From Cutting Out to Cutting With

A Materialist Reframing of Action and Multimodality in Children's Play and Making

Karen E. Wohlwend and Jaye Johnson Thiel

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ABSTRACT:
Using examples of early childhood play from our independent research studies, we take a closer look to ask what did we miss? In initial multimodal analysis of these events, how did an implicit human-centered insistence on semiotic affordances and strategic design tame the mobile jumble of children's play and making? The shift from multimodality to materiality in this retrospective analysis builds on and transitions from Kress' (1997) ground-breaking work on multimodality in children's play and making, where he noted that a child cuts around a drawing to bring its image into the world of action. "Cutting out" turns a two-dimensional drawing of a car into a three-dimensional paper toy that can be animated for play. In this chapter, we take a new materialist lens (Lenz Taguchi, 2014) to children's making that considers the intra-action among all the actants in the *toy/player/action* assemblage that co-produce a flow of play moves and pretend meanings. When we look for materiality, emergence, and mobility, we can better appreciate play's haphazard trajectories and recognize the embodied "muchness" (Thiel, 201X) of children's play, we can see how assemblages of bodies, meanings, and actions create knowledge flows from the most ordinary of school supplies: paper.

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Introduction

Paper is the technology of choice in early childhood education. Children can more easily and freely access sheets of paper than computers, iPads, or mobile devices in most preschool and kindergarten classrooms (Wartella, et al., 2013). And the child-friendly malleability of paper makes it a generative medium for the actions that little hands can easily manage as they fold, bend, tear, draw, color, crumple, and cut to represent their worlds. Across our research projects, we have been struck by the creative energy and transformative potential in the paper/digital play nexus. In Karen's research, 5- to 7-year-old children in kindergarten and first grade classrooms responded to a dearth of digital tools by creating cardboard box laptops, paper cellphones, and hand-drawn video games. In Jaye's research, children ages 4-10 work collaboratively with paper to create a plethora of different things at a community center makerspace (i.e. swords, spinners, money, cellphones, books, purses, etc). Our research projects (Wohlwend, 2008; Thiel, 2015a, 2015b) have expanded definitions of play and making as embodied and material literacies. Our studies also shared an emphasis on multimodal analysis and critical discourse theories to understand how children are inventively playing across paper and digital formats as they make use of these productive technologies. In this chapter, we share excerpts of early childhood play from our independent research studies of children's play and making, taking a closer look to ask what did we miss? We expand our prior multimodal analyses of these events, to ask:

How does an implicit human-centered insistence on semiotic affordances and strategic design tame the mobile jumble of children's play and making, whether with paper, fabric, or with digital tools?

Did prior multimodal analyses of play and making overlook the learning in repetitive and seemingly aimless explorations of the action/actant/meaning relations around materiality? What can we see if we use a materialist lens? What changes in a re-examination of these data from a materialist theoretical perspective and what does a materialist analysis reveal about children's play and making?

What does this mean for digital technologies in early childhood education? In this chapter, we argue that play that makes toys out of paper scraps or scribbles on an iPad constitutes technology learning. A materialist view of learning as an agentic act of becoming assembles children's desires to use new technologies, their limited access to computers or mobile devices, and the possibilities of the materiality of paper.

Cutting across Methods, Multimodality, and Materiality

Using an interactional strand of multimodal analysis as point of departure, Karen maps children's fluid use of available modes to shape social interactions within a classroom; the focus is on action in the moment rather than their manipulation of a mode to produce a designed, durable text or artifact. Here's an excerpt from an earlier multimodal analysis:

> ….using multimodal analysis to understand how actions are made meaningful and social *in situ* rather than in representation, looking at interaction among modes, semiotic practices, and discourses in glocalized contexts. I examine instances of classroom activity to see how modes shape children's literacy learning and participation in early childhood classrooms. [For example,] analyzing gaze as a mode reveals the meanings of the ways

that students look at classroom materials and at each other, as well as the ways that they are surveilled by the teacher and by the researcher.
Gaze turned upon people produces subjectivities, shared gaze among people produces social space, and a research gaze turns subjects into objects of inquiry. In this research, I drew upon the mode of gaze as a way of revealing which modes were most apparent in a classroom literacy event (e.g., gaze, print, and book-handling during a reading lesson) and how the foregrounding of particular modes enforced a set of power relations (teacher/student; reader/nonreader) legitimated by prevailing educational discourses.
Multimodal analysis involves isolating, examining, and explaining an aspect of lived experience to understand how actors exploit available semiotic resources to represent meanings, carry out social practices, and realize power relations. (Wohlwend, 2011, pp. 243)

From an interactional multimodal perspective, modes can be embodied (e.g., gaze, sound, gesture, posture, facial expression, touch), environmental (e.g., physical layout, proximity [near/far relationships of bodies and things) or textual (print, image, music, sound-effect).

Multimodal methods use video analysis to look closely at interaction in order to track the physical (e.g., visual, auditory, haptic, kinesthetic) aspects of materials that designers emphasize or wield to craft signs. For example, modal analysis maps material environments and artifacts—tracking modes and action to discern actors' meanings or participatory strategies. Multimodal analysis of video data tracks actors' modal use, looking at action first (rather than speech) to understand how meanings are made with bodies and things in a particular context. These maps reveal how children make use of bodies, things, and the environment to create a desired toy, play with friends, or get things done.

Toward a materialist analysis, we blur distinctions among theory and methods in a reflexive move to think with theory (Jackson & Mazzei, 2011), consistent with analysis suggested by posthuman and feminist materialisms. In this chapter, we use Barad's (2003) metaphor of an agential cut as a tool to reframe and expand the methodological focus from multimodality to materiality.

Thinking with Multimodality and Materiality Theories
Multimodality: Making Do and Cutting Out

Multimodal theory has drawn extensively on Kress' ground-breaking work on multimodality and literacies, such as young children's play and making. In *Before Writing* (1997), Kress analyzed the transformations of meaning and form that occurred as a child cut around a drawing of a car to bring this picture into the world of action and thus, created a toy that could be animated in dramatic play. In other words, "cutting out" turned a child's two-dimensional drawing into a three-dimensional paper toy that could be animated for play. The car cutout moved from an image to a shape that could move and mean in relation to other objects in the child's surroundings. The construct of multimodality explains the ways meanings and modes are mutually constitutive, and always situated in a cultural and physical environment. Modes are the meanings we attach to sensory aspects of the environment, shaped by cultural histories and systems of meaning (Kress, 2003a). Using modes and semiotic tools, ideas are transformed into

material forms and produce durable messages that can be shared and transported (Brandt & Clinton, 2002).

In sociocultural interpretations of multimodality, reading, writing, and making are mediational means (Wertsch, 1991; Scollon, 2001). Literacies are systems, each with a set of social practices and physical tools linked to a primary modality: reading is a system for getting meaning off the page by interpreting graphic symbols into audible language primarily using auditory and verbal modes of sound, speech, and print; writing and graphic design produce meanings primarily through visual modes including gaze and image, and play primarily uses action modes including gesture, posture, proximity, and movement through space. Multimodal analysis can identify the subtle reconstructive work produced through play's improvisation (Holland et al., 1998) and *Making Do* (de Certeau, 1984).

Making do is a Foucauldian (1978) technology of the disempowered that blends critique with play's safety valve of deniability and also blends production with scavenging of available materials to pull off out-of-reach identities and practices. This has relevance for Kress (2003b), who argues that children use 'whatever is to hand that is apt for their purpose' (p. 156), inventing artifacts by combining materials and manipulating modes in unique ways according to their immediate social purposes. This is our point of departure, inspired by the notion of "making do" with materials that are available to make something more, reconstructing typical practices and expected modes to enable actions that bend conventional meanings, rules, or grammars in sign systems. For de Certeau (1984), making do is a poaching or improvisation, a social actor's tactical take up and reframing of materials and actions that are offered for other authorized purposes in a place. Kress suggests that In comparison to adults, children are less bound by conventional uses of modes and more open to producing novel meanings, improvised and inspired by the materiality of objects. In this way, making do is a method of reconstruction with potential for creating critique and production with available materials and identities.

Modes are sensory properties that convey embodied and environmental meanings of actions and artifacts. The meanings that modes convey are culturally-given and situated in grammars or systems built from shared histories of use. Modality enables small shifts in the material but the movement comes from the change in the meanings of materials. In this way, play and design are methods of resemiotization and reconstruction. These transformations happen through transduction (Kress, 1997), quickly shifting the meaning of a sign by moving across modes but also across dimensions of time and space. For example, the act of cutting out a paper drawing of a paper cell phone transduces the image into an artifact, in this case a toy plane.

Cutting out creates an edge around a two-dimensional drawing that delineates its spatial boundaries and gives the phone cutout a three-dimensional albeit very thin shape that enables its manipulation as a toy in a classroom reality. Transduction can expand the potential meanings of a child's representation when a flat paper drawing becomes a three-dimensional prop for play actions.

For example, [a kindergarten boy] created a flip phone out of a folded piece of paper. He gave an oblong piece of paper rounded corners and penciled a 3 by 3 array of squares below a much larger square to represent a numeric pad and an LCD screen. Additional phone features (receiver, compact size) were emphasized by adding play actions: he held the opened paper flat in the palm of his hand, raised his hand to his ear, talked into the paper for a few seconds, then snapped it shut with one hand, and tucked it into his pocket.

As demonstrated with carrot or paper cell phones, children are flexible, inventive, and strategic meaning-makers who do not strictly adhere to convention. Children look at the world as

potential signs-to-be-made; their sign-making and sign use is more likely to be governed by their interest and an object's material qualities than by attention to established linguistic or visual conventions (Kress, 1997, 2003a). (Wohlwend, 2009, p.125)

When this boy drew a cell phone on paper, he created an image for viewing; when he cut out the image, the image was transformed into an object that also expanded the range of modes and practices for creating meaning: verbal modes and talking on the toy phone to others through embodied modes of posture, movement, facial expression as he pretended to be a cellphone owner. Additionally, this expansion of multimodality adds credibility to his pretend identity performance that adds cachet to his social status in the classroom's peer culture: the flip phone [a cutting edge technology in 2006] signifies coolness and capital as an affinity object (Fernie et al., 1995) when his designed paper toy inspired imitation among children in his play group.

In this and other examples of paper toymaking in Karen's "Early Adopters" (2009) research, kindergartners who had limited access to technologies at school improvised to make do with the most readily available classroom material: paper. In this way, cutting out and making do was a reconstruction, a settling for an imaginary or invented proxy as a substitute for the real tool. But it's also true that children *preferred* paper to other materials in the classroom. There is something about paper in the material itself that creates this appeal and that is not easily explained by multimodality, representation, and children's strategic design with a commonplace resource. We see paper as a technology and an active participant in these productions, not merely a material with particular affordances as conveyor of a single meaning. Perhaps this appeal lies in paper's mutability and ease of spontaneous and quick meaning transformations (e.g., it is easily folded, pliable, wadded up, tossed, torn, cut, ripped, shredded, etc). Paper's almost-unbounded malleability makes it a natural resource for play, a literacy practice that produces resemiotization and recontextualization of physical realities. Since this research, digital animation and drawing apps and iPads now provide intuitive and child-friendly digital tools that are highly malleable but with significant differences in the (lack of) physical traces, the sensory properties and the modal affordances and constraints of the materials.

Materiality: Cutting With and Making Much With

Here we shift the lens from multimodality to materiality to broaden our view and deepen our understanding of action: moving from the action of "cutting out" to "cutting with" and from the action "making do" to making much with". To do this, we take a relational materialist perspective (Lenz Taguchi, 2014; Barad, 2003) that considers the intra-action among all the actants in the *toy/player/action* assemblage. This changing, interacting, emerging, and affecting set of relations among people, materials, and spaces co-produces a flow of play moves and pretend meanings. When we look for materiality, mobility, emergence and emotion, we can appreciate play's haphazard trajectories and recognize its embodied "muchness" (Thiel & Jones, 2017; Thiel, 2016; Thiel, 2015a, 2015b).

Cutting With: We're proposing "cutting with" as a method for examining materiality that enacts Barad's agential cut. That is, we look at the tensions produced through constructed binaries to see what is made visible by looking at connections among components. An agential cut connects components of sociomaterial reality in order to make it actionable, accessible, and understandable. For example, the binary material/immaterial creates an arbitrary/artificial separation of lived experience that puts meaning on one plane and things on another. Binaries

create power relations: there is something done and something done to. We can look at a commonplace view of abstract signified concepts as represented by material object signifiers. Cutting with looks for agency across components, to see how things are not blankly waiting for human representation but are always/already conveying meanings. For example, a view of play as cutting with reveals new configurations as players/playthings joke around, blur, and twist the experiential and the representational. Play is ambiguous (Sutton-Smith, 1997), masking its meanings through pretense so that actor/action/material meanings in a here-and-now reality are experienced additionally as imagined ones. Children are adept at negotiating this agential cut and interplay of pretend and real action during play, in toy laser duels (Wohlwend, 2013) and other mock fights, pulling their punches and tempering their physical actions to avoid actually hurting one another. Looking closing at young children's digital play, Fleer (2014) uses the metaphor of flickering to conceptualize "microgenetic movements... as flickering in and out of imaginary situations, flickering between individual and collective activity, and flickering between concrete objects and virtual representations" (p.207). The demands and motives afforded through digital play in early childhood activity settings are not fixed but move among realities, an on/off flickering as a blurring of physical actions and pretended meanings.

The action of cutting out separates the desired object from its unwanted scraps. The car becomes a toy but what happens to the "negative space" or surrounding paper that cutting out turns into scrap. By contrast the action of cutting with attends to the static. If we accept Latour's (2005) premise that change and transformation are always occurring "What gets held in place and what was required to suppress the mess and keep things orderly?" becomes a more interesting question than "What was transformed and how?" To track the tidying up, the action of cutting with maps the scraps to follow the bits that are cut out by analysis. In coding, we can think of scraps as data that were tossed away to make a more sensible and orderly multimodal analysis. By mapping the scraps, we can track flows and tangles of assemblage/disassemblage (Thiel & Jones, 2017; Wohlwend, Keune, Peppler, & Thompson, 2017) in an expansive tracing of trajectories on a landscape that uncover entanglements.

Making Much With and Making More Than: Cutting is more than a child's spontaneous design to make do--it's a way of making muchness (Thiel, 2015a; 2015b) bringing meanings and materials across separation of represented and enacted, display and extension, production and imagined**,** material and immaterial, real and pretend, desire and joy. Muchness, "is theorized as an affective moment of intellectual and creative fullness that pulsates between bodies, space, objects, and discourse" (Thiel, in press). These moments are made possible through relational entanglements and are constantly shifting and changing as the boundaries of possibilities are redrawn. For example, muchness might emerge from the co-constitutive relationships between a playground on a sunny but not-too-warm day, superhero costumes, superhero texts (movies and books), a child's proclivity towards improvisation and pretend play, and a gathering of peers with equal interest in becoming superheroes one afternoon (Thiel, 2015a). It might also emerge from paint, and paint cups, and brightly dyed rolls of fabric that can easily be wrapped around human bodies to make dresses, and a warm, sunny just-right-for-a-picnic day, where paint becomes something other than paint, it becomes a pretend picnic lunch to celebrate the birthday of someone children hold dear (Thiel, in press). To further illustrate the ways paper serves as an actant in the unfolding of muchness, we offer the following story from Jaye's research:

Example 1: Paper Cellphone

Jaye walks up to the Playhouse doors but is stopped before entering the building. This is a practice that happens often--one that she has come to expect when arriving at the Playhouse in the summer when children are often waiting for the space to open for the afternoon. Zach offers a warm hello before asking, "Do you want to see what I made?"

As Jaye nods, Zach reaches into his pockets and pulls out four rectangle-shaped objects made from paper.

"These are my iPhones." Zach begins to show off the way he had recently collaborated with paper, markers, iPhones, apps, and notecards to craft his very own version of an iPhone in four different varieties (see Figure one for example).

Figure 1: Paper iPhone

He proceeds to offer details about the phones. He explains how the notecards are inside the paper to make the phones thick and sturdy. He explains how there are several versions to capture the many models/colors of iPhones that can be purchased. He explains how each phone has a different set of apps that a user can engage with when using the phone. He explains how every detail, down to the apple logo on the back of the phones has been carefully crafted. And he also explains how this is the only way he can afford to have an iPhone, that he sees many people in the world using these amazing digital-technological things, that he wanted one, and these materials helped him customize several different versions.

"I can't really text on one yet. But hey, I might figure that out." He explains through a large grin.

Zach found a way to *make much with* and *make more than* alongside paper. The boundary-making practices of economic inequities that have created a digital technology desert (both geographically and financially) for Zach's family and for the community at large shifted slightly when the traditional notion of what is possible for paper and phones changed. Zach's desirings (Kuby and Gutshall Rucker, 2016) enmeshed with paper's malleability, mark making tools' gesture, a notecard's sturdiness, and tape's stickiness to move beyond preconceived ideas about what paper can and cannot become. Paper's ability to wrap around, bend, fold, crease, and hold images offered a particular way of making much with and more than that produced new conditions of possibility (Barad, 2007). These varied possibilities are not new for paper. Paper's genealogy reveals that it has played a strong and viable role in historical events such as hiding messages during WW2, serving as correspondence over miles of land and sea, and even poisoning enemies when laced with toxins. As early childhood literacy researchers, we have seen paper become spinners, spitballs, dolls, guns, houses, lightsabers, swords, shields--the list could go on and on. It is abundantly apparent to us that people don't just make do with paper but co-collaborate with paper to make much and make more than, just as the events between Zach and paper described above.

Furthermore, using a lens of making much enables new relationships to emerge from affective energy (Thiel, 2015b) across a multitude of engaged bodies. Rather than making do, seeing children like Zach as making much and making more than moves away from material-discursive constructions of deficiency which sees individuals as lacking in some way to constructions of what-might-become which offers generativity to the world right now through its various snares and tangles. Making much doesn't see the subject as the sole-meaning maker ready to go out and manipulate and reshape the world as they see fit. Through a relational-material lens, a person can not claim to create muchness. Instead, muchness emerges unexpectedly through the coming together of time, space, and material bodies (human and otherwise).

Moving Across Multimodality and Materiality

We offer the chart below to illustrate the variations between multimodality and materiality, cutting out and cutting with, making do and making much with:

Multimodality	Materiality
Social Semiotics and Intentionality *Resources and Affordances/Constraints*	*Ethico-Onto-Epistemology*

Cutting Out:
    Isolates and compares modes
    Tracks resonances or shifts of meanings across modes and two- and three-dimensional realities
    Draws our attention to the ways that materials and social spaces are constructed and reconstructed with the material resources in the physical environment
	Cutting With:
	    Connects actants and actions
	    Plays around and explores materials
	    Connects unexpected to expected actions, identities, materials, and realities

Making Do:
    Uses and improvises on modes and materials within a given place
    Manipulates time and meanings to reshape and access fixed and inaccessible materials, technologies, and spaces
	Making Much With:
	    Enables new relationships to emerge among actants and spaces
	    Time, space, material, and meanings are never fixed but rather emerge through intra-actions between bodies

Example 2: Digital Cutouts

The interplay of these methods is illustrated below in an example from Karen's study of preschool iPad play:

    At the filmmaking table, four-year-old Simone sits alone, looking at the iPad in front of her. She opens the PuppetPals app and scrolls down and down the first screen of characters that the children have created and saved. Unsatisfied with the array of brightly-colored photos of ponies, princesses, superheroes, and classroom toys, she picks up a string doll from the table. The yarn doll shows the wear of several weeks of vigorous preschool play; its unraveling threads flop against her hand as Simone positions the doll on the table, props up the iPad, and snaps a photo with the iPad's camera. When the snowman photo appears on her screen, she taps the editing button that allows her to trace around the image with her finger, making a neon green line that indicates the edge of the cutout. But halfway around the snowman, Simone stops tracing the edge and begins scribbling, running her finger back and forth quickly, tracing the individual and matted threads of the doll. Whenever her scribbling produces a closed figure, the app instantly displays the partial figure, an irregular scrap of white yarn or sometimes just a thin squiggly line. Simone is unperturbed as she rejects each scrap, waits for the original snowman image to reload, and begins the cycle again, scribbling-rejecting-waiting-reloading-and-beginning again.
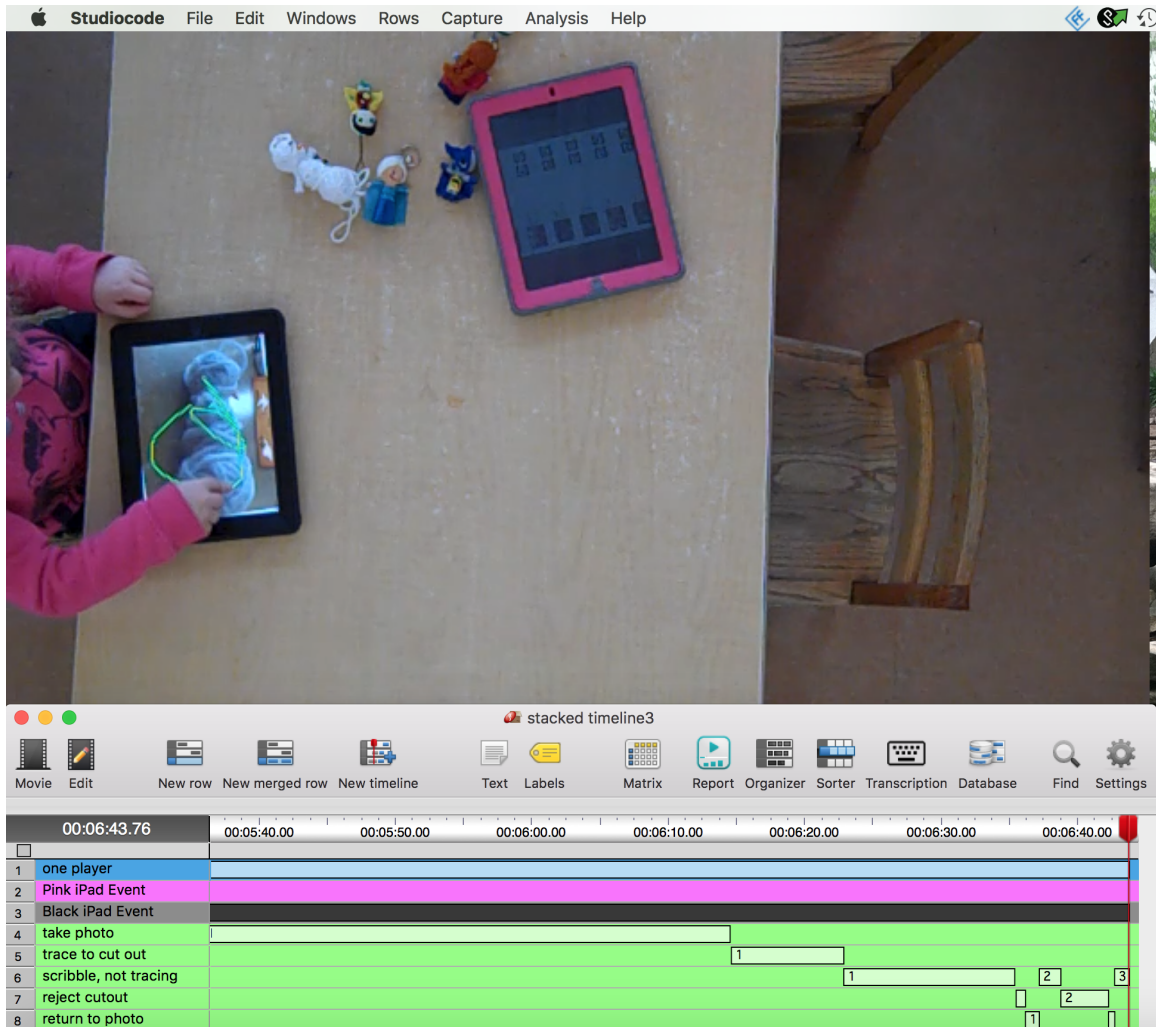
Figure 2. Multimodal analysis on video coding software

       The multimodal analysis reveals the merger of finger actions with haptic and visual modes that enabled affordances such as the easy slide of a fingertip tracing that allowed very young children to successfully hug the edges of an image and create cutouts. The video microanalysis tracked actions, modes, and meanings and demonstrated the complexity of children's digital composing, particularly at times when two or more children had fingers on the same iPad screen, collaborating and elaborating a scenario while negotiating their ideas for next moves.

       But it was also true that much of the preschoolers' play and filmmaking with this digital puppetry app resulted in seemingly aimless loops of activity like the one in the vignette that did not produce a recognizable character, a saved film, or any other product. Although the app used drag-and-drop fingertip navigation, an almost print-free interface, instant feedback, and multiplayer controls, children still were often unable to create and save films. In Simone's vignette, the iPad mechanics caused abrupt interruptions that prevented her from realizing her apparent intention of decorating the white snowman image with neon green scribbles. The geometry of the animation mechanics dictated that when overlapping lines completed a closed figure, it was immediately saved and the tracing function was closed, launching a photo of the closed figure. Adding to the confusion, the app automatically filed each new character as an icon

on the index page, but the most recent figures were placed at the bottom of a list of 100 or so previously saved character icons so that children had difficulty finding and recognizing the character that had just been created. Important here, the lack of an end product did not seem to be of much importance to the children. This will not seem surprising to many early childhood practitioners who have watched children at the easel happily paint a sunny scene into a muddy, blurry swirl until the brush wears a hole through the damp paper. Early childhood education has a long-standing ethos that values exploratory process over product, but how do we can value this kind of rambling exploration in a multimodal analysis that expects an intentional design and strategic manipulation of modes?

Cutting out depends on a representational frame and dimensional boundary crossing in which a two-dimensional drawing is transformed into a three-dimensional toy. Cutting with looks at this same cutting action as a connection that makes more of a drawing-cellphone-player. In the same way, photographing a classroom toy to make a digital character connects the fraying yarn-small doll-snowman image and entangles dimensions and realities. The digital image of a character turns into a toy through action and animation that allows it to be rotated, resized, and moved across the screen and layered with other images.

Cutting with also attends to the remnants that are backgrounded and that are unexplained by intentional design. Mapping the scraps looks at the paper bits that are dropped on the floor or the unwanted pixels that vanish into the ether. Simone's back and forth tracing of yarn strands attended to the material and the individual yarn strands, rather than the outline of the doll as a whole. Her yarn focus inspired a repetitive action that produced something new each time. While cutting out on the iPad produced a photo image that players could accept and save, it also often produced scraps; some of these were quickly and easily deleted, leaving no trace. But it is important to note that Simone's unrecognizable scraps with blurry pixels were saved as often as her carefully traced characters (fig. 2). Her tracing was an active exploration in bridging realities that is enough in itself, without the need for additional interpretation of representation.
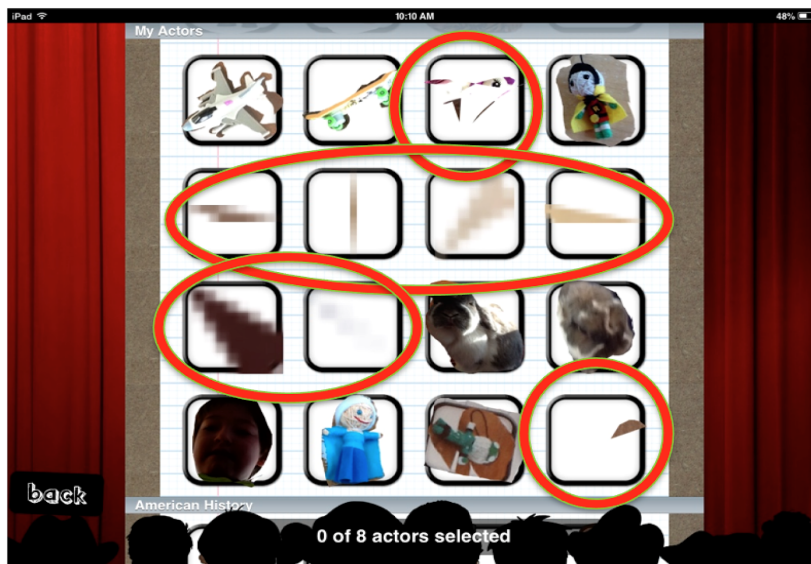

Figure 3. Examples of Digital Scraps

Making do is evident in Simone's re-purposing of the neon green digital line that bounded a traced area. She noticed and exploited the tracing feature's design potential to add color and emphasize the yarn tangle by scribbling rather than overlaying additional lines. The bright lines were intended to provide contrast and clearly show the edge of the cutout on a variety of photographic images, but Simone repeatedly appropriated the cutout feature to color rather than trace the snowman. She persisted, exploring various configurations, undisturbed that the coloring produced only fragments rather a snowman.

Making much with shifts the analytic lens to value what is being/becoming, a shift that reveals the learning in children's experimentation that blurs and play with material/immaterial boundaries. In the vignette, the act of photographing a classroom toy is an experiment in understanding the movement of an object-image, from toy to digital photo. Simone's exploratory play with the camera function in the iPad tested the limits of the screen's page boundaries and camera framing. But it was also an exercise in making more than by playing with materiality across dimensions, proliferating meanings and characters that connected a fragment of a digital image to a classroom toy to favorite popular media characters. The digital fragments of an image mingled with superheroes, ponies, and princesses in the character index where children scrolled and selected characters. Simone's finger tap instantly populated the next screen's puppet stage with an assemblage of polysemous scraps and recognizable characters. This assemblage could be spun, stretched, shrunk, and wiggled in a chaotic giggly scene or could vanish with a finger swipe in a new becoming that restarts the photographing-cutting-selecting-assembling sequence.

Multimodal and materialist methods capture different aspects of early childhood becomings that are constantly changing. Multimodal methods reveals children's hidden abilities, creativity, and resourcefulness in crafting designs by coordinating complex actions and their knowledge of visual, auditory, haptic, and kinesthetic meanings. Materialist methods reveal the deep interconnectivity among inquiry and experimentation in seemingly random moments of play and making. This suggests the need to consider the things that children produce not as products to assess but as emergent and active inquiries made up of actions, bodies, ideas, and materials.

Value to Field of Digital Technologies

Children are even more entangled in the interplay of social/material/digital when they use animation apps and digital photography. Simple actions like cutting, photographing, tracing, and animating remake meanings in ways that change children's relationships to toys and technologies. The action of cutting out a drawing changes a paper drawing to a toy, but also changes the child from artist to player. Similarly, the actions of assemblages of fingers, toys, screens, and mobile devices shift the meaning relations from viewers to designers, animators, and dimensional explorers. The action of photographing a toy moves an object from the physical table to a static image on a touchscreen, while tracing it with a finger to virtually cut out the photo turns the image back into an actionable toy that could be moved, wiggled, and resized to interact with other elements onscreen.   Theorizing and tracking this kind of manipulation blurs virtual/real or here/there binaries that currently limit how we think about digital literacies. A materialist lens reveals new possibilities for research on video-editing tools (e.g., cutting and assembling as analytic methods) that offer more robust models for

theorizing and examining the blurring of material/immaterial in children's digital production.

Moving beyond expectations for saved products and human-only designers requires appreciation of the messy knowledge that comes from exploration, a recognition that it is the becoming that matters. Like children tossing soggy paintings once they're finished, we know that the learning was in the action and the making was in itself already enough; there's no need to display a final product. This focus appreciates the scraps as well as the cutouts, as connected components linked by languages, codes, and logics. In these cooperative digital mergers of physical--embodied and electronic--actions and languages, it is the intra-action that matters, not the product. Like an animated doll-photo-digital puppet, the digital literacies here are moving, growing, shrinking, and becoming.

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