Bidirectional artifact analysis:  
A method for analyzing creative processes

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Abstract: In order to understand and design learning environments that support new literacies, we must develop methods to describe the creative production of literacy artifacts. In this paper, we describe bidirectional artifact analysis, a framework that employs ethnographic observations of participants in situ, interviews over time, and the artifacts they create to trace young peoples’ creative production practices. While typical descriptive analyses move forwards, we move bidirectionally—from final product backwards and from initial idea forwards—to better understand participants’ learning processes and the role of social, collaborative audiences in that learning.

The Need for a New Methodology
In recent years, research on new media and new literacies has re-focused the meaning of “literacy” (e.g. Moje, Overby, Tysvaer, & Morris, 2008; New London Group, 1996). Beyond comprehending and producing texts, “being literate” has come to describe the use of medium- and context-appropriate tools, practices, modes, and epistemologies to produce textual, visual, and multimodal artifacts. These understandings have particular purchase in digital environments and creative arts education, where social interactions are often shaped by the production and critique of artifacts for and with a responsive audience (Magnifico, 2010).

In order to understand and design learning environments to support these complex literacy practices, we must develop methods that describe creative production and literacy artifacts. We must build analytical lenses that take creative works—video, writing, multimedia collage, etc.—as units of analysis and trace them through complex processes of creation and revision. This paper is thus guided by two methodological questions: (1) How can we study the relationship between processes and products in creative new literacies spaces?, and (2) How can we document and describe the ways in which participants become literate in these environments?

In this paper, we describe bidirectional artifact analysis, an analysis framework for creative production processes that employs ethnographic observations of participants in situ, the artifacts they create, and interviews over time. Marrying narrative analysis (Halverson, 2008; Labov & Waletzky, 1967/1997), discourse analysis (Wood & Kroger, 2000), and artifact analysis, this framework echoes and extends Enyedy’s (2005) description of bidirectional analysis: “go[ing] ‘backwards’ in time in an attempt to trace the origins of this intervention and ‘forwards’ in time to examine what subsequent impact it had on the way other students reasoned” (p. 437). While typical descriptive analyses move forwards, we, like Enyedy, have found that moving bidirectionally—from final product backwards and from initial idea forwards—helps us to understand participants’ learning, as well as the role of social and collaborative audiences in that learning.

Theoretical Perspectives
In order to produce creative work successfully—or to teach creative processes to others—artists of all kinds must consider not only the quality of their original ideas, but also how these concepts will be translated to consumers. In our attempts to trace the learning of creative processes, we have found it useful to attend to several factors: (1) the representations that artists use to build ideas and describe them to others, (2) the audiences for creative processes, and (3) the metrics of quality for evaluation of creative products.

The Role of Representation in Creative Processes
diSessa (2004) argues that representation design is a creative endeavor, “a venue in which creative and artistic skills are at a higher than normal premium” (p. 300). Thus, observing creative production helps us to understand the role of external representation in creativity and learning (e.g. Eisner, 2002). “Getting smart” in the context of producing art “means coming to know the potential of the materials in relation to the aims of a project or problem” (Eisner, 2002, p. 72). The capacity to build representations from different materials for multiple situations is a marker of creative expertise (Hayes, 1989), and has been called “essential in investigations of creativity” (p. 262) (Hasirci & Demirkan, 2007). Since artistic production requires creative representation, learning art means learning how to construct and evaluate these representations.

Many methods for studying educational settings focus on examining one kind of data to evaluate learning. Educational researchers have developed deep frameworks for understanding classroom participants’ conversations, written texts, interviews, visual art, and multimodal online activities. Creative production settings, however, often encourage novices to engage with multiple media to produce a poem, script, video, or piece of visual art. While representations may shift, and ideas may transform through drafting, feedback, and
revision, understanding how all of these artifacts contribute to the final “text”—the final draft of the creative production—is necessary to understand the processes that artists employ.

**How Producers Engage with Their Audiences**

Our understanding of audience and collaboration have broadened as new literacies and new media have pushed writers and artists into a world where they may create, read, and view, as Lunsford & Ede put it, “among the audience” (2009). This shift can transform writers into speakers, readers into critics, and both into collaborators. Online artists can request audience feedback by soliciting email or comments and respond with another draft if they choose. Writers and creators in the same physical space can work together to solve problems and clarify ideas. Within such artistic communities, it is increasingly plausible to think of readers and viewers in terms of Ong’s (1975) “collectivity, acting… on one another and on the speaker [or writer, or artist] as members of an audience do” (p. 11). Considering how feedback guides artistic process suggests that audiences for creative work may play both a cognitive role, in that sharing work forces creators to consider readers, and a social one, in that creators define themselves as community members by the work that they share (Magnifico, 2010).

**Method: Bidirectional Analysis**

Most education research moves forward in time. Teachers and researchers create intervention curricula; they teach the curricula; they observe the effects by comparing pre-intervention and post-intervention data. Learning builds up from prior knowledge, and therefore, teachers and researchers teach and analyze in this direction, too.

Prior’s (2004) multi-textual “tracing” methodology, developed to examine students’ learning in higher education, deepens this notion of learning over time by capturing multiple contextual threads of teaching and learning practice. Analyzing assignments and other “initiating texts,” classroom discourse, writing drafts, teacher and peer feedback, and students’ reflections, Prior traces how scholarly arguments and ideas are written into being, often as hybridizations of student interest and teacher guidance. Similar multi-layered evolutions might be traced over time for any student, either in schools or creative production environments.

In his studies of elementary classrooms, Enyedy (2005) turns this forward-development timeline metaphor on its head. Students worked progressively to “inven[t] representations and iteratively refin[e] solutions to problems that the class ha[d] identified” (p. 428). Instead of looking at the students’ successive representations over time, however, Enyedy (2005) analyzes these interactions by reaching backwards and forwards, examining how each new representation was a revision of prior ideas. By turning the analytical lens, this study shows how students’ reflections became a base from which the class’s inquiry progressed.

In our work, we extend Prior’s tracing and Enyedy’s bidirectionality to creative production. Learning models in creative production settings often resemble the common instructional models of writers’ workshops (e.g. Atwell, 1998) or design crits (e.g. Soep 2006). Young creators present drafts to a group of mentors and peers, assess their current successes and difficulties, and receive revision suggestions. Final drafts are built from past representations, and reflect not only the artist’s changing ideas, but also those offered by readers in peer and mentor feedback. While we focus on creative and artistic production here, the cross-content implications are clear: When we analyze drafts as representations that grow and change as a result of individual cognitions, mentor responses, and social reflections, we can build models for developmental learning progressions (e.g. Duncan & Hmelo-Silver, 2009) that account for collaboration in many different subject areas.

**Examples of Bidirectional Analysis in Action**

To demonstrate this method, we draw on two studies of new literacies learning. We present a brief example from each data set to demonstrate how bidirectional artifact analysis allows researchers to “see” how students engage with their compositions and audiences, as well as their growing mastery of appropriate representational tools. We demonstrate how the method works and how it helps us to understand young people’s emerging access to and use of the new literacy practices that researchers describe as crucial for 21st century success.

**Example 1: Frank as Border Crosser**

This example is drawn from Halverson’s case studies of United States youth media arts organizations. Data collection traced students’ digital art from initial program applications to final public presentations, and included ethnographic observations, artifact collection, semi-structured interviews, and post-mortem reflections.

Frank’s piece (Figure 1), is an autobiographical graphic design piece created through Street Level Youth Media’s 2007 program, “Represent!: exploring your identity through history and culture”. This piece includes three elements: 1) a photoshopped image of himself in front of two flags; 2) a black and white line drawing of a person split down the middle; 3) below the images, a series of names/nicknames printed on individual placards. The meaning and genesis of these elements can be traced by examining Frank’s journal, interviews, and final piece. Frank’s artist statement describes his work as: “a graphic design piece dealing with him being a Mexican American, crossing borders each day going to different places with his art work and...
gathering all of his names.” Each of the elements is analogous to the components described in the statement; they are all connected with this vision for his art and how it represents his identity. In other work, we use bidirectional artifact analysis to trace the evolution of Frank’s whole piece as a method for documenting learning (Halverson, in press). For illustrative purposes here, we trace one of the three core components of Frank’s piece.

The largest image in Frank’s final piece is a screen print, a color image of him and two simplified flags, American and Mexican (see Figure 1). The initial idea for the dual flags appears in his journal as a drawing of a black figure standing in front of a box that is half white and half grey. This image is accompanied by the text, “border crossing from Mexico to USA.” Frank attributes this idea to his father. In an post-mortem interview, he described struggling to represent himself in his final piece of art. His father asked him, “Why don’t you do something about you being Mexican American?” Not only did Frank embrace the idea, he felt motivated by this contribution: “That’s like, part of the reason I did this. Because of my dad. He helped me too” (09/15/08).

Interviews with Frank reveal how he got from border crossing to the two flags present in the piece. He describes beginning by, “taking a regular flag from here and a regular Mexican flag and put[ting] them in the background,” behind his photo. The simplified flags emerged from his artist-mentor’s suggestion—“he gave me the concept of make your own flag”—and an image from an album cover. “I saw a flag that Trent Reznor did… It’s basically black. It’s all red. It’s like blood dripping down from the flag. I wanted to do that, but it kind of, it strayed from who I am (Interview, 09/15/08).” In describing the flag from a Nine Inch Nails album, Frank identifies what he likes about a self-made flag. The reason that he does not import this image, however, was that, “it strayed from who I am”. He wanted to keep himself in the center of his art, so he chose an aesthetic and created a Mexican-American border-crossing version of the image.

The black and white image to the right replicates the sketch from Frank’s journal. He describes this image as, “basically the same thing, have to dealing with borders. Only it’s...it’s the same thing as this only it's stripped down of everything”. He sees the two images conveying similar meaning: Frank as border crosser. Here, where the large image refers to Frank’s Mexican-American identity, this “stripped down” version is different: “It can mean anything. I’m basically walking into anywhere. With the same concept of walking into different borders or different places.” (Interview, 09/15/08). The final image included both border crossing representations, the full color image of Frank in front of two flags and this initial sketch. But Frank transforms the meaning of the initial sketch to represent himself as a more general border crosser. He understands and represents himself as someone who can “go anywhere”, a broader scope than his dad’s original idea.

The above analysis traces one of the three key components of Frank’s piece from initial conception to final piece. However, this division is more analytic than temporal; Frank did not conceptualize each of these elements independently. Bidirectional analysis allows us to understand Frank’s artistic process and the evolving relationship between his concept (identity) and his representational choices (graphic design). Frank struggles initially, but through conversations and journal entries, he determines that he wants to create a visual representation of himself that portrays his identity as a Mexican-American, a border-crosser more generally, and a friend and family member with many roles and names. He marries his narrative perspective to the affordances of the tools, which results in his final piece and an artist statement that explains this relationship to an audience.

Example 2: Noah’s Poetry Collaborations

The second study, is drawn from Magnifico’s (under review) case studies that examined creative writing practice and young writers’ work with different audiences. Data collection included ethnographic observation, artifact collection, peers’ and mentors’ feedback, final products, assessments, and semi-structured interviews.

This second example details the effects of reader feedback on one student, Noah (all names are pseudonyms), who used poetry to describe everyday events as epic occurrences. In his 11th grade classroom, Noah’s teacher, Mr. Caswell, designed an “open workshop” format for students to write creative pieces and respond to each other’s work. Tracing the artifacts of Noah’s poem drafts reveals different revision patterns as he worked with and received feedback from different peers. This bidirectional analysis shows the genesis of Noah’s revisions on Pitter Patter, his poem about driving in a rainstorm, and suggests pedagogical structures to encourage generative critique in classroom workshops. Noah’s experience exposes a problematic feature of this pedagogy: The continued development of students’ writings seemed to depend on their workshop critique sessions, but the content of these conversations was quite diverse in practice.
**Abstract Critique**

Mr. Caswell often asked his class to complete a written close reading exercise before they launched into verbal critique. On a close reading day, Henry writes comments on Noah’s poem *Pitter Patter* when Mr. Caswell asks the class to exchange papers, choose a literary element to analyze, and write comments on each other’s work. Henry suggests changes, noting, for instance, “this sentence doesn’t make sense grammatically” (see below).

The car slows and stops where  
Soaked grass begins over there  
Rubber tires brush the damp fuzz  
With pitter-patters the grass is abuzz (from Draft 4 of *Pitter Patter*).

He does not identify specific errors, however. Next the to the last two lines of this stanza, Henry writes “what made you pick this?!” The students never have a chance to discuss these edits, though, because the hour ends. Henry’s comments are emphatically punctuated—“?!”—but do not offer clear suggestions or justifications for why Noah should consider making changes. Perhaps as a result, Noah’s revisions never address these ideas.

**Concrete Critique**

Noah and Kira work together for two class periods to discuss *Pitter Patter*. Their conversations, however, feature close readings and textual antecedents. While they challenge each other, they often resolve arguments and questions with textual evidence. Here, Kira and Noah discuss *Pitter Patter*’s setting in detail, considering the scene that inspired the poem. Kira notes the unclear setting, invoking herself and “people” as readers:

_Kira:_ You were _that_ off on the side of the road?  
_Noah:_ Nooo, no, here, let me sketch the scene... This is mine, this is the road, this is the church... This is the soccer field behind the church... I drove my car up, and it was pouring.  
_Kira:_ So you're in a parking lot. So you stop. So you drive into a parking lot and stop... You need to tell me that somewhere in this poem, because I didn’t get that at all... I mean, do you want the reader to know you’re stopped in a parking lot?  
_Noah:_ It doesn’t matter it doesn’t matter... I dunno. […]  
_Kira:_ You just have to remember that the people reading this have never been here. Like when I read it, I imagined [our school’s] road, right there... And your car brushing the grass would be on the side...  
_Noah:_ Are you saying I’m a bad driver? But yeah... Maybe that would be it. Clarify…  
_Kira:_ Like, you don't HAVE to, but if you wanna create that image then well, obviously.  
(Classroom transcript, 4/1/2009)

While Noah argues that Kira’s failure to understand the setting “doesn’t matter,” Kira persists, explaining the uncertainty that might confuse other readers. She asks questions, pointing out that if the poem doesn’t “clarify where [she is]” then it is difficult to “create that image.” She justifies her suggestion by implying that poetry “creates images” for readers and noting that “people” cannot understand the poem without the setting. Kira aligns her critiques with Noah’s text, pointing out textual elements and the consequences of those choices.

In the next draft, Noah modifies two stanzas, making changes to “clarify” the events of the poem. During their meetings, Kira makes many explicit written suggestions, including word substitutions, image clarifications, and perspective suggestions. To this, she adds oral suggestions that refer to *Pitter Patter*’s text rather than general criticisms. As a result of these exchanges, Noah makes 12 revisions to his poem, including two new or expanded stanzas, several clarified images, and a strengthened first-person perspective.

In contrast to his collaboration with Henry, Noah’s critique conversations with Kira led to many more suggestions and revisions. Examining Noah’s work in a bidirectional way, tracing his poems through drafts and critique conversations, shows us that while most students made comments that were relevant, few general suggestions led to textual changes in future drafts. Rather, Noah’s responses to critiques and revisions present a clear pattern. He revises when a reader shows him that his language is obscuring rather than conveying his ideas—for example, Kira’s notes about *Pitter Patter*’s perspective—and suggests how these lines might be improved. In this way, audience response seems critical to Noah’s creative and representational processes.

**Significance and Implications**

While these two examples explore different forms of creative production, bidirectional analysis reveals similar processes. Frank designs his autobiographical screenprint with several media. He consults with others and captures his evolving thoughts about self-representation in his journal. These data sources show why he made representational decisions and how he used media tools to represent himself. Noah revises his poetry through
critique conversation with his peers. While his poetic medium does not change, he uses in-depth feedback to improve his poems and his understanding of readers’ reactions. In both cases, audiences make valuable contributions to the creative work. With its focus on drafts, artifacts, and young artists’ interactions around those artifacts, bidirectional analysis shows us how representations shift through creative processes and how feedback helps young artists to refine their ideas and knowledge of representational materials (Eisner, 2002).

For researchers seeking to design environments that encourage the development of new literacies, taking up production-oriented definitions of literacy requires a complementary shift in analysis. Methodological tools such as case study (e.g. Stake 1995), ethnographic observation (e.g. Geertz, 1973), thematic coding (e.g. Saldaña, 2009), and discourse analysis (e.g. Wood & Kroger, 2000) represent vital steps in documenting literacy practices of a learning environment in context. No single analytic tool, however, provides enough information to understand how production processes lead to literacy learning in complex environments—those focused on creative production and on developmental content learning (Duncan & Hmelo-Silver, 2009). These complex tasks and questions require broader methods that help researchers to parse data drawn from observation, conversational discourse, and artifacts in careful combination. Bidirectional artifact analysis offers a way forward by articulating an analysis framework that combines methodologies for conducting inquiry with complex qualitative datasets.

References