Currently, there are disconnects among established scientific knowledge, lived experiences of marijuana users, and the policies and laws that disrupt literacy education and oppress racially marginalized people. Studies on cognitive performance and marijuana in general are inadequate because the Drug Enforcement Administration (DEA) classifies marijuana as a Schedule I drug. According to the DEA, marijuana has "no currently accepted medical use and a high potential for abuse" (DEA). This classification significantly limits researchers' access to marijuana to study its effects as they must seek DEA approval for all studies. So-called concerns about marijuana abuse have been used as a foil since the 1970s to enact racist methods of persecuting African American communities in disproportionate numbers compared to whites (Lynch 186; Alexander 59; Beckett and Herbert 68). Nevertheless, marijuana has been approved to treat certain conditions in 32 states (Lopez), and there's an abundance of anecdotal evidence (Green, Kavanagh, and Young 458) that suggest marijuana enhances creativity, although recent scientific studies that explore have found conflicting evidence (e.g. Schafer et al., Kowal et al., and LaFrance and Cuttler). Meanwhile, there is a long tradition of computer programmers using marijuana, and other drugs like LSD (Lysergic acid diethylamide), to address the strenuous work of coding at a computer or to arguably jumpstart creativity and rationality (Vekshin; Markoff 65–68). Given this context, DeAndre's story represents a common experience for millions of literacy learners; however, it also underscores the legal danger smoking weed poses to his own freedom and efforts to learn coding for mobility.

As weed is an important component in shaping his behavior and learning, DeAndre relies on himself and friends for a continuous supply. "If I don't have no weed, my roommate has some weed," observed DeAndre. "If he don't [have weed], Charles will have some. And he don't, Marcus will have some, and if he don't, I will have some . . ." But his friends also participate in helping DeAndre work through his emotions when he's upset. Familiar with his swinging moods, his friends would notice when something bothered him, even without DeAndre speaking about his problem. They would give him a blunt and sit and relax together in silence. Thus, friends and a supply of weed served as the foundation DeAndre's experience in Clearwater.

First, weed helps DeAndre find a calm and collected attitude in class. DeAndre noted that he doesn't use weed to "deal with stress," as stress is a life-long, daily experience that he can address with on his own; instead, he wants to just be "chill" at Clearwater. Otherwise, DeAndre admitted, he could get angry easily, especially when classmates didn't catch on to coding lessons as quickly as he expected. Thus, weed helps DeAndre keep a state of mind that allows him to maintain healthy relationships with his instructors and classmates, such as T-Dub and F-Dougie. These two classmates are key partners to his learning of coding literacy, especially later in the semester when Richard withdrew his helping. DeAndre recalled Richard saying, "We are at a point where I'm not going to help you no more . . . you smart enough to get stuff done on your own. Use your resources." Both T-Dub and F-Dougie were willing to give DeAndre clues on how to figure out coding problems or an issue in app development that he couldn't figure out. To DeAndre, T-Dub and F-Dougie are good

resources to tap into, and weed helps DeAndre reach out to those students without incident.

In addition to mediating his emotions and behavior, weed assists DeAndre in learning coding literacy itself. The drug “stimulates everything I wanted to do. I just do [tasks] faster. So if I wanted to focus on something I just smoke some weed . . . I can basically direct my effect to where I want it to go . . . to make it into a cerebral high.” DeAndre said that he even has agency over the chemical influences on his brain, that he can direct the high to keep him focused. Nevertheless, there’s a limitation to smoking weed. The high could be too much for him to handle in one sitting. One day while working on his resume, DeAndre was “high as hell.” Being too distracted from the high, he “went from one thing to another in less than 10 minutes because I kept thinking of new things. I kept switching [the resume], asking people what to do.” The distractions caused him to get nothing done in class, so he has to keep in check what goes into his body. Despite this danger, DeAndre sticks to weed because, if anything else, he likes not being too “turnt up” (being too excited) in class.

Music seems to share a similar cognitive and behavioral process that helps DeAndre manage his self-disclosed attention deficit disorder and stay in step with Clearwater Academy’s intense and fast-paced curriculum. DeAndre explained that he feels one side of the brain while working on something. When playing video games, for example, he feels activity happening in on the right-hand side, just above the temple. There’s still activity in the back of DeAndre’s brain but “it’s still distancing but that [the game] takes both parts of my brain. It’s still a lot of [mental] work.” When practicing coding, DeAndre finds himself needing to distract one thought while the other focuses on actual work. One part of the brain deals with the “numbers and letters,” he said, while the other part “has nothing [productive] to do.”

For example, to help teach computer programming, Richard, the technical skills instructor, directs students to an interactive website where they can complete lessons on HTML, CSS, and JavaScript and receive certification after completing a certain number of hours on the website. The website offers many options for how DeAndre might design the look and feel of his websites and mobile apps. But in addition to completing these exercises, DeAndre must turn in a web portfolio at the end of the semester. As DeAndre explained, “I keep thinking about certain things I got to do and certain shit I need to be coding. Like, ‘Oh I could be adding this and such and such. Or I add this and this [to the portfolio].’” The side of the brain that has nothing to do is, according to DeAndre, “the ADD side. That’s the side that says, ‘Yeah, let’s do all that shit at one time.’” DeAndre wanted to use the ideas he learned from the interactive website for the portfolio assignment, so he got sidetracked, tried multitasking, but got nothing accomplished. DeAndre was aware of this competition between himself and his ADD. Hence, music keeps the ADD side of his mind occupied while DeAndre codes. A variety of songs pass through his ears each day from beats that he “just found fucking dope” to A\$AP Rocky to Adele. With music playing in his ears, DeAndre “sings along and do the code camp. It distracts me. And it keeps my brain working on that while my right side is working on this. While my left side is focusing on quotes and lyrics. *Occupied*.”

DeAndre describes a mental model of how his ADD works. That awareness has helped him hash out an effective method to not get derailed from practicing coding. But this small task resonates throughout the network DeAndre established for himself. In other words, we can see how different

alters in DeAndre's network impact his relationships with other alters. His investment in objects like weed and music suggests that he staves off the consequences of bad habits: falling asleep in class, returning to a life of committing cons, and getting sidetracked not only from tabs on his browser but also his own thoughts. But this disciplining of the body and mind also helps with relationship-building. DeAndre might fall behind in his work and appear uninvolved in the class, so he learns to discipline himself based on the behaviors of his peers or advice from Janet and Richard. And weed and music keep DeAndre professional-minded and professional-acting in Clearwater Academy. But this strategy has troubling implications: while learning to mentally focus may not indicate a racial ideology, the behavior of his body implies that he must balance acting out his authentic racial identity with attitudes of discipline that can be associated with whiteness.

Responsibilities related to racial oppression make coding as a material and embodied practice more visible for study participants. Keisha living on the border of homelessness, Kevin in search for time and space, and DeAndre's racial body all implicate racial oppression as a risk to maintaining access. Programming looks like a cognitive process, but that dimension of learning may be a privilege for some who live in stable sociomaterial conditions. Participants call on and arrange additional alters to form their networks that help keep volatile conditions in check, within and without Clearwater Academy. Even this might be a privilege, as students from previous cohorts have been overwhelmed by physical and mental disability, childcare, and domestic violence, forcing them to quit Clearwater and quit coding.

CONCLUSION AND FURTHER RESEARCH

Using ego network analysis, this study investigates the processes of how low-income African American adults access coding literacy as they manage the social and emotional consequences of white supremacy that may block that access. Clearwater Academy can provide ample resources for the cognitive process of learning coding literacy but doesn't have the same breadth of resources to circumvent the bodily, emotional, and financial responsibilities and challenges students must endure. For this reason, adults draw on an ad hoc cluster of support to design and patch up their vulnerable sociomaterial and financial circumstances. From these clusters, they gather resources that help them

“Combining these ways of seeing literate practice helps scholars understand how current racial formations (e.g. color-blind racism) intertwine with economic and political policy and influence literacy learning and the circulation of literacy materials.”

access coding literacy as a resistant response to inequality in their lives. Some resources from these networks of support include emotional agency, temporary time and space, and disciplining the mind and body. These resources may help create stability in the lives of participants across different contexts so that they can tap into an

uncommon and infrastructural literacy like programming. In describing these experiences, the study contributes to understanding racially marginalized communities' strategies for accessing new

emerging technologies. It shows how a complex network operates in helping adults approach these technologies when made available, demonstrating the kinds of knowledge they pose to make access possible in light of the racial inequality that may disrupt that access.

These findings encourage ample areas for further research. First, as literacy scholars continue to study writing ecologies and the materiality of literacy, they may draw on the critical race theory. Combining these ways of seeing literate practice helps scholars understand how current racial formations (e.g. color-blind racism) intertwine with economic and political policy and influence literacy learning and the circulation of literacy materials. Second, this study captures networks of support in a specific moment in participants' lives; there's opportunity for studying literacy practice and learning over a lifespan (Prior 217; Bazerman et al. 354-57). A long-view perspective of writing systems may help ecological writing theory take into account how writing ecologies change. By applying these theories to learning digital literacy, scholars may use ego network analysis to reveal other kinds of relationships between material and nonmaterial in a system of writing and what flows among those alters to support digital literacy learning. As composing and learning become more networked but vulnerable to historical and ongoing forms of identity-based oppression, writing studies can take up new tools to study these happenings and possibly influence the policies and attitudes that determine the social consequences of these digital literacy practices.⁵

NOTES

¹ HTML and CSS structure and visually style webpages while JavaScript automates tasks, such as algebraic calculations. Some software developers consider JavaScript a proper programming language over HTML/CSS. Coding literacy, I argue, does not make such distinctions; coding literacy encompasses the broad understanding and act of writing out a set of procedures, in any kind of programming language, for a computer to follow.

² All maps in this article have been de-identified and anonymized.

³ Alters seem to share characteristics with literacy sponsors—“people or institutions that can help or hinder literacy for their own advantage” (Brandt 167). However, in ego network analysis, alters are the items named in the maps themselves. Another distinguishing feature of alters is that the scope of sponsorship widens to include locations of objects.

⁴ Writing studies has yet to adequately theorize the effects of drugs on writing bodies. Although a necessary area of research, this topic does not enter the scope of this study.

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