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Kalinowski, Robert

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TECHIES, LEARNERS, AND CONSUMERS

UNIVERSITY OF CALIFORNIA,
IRVINE

Techies, Learners, and Consumers: A Multi-Case Ethnography
of 3- and 4-Year-Olds' Digital Screen Use in Daily Life

DISSERTATION

submitted in partial satisfaction of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

in Education

by

Robert Tom Kalinowski

Dissertation Committee:
Mark Warschauer, Chair
Jacquelynne Eccles
Katie Salen Tekinbas

2020

DEDICATION

In memory of my mother

Betty Lou Tom, M.D.

who heard the proposal of this work and encouraged me in it,
but who passed before the final defense.

I am but one monument of her love and work in the world.

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VITA

Robert Tom Kalinowski

- 2002 B.A. in History, University of California, San Diego
- 2013-2015 Research Associate, Teaching and Learning Lab, Department of
 Psychology, University of California, Los Angeles
- 2015-2017 Graduate Student Researcher, School of Education and Department of
 Ecology and Evolutionary Biology, University of California, Irvine
- 2017-2020 National Science Foundation Graduate Research Fellow
- 2018 M.A. in Education, University of California, Irvine
- 2020 Ph.D. in Education, University of California, Irvine

FIELD OF STUDY

Human Development in Social Context; Learning and Cognition; Media Studies

ABSTRACT OF THE DISSERTATION

Techies, Learners, and Consumers: A Multi-Case Ethnography
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Doctor of Philosophy in Education

University of California, Irvine, 2020

Professor Mark Warschauer, Chair

Today, we are in the midst of a technology panic characterized by a fearful response to the rapid, nearly universal adoption of a new technology by preschool-aged children which did not exist a relatively short time ago: internet-connected touch screens. The focus on screen harms from some voices within child development research, professional organizations, news media, and lay groups effect policy which in turn can impact family life and daily activities that are important to children. I endeavor to contextualize screen use in the daily lives of children and better represent the voice of the young child in the screen use debate. To approach these goals, I conducted a year-long, multi-case ethnography of 15 children aged 3 or 4 at the start of data collection from 13 diverse families across multiple communities in Southern California. I found that young children's media use may be best understood as an ecologically situated process involving the interplay between the content, the child, their family, community, and societal spheres. Children's media behaviors are supported or constrained by a range of resource, culture, and policy factors specific to family and community background. I argue that policy makers and

technology designers are better served by an ecological perspective if they wish to understand how digital content used by children in sociocultural context.

CHAPTER 1: INTRODUCTION

The scene is a cold night in early winter in a high-desert suburb in Southern California. The wind whips dry leaves through the street and into the beds of a number of pickup trucks and cars parked up on a curb. Inside a one-story home on the corner of the street, it's warm and noisy, perhaps even chaotic, as an extended Mexican family gathers for a Christmastime reunion of sorts. I say "reunion" because there's even more family present than usual, but for this family, it is an ordinary occurrence that multiple families and generations come together under one roof, often multiple times in a week. In the main room, boy cousins in middle-childhood roughhouse and scream. One shows off his collection of Roblox figurines while another very loudly explains which Roblox toys he already has and which he does not and why. The big screen TV above the fireplace plays a traditional-format Mexican variety show on a broadcast network while older Aunts and Uncles sit and watch along with Grandpa. An infant is passed around for admiration. Aunties and Uncles, kids and cousins, different generations overlapping in age, find a place wherever they may and join in family time.

I sit with one of the youngest cousins on a stool almost underneath a high dining table. Three-year-old Anita is transfixed on an iPhone screen. She sits in an elaborate, ruffled Christmas dress, Christmas bow in her hair, and food smudged on her face. She's staring at videos playing on YouTube. She operates the phone by herself and never asks for help. When a family member comes by and tries to touch the screen, Anita pulls it away from them or smacks their hand away. On the screen, the characters from Peppa Pig play out a bizarre scenario: Papa Pig opens his mouth wide, much wider than he ever would in the canonical TV series, and reveals giant, grotesque, human-like molars. Peppa then produces an oversized pair of pliers. She grasps one of Papa Pig's molars and pulls. The characters on screen make various grunts and

sounds, but there is no dialogue. In a moment, it seems as if Papa Pig's mouth explodes, and the screen is covered with blood. Anita watches with wide open eyes. She doesn't laugh or speak, but attends closely to the action on the screen. I'm curious about this and ask Anita what's happening on the screen. She is not very verbal yet, and only responds by naming some of the characters. "Peppa...Peppa Pig. oooo! Look! That's *Papa Pig!*" She gives no indication that what she just watched was violent or disturbing to her. Above her protestations, I tap the screen a few times because I want to observe Anita making a new selection. Without any help, she settles on a cartoon featuring mainstay Disney characters: Mickey, Donald, and Goofy. Each of the three make sounds familiar to their character, but there is no dialogue. Also, the animation is of very poor quality, with the characters simply disappearing and re-appearing in other places on screen. For no narrative reason I can perceive, Goofy is suddenly seen dropping in from the top of the frame on his head. Characters rush off to the left or right, but no storyline is advanced. As with the Peppa Pig video, Anita just watches, eyes wide open, speechless, and makes no indication that she is aware of the family gathering around her.

An 8-year-old cousin passes by and I ask him about Anita's YouTube behavior. He pulls the screen toward himself for a quick look. Anita screams and he immediately gives it back. The 8-year-old says, "tsk! Anita why are you watching that stuff??" before turning to me and telling me that she always does that. He then goes and joins one of the other boys playing Roblox on a tablet.

This home visit occurred early on in my ethnographic field work on 3 and 4-year-old children and screen technology, and at the time I was delighted to have captured, right off the bat, the very phenomenon that is so often raised as an example of how screens are detrimental to young children: on their own, children access and are mesmerized by bizarre depictions of

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violence on YouTube (Papadamou et al., 2020; Lafrance, 2017; Brandom, 2017; Maheshwari 2017; Subedar & Yates, 2017; Weston, 2018). Children's time with screens displaces other, more beneficial activities, like socializing with family (Burroughs, 2017; Daniel, 2018). The digital-divide is on full display as poorer or immigrant homes lack the parental mediation necessary for technology to be used to benefit rather than harm the child (van Deursen & van Dijk, 2014; Kamenetz, 2018; Bowles 2018a, 2018b, 2018c). If this is all that is witnessed, why wouldn't concerned parents, teachers, or caregivers produce theories such as these? Reflecting back after more than a year in the field including over 80 home visits with 15 kids aged 3-4, I can interpret this scene with more than just dominant-culture finger-wagging. I witnessed a young child transfixed on what we - adults of the dominant culture - see as poor quality content, but as only one occurrence in a constellation of socio-culturally situated transactions between the child, the screen, the family, and the wider world including media producers and tech giants. With ethnographic methods and more complex theoretical frames (e.g., Bronfenbrenner 1994, 1995; Ito et al., 2013; Takeuchi, 2011), I can see a more complete picture of this child's journey with media as it relates to her acculturation into her own Mexican-in-America family; her acculturation into the dominant, English-speaking and academically-focused culture voiced at her preschool; and into the realm of learning technological and academic skills that she uses to become a fully participant and accepted member of her world.

Normalizing a New Phenomenon with Contextualized Knowledge

As a qualitative researcher reviewing this scene at the conclusion of my multi-case ethnographic field work, I see complex, socio-culturally explanations for the ways in which Anita interacts with her screen, and the ways in which different family members interact with different screens (the iPhone, the big screen TV) and media brands (Peppa Pig, Roblox, the

Mexican variety show), with all of these interactions belonging to specific cultures in their own place and time. For example, while contemporary lay theories have posited that ubiquitous, internet-connected touch screens running YouTube mesmerize children and draw them away from social interaction, even fostering anti-social behaviors (Kamanetz, 2018,) research from media studies from before the digital media era (e.g., television audience research) have shown how people have used media to signal preoccupation and unavailability to others in the room, like a dad hiding behind a newspaper to avoid being asked to do chores (Bausinger, 1984; Radway, 1984). The older cousins chat about Roblox, the wildly popular cross-platform video game, while also playing with spin-off Roblox toys. While Roblox is new, for generations people have been using media to form community or arrive at a topic of conversation (Palmer, 1986; Lull 1991). Anita is transfixed on the video featuring Peppa Pig, her favorite character, but from before the age of digital media, we know that it is commonplace for young children to become so engrossed in play such that they will not interact with people around them (Ruff & Lawson, 1990). Just as young children develop early, intense interests today in certain media brands like Peppa Pig and access these brands via new media like YouTube, in the pre-digital era children, too, developed early intense interests and focused their time and attention in play toward these interests, to the exclusion of other activities (DeLoache, Simcock, & Macari, 2007).

Perhaps to a parent, preschool teacher, or pediatrician in the dominant culture, Anita's transfixed gaze on bizarre, violent content on YouTube might confirm the lay theory that unsupervised use of screens is bad for preschool aged children. I should note that qualitative research is not suited to confirm or falsify such theories. However, a qualitative multi-case study such as the one presented here can serve to interpret the meaning of screen use, taking into account contextualized factors at the individual, family, and broader levels, and making use of

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ecologically valid observations through time and in different contexts. For example, the length of contact that I had with Anita and her family (over one year) afforded me the knowledge that Anita was not using her parents' phones at the holiday gathering described above, and that she was never allowed to use the iPhone at her own home. While an older cousin came by to tell me, "she always does that," in fact her screen viewing at her own home was restricted to only children's educational programming, only from PBS Kids and Nick Jr., and only at specifically scheduled times of the day via the family's big-screen TV attached to a cable box and DVR. Other research has also found that children have a different set of media rules at their grandparents' homes versus their own (Elias et al., 2019). Such important context is totally missed in study designs which only observe children and screens from afar and in public, e.g., a study which observed children and adults from afar for a single instance, coded the interactions, and found that screen use diminishes parental interactions with the child (Ochoa, Reich, & Farkas, 2020). The knowledge and lived experience from a multi-case ethnography allows for quite a different interpretation of the Christmas scene, versus a counterfactual where I might have only spent that one occasion with the child, or perhaps have only reviewed video footage of the scene without being a participant observer, as is the case with video observational studies.

The Current Technology Panic

Panic in the general population over novel, pervasive technologies are not new. From writing (Wartella & Reeves, 1985) to radio (Dennis, 1998), new technologies have been met with deep concern from dominant voices. Recently, Amy Orben created a framework for technological panic cycles, "The Sisyphean Cycle of Technology Panics" (2020) to provide historical perspective on our current panic on digital screens. In the following paragraphs, I characterize our present panic cycle as it applies to screens and young children.

Direct access to information for toddlers and preschool aged children is, in a sense, fundamentally different today than it was only a short time ago. According to 2017 data from the Common Sense Media representative survey of US households with children aged 0-8, 95% of families have at least one smartphone (Rideout, 2017). This is a marked increase from 63% in 2013, and 41% in 2011, the first wave of this data collection (Rideout, 2017). The iPhone was first released in mid 2007. Thus, a piece of technology that did not exist in 2006 is now ubiquitous in homes with children. Tablets are also a rapidly growing technology in the home. 78% of US households have a tablet in the home in 2017, compared with 40% in 2013, and 8% in 2011 (Rideout, 2017). The first tablet, the Apple iPad, was released in 2010.

Not only are touchscreen-operated, internet-connected smartphones and tablets ubiquitous in homes, they are also being used by young children. Children are born into digital media-rich homes, but this does not mean that children *use* all of the technology that surrounds them (Chaudron et al., 2015). In the case of tablets and smartphones, however, they do. In the UK for example, 28% of 3-4-year-olds used tablets in the home in 2013. This figure rose to 55% in 2016, and in only a year saw a significant increase to 65% in 2017 (Ofcom, 2017). This phenomenon is not restricted to high or middle income families; in a survey of mothers who visited a community health clinic in a low income neighborhood in the US, measures of use were highly similar to those found in US representative surveys. In this low-income, urban, mostly African American population in 2014, 36% of children aged 0-4 owned their *own* tablet. 99.6% had used a mobile device, and the age of first use was reported as under 1 year old by 69% of respondents (Kabali et al., 2015).

The spread of connected touch-screen devices means that infants and toddlers can now operate internet connected devices themselves, an advent for information access for this

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population not possible before 2007 (Burroughs, 2017). Babies typically develop the ability to purposefully point between 10 and 14 months, and this enables them to use touchscreens for themselves (Holloway, Green, & Stevenson, 2015). In the world of connected devices, young children also prefer tablets, followed by smartphones, because of their size and functionality (Chaudron et al., 2015; Blum-Ross & Livingstone, 2016; Holloway, Green, & Livingstone, 2013).

The introduction and subsequent mass adoption of these devices, “pre-adapted” to toddler use, have changed the day-to-day experiences in young children’s lives (Barr, Linebarger, & Huston, 2017; Holloway, Green, & Stevenson, 2015; Burroughs, 2017). Survey data, parent interviews, and usage data from video platforms like YouTube make it evident that young children are spending time with these devices (Hourcade et. al., 2015; Elias and Sulkin, 2017; Rideout, 2017; Blum-Ross & Livingstone, 2016). Furthermore, that time is relatively unmonitored. It may be that most parents do not know the activities of their young children online in any detail (Chaudron et al., 2015). This type insight is difficult to obtain, because most studies about children’s use of media is from survey or parent interview data. There are a few ethnographic studies examining daily life and screens use for young children but they come with considerable limitations, for example, ethnographic studies of young kids and screens by Harrison and McTavish, 2018, or by Thompson, 2016, are by an aunt and a father of the participant child, respectively. A few studies employing ethnographic methods across a spectrum of families do exist, however. For example, Chaudron and colleagues triangulated information from parents with in-home observations by a researcher, in a large, multi-national European study where the children in participant families were mostly 7-8 years old (Chaudron et. al., 2015). Closer to the age range addressed by this paper, Marsh and colleagues followed up a

survey study by interviewing and observing a subset of six participant families at home with children ages 0-5. That study was focused on the question of play and creativity with digital media (Marsh et al, 2018). These handful of qualitative studies employing ethnographic methods are invaluable to providing context of use, especially considering that the loud public discourse over children and screens today suffers from a lack of discussion over context, as I examine below.

A Need to Shift Research Methodologies

The qualitative, ethnographic study presented here is fit in a place and time in the new media research world analogous to that of ethnographic research in media (particularly television media) studies in the 1970's. Speaking of the shift to include *ethnographic* methods in television audience research, which did not begin until the 1970's, media researcher Ellen Seiter wrote, "the primary contribution of ethnographic audience research since the 1970's has been its demonstration that media consumption is embedded in the routines, rituals, and institutions – both public and domestic – of every day life. The meanings of the media, whether in the form of print, broadcast, or recorded video, or computer forms, are inseparable from and negotiated within these contexts" (Seiter, 1999). In light of this, my own research may be thought of an extension of the ethnographic work that was brought to television media starting in the 1970's, now applied to the context of ubiquitous smart screens in the lives of preschool aged children. My research acknowledges that the meaning of screen technologies to 3 and 4-year-old children can only be understood within their own contexts of daily life, their own individual persons and preferences, their families, their homes, their communities, and their cultures.

The present moment in research on *digital* screens and kids may be thought of as similar to the moment which confronted media researchers in the 70's and 80's. Before the 1970's,

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research in mass communications (especially television) was done entirely with experimental or survey methods, and findings focused on narrow and measurable impacts of media on audiences, often in lab settings stripped of any ecological validity. The media itself was not necessarily familiar or understood to the investigator, and was seen as entirely external to the viewer; media acted as the stimulus in a controlled experiment. The viewers were seen as entirely passive and receptive, and responses to surveys or questionnaires were taken as outcomes. In the late 60's and 70's some began to critique the methods and theoretical underpinnings of this research, especially behaviorism (Seiter, 1999). It is noteworthy that immediately prior to this shift, behaviorism was re-evaluated as the theoretical base and tool kit of choice in psychological science. In 1959 Noam Chomsky published a sharp critique of B.F. Skinner and behaviorism as a phenomenological base to study the human mind, and this critique helped initiate the "cognitive revolution" in psychological science, a move away from behaviorism and toward meaning-making (Chomsky, 1959). Until the 1960's, media research was very much a wing of cognitive research, limited in that era to the wrong sorts of questions bounded by behaviorist methods and often funded by advertising firms or television networks who demanded hard data. Seiter reflects that these methods in media audience research were "producing data that was irrelevant to everyday life" (1999, p 13).

In order to conduct research that was more useful and which could more deeply understand the use of media, audience researchers like Seiter, David Buckingham, and others shifted from media effects paradigms to more holistic, cultural studies paradigms, and employed frameworks more familiar to sociology like Marxist, critical feminist, or critical race theories (e.g., Buckingham, 1987; Seiter 1990). In doing so, these ethnographic investigators were able to contextualize media use in lives lived, for example shedding light on the ways approaches to

media differ for preschool teachers, according to the socio-economic and cultural sphere in which the preschool communities are situated. Preschools serving higher SES communities restricted the use and even play surrounding television media far more than preschools serving lower SES communities. Passing on a certain attitude and behavior toward television and its rank in all media/cultural pursuits was seen as an important mechanism for the transfer of cultural capital to higher SES children (Seiter 1999, 1993). The present study is situated in an analogous place to these television audience ethnographies: meaning making is the focus rather than media effects, and children are seen as co-constructors in their digital media use, situated in an ecological framework which includes important individual, family, community, and global characteristics. In this way, I hope to richly inform thinking in both academic and public spheres on the meaning of digital technologies for little children.

Quant to Qual

In the following section I situate this research both within the academic literature on kids and screens and within the present socio-political moment, a panic phase in a “Sisyphean cycle of technology panics” and adjoining lay theories (Orben, 2020). First, I briefly review the lively debate amongst pediatric screen time researchers, which has reached new heights fueled by the pandemic closure of many schools and the resulting dramatic uptick in pediatric screen use. I argue that this debate is productive in a way, but even the belligerents agree that a deeper, contextualized understanding is needed (e.g., Orben & Przybylski, 2019; Twenge, Haidt, & Joiner, 2020). Deep, contextualized studies which richly describe developing children’s lives with screens are rare, in part because they are expensive and difficult to execute (Chaudron et al., 2015; Marsh et al., 2018). Next, I will give an overview of the screen time debate in the public sphere, which is only weakly connected to academic research in the area. The screen time debate

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in the public sphere is better understood by examining lay theories, especially parental ethnotheories (Kenner, Ruby, Jessel & Gregory, 2008; Marsh, Hannon, Lewis and Ritchie, 2017; Plowman, McPake, & Stephen, 2008). I review work on these lay theories and explain direct impacts that they may have on children's on and off-screen lives. Parental ethnotheories differentially impact children with different individual, family, and community characteristics. I argue that the present study, an ethnography of 3 and 4-year-olds daily lives with digital technologies, directly addresses gaps both in the scientific literature and in the public discourse in a way that cannot be achieved with survey data and parent interviews alone.

Quantitative Studies. Quantitative research is well represented in the area of children and young people and media, including internet-connected media. As with television audience research pre-1970's, the primary methods used are surveys and interviews with adults, speaking for their children, and are focused on health, personality, or quality of life outcomes. Also as with television audience research pre-1970's, this research may be difficult to apply when it comes to approaching meaningful, interpretable answers to questions of screen and technology's impact on health and wellbeing.

The inutility of quantitative studies to meaningfully address these questions is illustrated by a recent (2019) pre-registered study on digital screen time and sleep for children and young people. Andrew K. Przybylski is an experimental psychologist who has emerged on the global stage as an expert voice rebuffing various screen harms hypotheses with quantitative methods (e.g. a story in *Wired* titled *Screens Might Be As Bad for Mental Health as... Potatoes*, Gonzales, 2019). Przybylski published a separate study focusing on the outcome of reduced sleep, already one of the least debated and most consistently associated outcomes with screen time. Using a pre-registered analysis plan with a representative data set of children in the United States

(n=50,212,) Przybylski reported a meaningful association between time on digital screens and reduced minutes of sleep, but found little *effect* of screen time minutes on reduced sleep. Rather, contextual factors associated with screen use “exert a more pronounced influence on pediatric sleep compared to screen time itself” (Przybylski, 2019). These “contextual factors” in the datasets used are mostly demographic variables, and do not serve to deeply contextualize use. This research is important in weakening the “displacement hypothesis,” a leading hypothesis in the screen risk-focused camp, which posits that time spent on screens displaces healthier behaviors elsewhere, but it does not help us to understand the context of use itself. Przybylski concludes that “it is incumbent on researchers to clearly articulate the ways and extent to which exposure to screens influences young people” (2019). What is needed then is an exploration of these mechanisms within social context. After all, according to Przybylski’s (2019) findings, to analyze screen time use using quantitative methods, *even to match it with a narrowly defined outcome like sleep*, is to miss more than 98% of the variance, and only with respect to the sleep outcome, to say nothing of the socially and culturally contextualized story of screens in the daily lives of kids. Of note to me is the light-touch discussion of developmental pathways connecting screen use with outcomes in the quantitative literature, and lack of careful discussion around very different childhood ages.

Amy Orben, along with Przybylski, stirred up some spirited debate amongst screen time researchers earlier in 2019, with research which carefully demonstrated how negative effects of screen media use in quantitative studies may be the result of cherry picking (Orben & Przybylski 2019a; Orben & Przybylski 2019b). Famously, one of these articles used specification curve analysis, a sophisticated statistical method of calculating many pathways to outcomes of interest, and demonstrated that screen time might be about as predictive of later depressive symptoms as

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the consumption of potatoes (Orben & Przybylski 2019a). That is to say, screen time was a poor predictor of important health outcomes, and was only about as strong as other predictors with no theoretical mechanism to effect those outcomes.

This work was partly aimed at another camp of investigators who argue that certain types of screen use among certain populations is extremely dangerous and must urgently be addressed by policy intervention. For example, Jean M. Twenge has gained both academic and popular attention for her work connecting social media use with adolescent depression and suicide (e.g., Twenge et al 2018;) including publishing popular articles with titles like, “Have Smartphones Destroyed a Generation?” (Twenge, 2017). Orben and Przybalski, from the screen-opportunities camp, pointedly attacked methods used by Twenge and other screens-risks focused scholars and accused them of cherry picking. Twenge and colleagues in turn argued that Orben and Przybylski’s methods failed to make reasonable restrictions in age, gender, and types of tech use in their model, the very sorts of restrictions which would help to test certain screen harm hypotheses. For example, in a response in *Nature Human Behavior*, authors Jean M. Twenge, Jonathan Haidt, Thomas E. Joiner, and W. Keith Campbell noted that some screen harms hypotheses do not encompass all screen uses for all populations, but, for example, sometimes focus on exclusively social media screen use and girls of a specific age range (Twenge et al., 2020, Twenge & Campbell, 2018; Boers et al., 2019; Pimrack et al, 2017). Twenge and colleagues argue that Orben and Przybylski’s method of “harvesting the whole orchard” (in Orben’s words) to avoid cherry picking is needlessly unrestrictive, and certain methodological decisions result in any effect sizes appearing smaller than they otherwise would. The debate has drawn others into the ken; I note quantitative developmental psychologists active in the open science, pre-register movement have come forward to defend Orben and Przybylski’s methods, adding that

associations between depression and social media use in teenage girls are probably bi-directional (Odgers & Jensen,2020). Throughout the debate, voices from all camps seem to agree that *contextualization* of screen use is important, but they seem to me to lack the data and methods to more fully address the work they say is so urgently needed.

Qualitative Studies. Just as there was a need for methodologies to lend more meaning to audience research with television in the 1970's, in the 2010's some media researchers used qualitative and ethnographic methods to shed light on the pressing issues of digital media and children. Livingstone and Sefton-Green, media researchers in the UK, wanted to probe deeply into the meaning-making of digital use in the daily lives of their audience of interest, adolescents. Livingstone and Sefton-Green conducted a year-long ethnography of a single class of 13-14-year-old children at a UK school in their book, "The Class" (2016). In doing so they were able to probe the dimensions of screen use in adolescents far beyond what survey studies could accomplish. As with my study, Livingstone and Sefton-Green sought to better characterize media use in sociocultural context, as a way to inform the heated debate at the time of digital technology use in schools for the purpose of formalized education. "The Class" proved to greatly illuminate the debate over tech in schools in Europe, finding, among other things, that much learning with technology occurs out of school in the context of kids wanting to explore and learn in domains that were socially relevant and interesting to them (Livingstone & Sefton-Green, 2016). As "The Class" study was meant to inform the social media harms theories, especially privacy concerns, the authors also found that far from wanting to expose personal information in a myriad of platforms, teens carefully firewalled off identities and information from one platform to another, and avoided some platforms altogether. For instance, teens in the 2016 study withheld

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information or participation from Facebook, since that was the same site their parents and teachers used.

A few studies have lent ethnographic methods to preschool technology use. For example, Lorna Arnott used an ecological systems approach to examine preschoolers' use of a wide range of technologies, including digital screens but also non-digital technologies (i.e., electronics or appliances like cassette players and hair irons) in two different preschools in central Scotland (Arnott, 2016). While this study did not have a longitudinal component since individual children's uses of technologies were not tracked over time, Arnott was able to uncover the social nature of play that characterized virtually all use of these tech devices in the preschools. Arnott's use of the ecological perspective (Bronfenbrenner 1994, 1995) allowed her to describe a "digital play system" involving different types of social interactions among preschoolers using these technologies (Arnott, 2016).

Recent ethnographic work in the area of screen use in ecological context has uncovered important insights, invisible to quantitative methods. Investigators using ethnographic methods resist treating the media using population as monolithic, and instead attempt to prise out a picture of life with technologies for different populations. Some point out that our understanding of important screen use phenomena (like fast internet access, or social media use) is limited to middle or upper class families in the West, and in studying Latino families' we can better understand how technology use and adoption may meaningfully differ for non-white, non-dominant communities (Katz & Gonzalez, 2016). Ethnographic methods have revealed important differences in the ways screen technologies for children are perceived, with Spanish-speaking, immigrant, or low-income families being more opportunity-focused rather than risk-focused (Ames, Kaye & Spasojevic, 2011; Yardi & Bruckman, 2012; Katz & Gonzalez, 2016).

Ethnographic work with parents has also offered keen insight on the effects of risk-focused narratives about screens in the zeitgeist, and the ways this impacts parental mediation of screen use for their kids at home (Mazmanian & Lanette, 2017).

Indebted to the few ethnographic, qualitative studies listed above in the area of childhood and digital screen use, the study I present here can be thought of as a shift from quantified effects of screen media on children to a more holistic, culturally situated paradigm. My study adds some novel approaches and factors: my primary mode of data collection is direct, prolonged contact with the young children themselves, and I only supplement this with parent semi-structured interviews and surveys. The foundation of my epistemology rests on achieving *verstehen* with these children, directly. Also, my study includes a longitudinal component, where I track these kids' use of screens through a year. This component allowed me to uncover a few important findings, like the transition to becoming a first-time gamer, or the emergence of a YouTube user as a cognitively gifted preschooler. For the present study, meaning making is the focus rather than media effects, and children are seen as co-constructors in their digital media use, situated in an ecological framework which includes important individual, family, community, and global characteristics. In this way, I hope to richly inform thinking in both academic and public spheres on the meaning of digital technologies for little children.

Lay Theories

One might think that such a history of the screen time debate is irrelevant to a study on screen use and meaning making *among three and four-year-old children*; after all, screen harms are often focused on teens and social media, and 3 and 4-year-olds do not use social media. But screen-risk focused narratives featuring any age of children penetrate deeply into society and

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impact parents of younger children, and the ways they mediate – or at least wish to mediate – screen use (Mazmanian & Lanette 2017).

Why the current technology panic, and why does this panic extend even to concerns for very young children? Technologies of past decades and centuries have transformed daily life, but in any generation, a young child's access to information, be it in the form of artefacts like books, toys, or video, or in the form of life experiences, are restricted by caregiver behaviors or by scarcity. This is the first time in human history that the young child has unrestricted access to something and can exercise that access, usually without any help from an adult or without an adult knowing exactly what they are up to (Chaudron et al., 2015; Burroughs, 2017; Harrison & McTavish, 2018; Thompson, 2016). Perhaps this striking change to any earlier time is what causes such a fearful response by some. In a review of 24 sources of advice, ranging from government and policy bodies to non-governmental organizations and news media/blogs, Alicia Blum-Ross and Sonia Livingstone (2016) found that the number of organizations focused solely on risk was about equal to those which addressed both risks and opportunities, and only one source reviewed offered advice solely geared toward opportunities. Blum-Ross and Livingstone (2016) also noted that the closer an advising entity was to an official government or policy group, the more risk-focused the advice, whereas entities generated from parent interest groups tended to be more balanced.

Empirical studies based on parent surveys and interviews provide evidence that parents have a balanced view of children and connected media, considering both risks and opportunities. In a survey of 297 parents of children aged 3 and under focusing on screen media in general, the policy group Zero to Three found high rates of screen viewing, with the highest rates at the older end of this age group, but parents did not seem monolithically concerned or anxious about screen

use. Instead, parents had a range of beliefs on the benefits of screen time (Vaala, Bleakley, & Jordan, 2013). Most studies available on children and use of connected technologies survey parents whose children are older than 5. For these parents, again, beliefs about risks and benefits seem more balanced (Chaudron et al., 2015; Blum-Ross & Livingstone 2017; Rideout 2017; Ofcom, 2017; Rideout 2014).

Despite a seemingly balanced approach to risk and opportunities from parents, news media and policy bodies often take on a fearful tone. Anya Kamenetz, writing for *The Columbia Journalism Review*, points to a trio of *New York Times* articles which in her view prey on parental anxiety over child media use (Kamenetz, 2018). The *New York Times* articles, titled “A Dark Consensus About Kids And Screens Begins to Emerge in Silicon Valley,” “Silicon Valley Nannies are Phone Police For Kids,” and “The Digital Gap Between Rich And Poor Kids Is Not What We Expected” were published over a single weekend in October 2018, and were among the most popular lifestyle articles for the paper (Bowles, 2018a; Bowles, 2018b; Bowles, 2018c). These articles paint a picture of the most technically expert adults putting exceptionally high restrictions on media for their children because they believe this media to be harmful. The third article mentioned reflects a different side to the same argument: that children from low SES backgrounds spend more time on screens than their higher-income, more highly educated peers, and the screen content is of lower quality. Stories founded on screen anxiety are by no means limited to premier newspapers like the *Times*. *Today* also frequently runs such stories, for example, “Moms Warn of Disturbing Video Found on YouTube Kids: 'Please Be Careful'” published in 2017, or “Child Advocacy Groups Say YouTube Kids Rife with 'Inappropriate' Videos,” from 2015, both highlighting that young children access inappropriate videos without

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their parents' knowledge on YouTube, including via YouTube Kids, YouTube's site designed to filter out such content (Peters, 2017; Eng, 2015).

Respected policy groups, too, respond to this dramatic change in daily life with risk-focused advice. Famously among child-focused professionals, the American Academy of Pediatrics (AAP) took an extremely conservative, risk-averse position toward screen time and early childhood. Until 2016, the AAP advised no screen time whatsoever for children under 2, and no more than 2 hours per day for children over 2, a policy abbreviated as "2x2" (AAP Council on Communications, 2016; Livingstone, 2016). In 2016, the AAP finally revised their out-of-touch "2x2" recommendation, replacing it instead with a more nuanced but less memorable set of recommendations (AAP, 2016). Pervasive through all these recommendations is that screen time is something that is to be limited. It is noteworthy that one of the 2016 AAP recommendations actually lowers screen time for some children, from 2 hours to 1, for those aged 2-5 (AAP, 2016). One very clear recommendation is that children from birth to 18 months are to be "unplugged," in stark contrast to a large 2014 survey of predominantly low-income, urban, minority mothers in a US city finding that virtually all children use mobile devices and most use before age 1 (Kabali et al., 2015). During the pandemic closure of schools and public life, amidst working parents needing to keep children occupied at home, the AAP is doubling down on their risk-based advice, "urg[ing] parents to preserve offline experiences, which help families connect emotionally, process difficult experiences, and heal" (AAP, 2020). Does the AAP think that families do not connect emotionally over screen and online use?

The research and professional community will also sometimes approach the rise in connected technology use by children with anxiety. The policy group "Children's Screen Time Action Network" seems to exist primarily to limit children's screen time. In August, 2018, the

policy group sent a letter to the American Psychological Association (APA), signed by scores of psychological scientists, practitioners, and other child-focused professionals, causally connecting the rise in screen time to outcomes such as increased depression, decreased scholastic achievement, decreased employment, and family stress (Daniel, 2018). In a review of anxiety-focused publications on the proliferation of media technologies in childhood, Plowman, McPake, and Stephen (2010) list grievances such as “irreversible changes in human biology and the world’s ecology” (p. 1). Note, however, that these authors did not find this same level of anxiety in a survey of 346 families including 24 case studies (Plowman, McPake, & Stephen, 2010).

At the crux of the problem between risk-focused advisory groups and the reality of widespread digital media use is the veracity of underlying screen harms lay theories. In a response to the updated 2016 AAP recommendation, Sonia Livingstone (2016) wrote, “while the new guidelines fit better with the current circumstances of family lives, the AAP faces a dilemma: there isn’t yet a robust body of research on the effects of digital media on children, yet parents want guidance now” (2016). She argues that in the debate over risks and opportunities, “at stake is the strong claim that screen time is displacing social, cognitive and physical activities that are important for child development” (Livingstone, 2016). This narrowed focus on risk seems to frustrate some researchers with expertise in child development and media, who would prefer to move beyond risk-focused discussions toward answering questions about developing with media, both risks and opportunities, and, importantly, differential use and outcomes by SES (e.g., Livingstone, 2016; Gee, Takeuchi, and Wartella, 2017).

This anxiety is arguably more intense with respect to younger children, despite younger children’s non-use of social media. While the AAP recommendations are intended for children of all ages, special attention is paid to early childhood, and oftentimes infancy and early childhood

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attract a magnified level of stress from policy voices and the media (Plowman, McPake, & Stephen, 2010; AAP, 2016; Livingstone, 2016; Blum-Ross & Livingstone, 2017). However, while risk-focused advice from bodies like the AAP are especially cautious with younger children, most research on children and media focus on older children (see Figure 1) (Ólafsson, Livingstone, & Haddon, 2014).

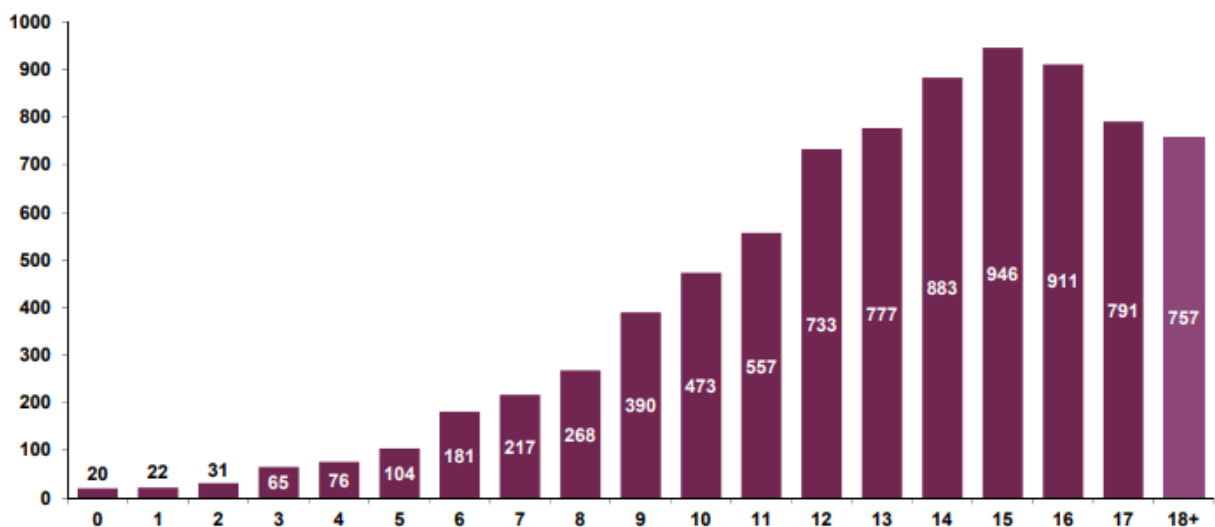


Figure 1. Number of European studies by age of child studied as of 2014. The x axis is age of child studied; the y axis is number of studies. “The studies are multi coded and most studies cover more than one age group. Even though a particular age-group has been included in a study it does not necessarily mean that individuals from that group have been interviewed in person.” Reprinted from *Children’s use of online technologies in Europe: a review of the European evidence base.* by K. Ólafsson, S. Livingstone, & L. Haddon, 2014, LSE, London: EU Kids Online, Revised edition. Copyright 2014 by EU Kids Online.

The increased concern with younger children may be because young children are seen as more vulnerable than older children, or may be related to earlier periods being seen as more developmentally sensitive than older periods (e.g. Burroughs, 2017; Plowman, McPake, & Stephen, 2010). Additionally, part of the concern may be due to a lack of research with younger children, and/or the special difficulty with researching this population (Livingston & Blum-Ross, 2017; Olafsson, Livingstone, & Haddon, 2014). In 2007, Staksrud, Livingstone and Haddon noted that “increasing the body of research on children younger than 12 is a priority, since their activities may challenge their maturity to cope with unanticipated risk.” However, by the 2014 EU Kids Online research review, the proportion of studies on younger children had not increased, perhaps reflecting the unique difficulties with conducting research with young children (Staksrud, Livingstone, & Haddon, 2007; Olafsson, Livingstone, & Haddon, 2014).

Lay theories are not an aside to my study; indeed, the impetus for the study was to address widespread lay theories, which impact the ways young children are allowed to engage with technology in day to day life. To address these concerns over young children’s media use, and as a response to the prioritized need for research with younger children, I propose a study which looks deeply into the daily use of toddler-operated connected devices.

CHAPTER 2: THE PRESENT STUDY

The study presented here is a multi-case ethnography of 3 and 4-year-old children who use digital screens in daily life. After an explanation of methods used in the current chapter, I move on in chapters 3, 4, and 5 to describe and interpret three broad and interconnected domains in the world of preschoolers and screens, and for each domain situate children's use within its ecological context while also describing multidirectional relationships between ecological levels (Bronfenbrenner, 1994, 1995). In Chapter 3, I address the question of content selection. How do pre-literate children choose their screen content? This exploration addresses two distinct but interconnected domains: what children choose to consume (children-as-consumers), and in what manner they are able to do it (children-as-techies). In Chapter 4, I examine ecological systems outside of the individual child (the family, community, immediate culture, and broader/dominant culture) to describe how these different levels serve to afford or constrain children's use of internet connected smart screens. In Chapter 5, I examine how children might learn from their daily life context with screens. For example, how is it that a pre-literate, non-verbal, Spanish-speaking boy can learn English letters, numbers, colors, and shapes via YouTube on old iPad? What contextual factors grant affordances for learning from screens, and what factors constrain screen use? In which types of socio-cultural environments does this kind of learning take place, and in which does it not, and why? Finally in Chapter 6 I conclude with a discussion on illuminating the black box of young children's own meaning-making, learning, playing, and living with digital screens, and why the ecological model is important for addressing these questions.

Participants

We recruited 13 diverse families with at least one child aged 3 or 4 who regularly used digital technologies at the beginning of data collection. We purposefully sought out variation in our sample. Our final participant pool was drawn from a range of communities in Southern California, including a University community, a number of working-class, Spanish-speaking communities, and a Montessori preschool community in a neighborhood serving many entertainment and tech professionals. Families spoke primarily English, Spanish, or Chinese in the home. Our 3-4 age range child participants varied in age, gender, developmental characteristics, abilities, interests, schooling contexts, and number and type of digital screens available to them. Children also varied in the number and ages of siblings they had, as well as the number of people total they had living with them. Parents represented a wide range of attitudes on screen and technology use, as well as a range of parenting attitudes regarding screens, from allowing children largely unrestricted use of their own phones, to totally forbidding all screen use at home, (though conceding use at the grandparents' house) (See Table 1).

Table 1

Participant Characteristics

Child Name	Children Aged 3 or 4	Sibling N	Home Languages	Parental attitudes toward screens	Devices used (broad categories)	Community Group
Kwai	1	0	Chinese and English	opportunity	TV, smartphone, tablet, game system, home hub	A
Addy	1	1	English	risk	TV, game system	A
Xue	1	1	Chinese and English	risk	TV, tablet	A

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Cleo	1	0	English	balanced	TV, tablet	A
Anas	1	2	English and Arabic	risk	TV, smartphone	A
Pedro	1	2	Spanish	opportunity	TV, smartphone, tablet	B
Kristal	1	4	Spanish and English	opportunity	TV, smartphone	B
Frederick	1	1	Spanish	balanced	TV, smartphone	B
Imelda	1	2	Spanish and English	opportunity	TV, smartphone	B
Anita	1	2	Spanish and English	opportunity	TV, smartphone, game system	B
Hitoshi	1	1	English	balanced	TV, tablet	C
Aspen and Fiora	2	2	English	opportunity	TV, tablets, game system	C
Bannon and Wendy	2	0	English	risk	TV, smartphone	C

Note. The more prevalent language used in the home is listed first per family. For the sake of brevity, parental attitudes toward screen use are here generalized into three categories: opportunity focused, risk focused, or balanced, following a Livingstone and Blum-Ross categorization of children's media related policy or news organizations (2017). However, the

attitudes our participating parents held would more accurately fall on a spectrum. We organize Community groups into A: a “University community” bounded by families with at least one parent studying or working at the University and living nearby; B: a “working-class, immigrant, Spanish speaking community” bounded by families with at least one parent emigrated from Mexico, who speak primarily Spanish in the home, and who have children who qualify for Head Start enrollment, and C: a “tech/artists community” including a collection of neighborhoods within a large metropolis which house and serve media industry professionals.

We used a snowball method to achieve the full participant sample, deliberately seeking out variation in demographic factors and screen use attitudes. The first author used his personal networks within (1) a University community, (2) a local Head Start organization, and (3) a Montessori preschool in a nearby metropolis in order to enroll the first participants. Flyers describing the study were distributed among these three networks. Respondents were screened and admitted into the participant pool as appropriate (i.e., according to child ages, child use of screens, accessibility of the homes to researchers, and with an eye toward variation). Respondents also shared news of the study within their own networks, and in this manner participant enrollment was eventually completed. Note that participant families entered the study at different times, but all home visits were completed in a 16-month time frame, from December 2018 to March 2020.

All aspects of the study were approved in advance by the authors’ home institution Institutional Review Board (IRB). Great care was taken to protect child and family participants, and the research team worked closely with IRB administrators and others proficient in data protection and research ethics. For example, the nature of our video recordings was carefully considered by a University data security expert, who assessed that the nature of the recordings

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was benign and contained no information that could facilitate a breach of privacy. Also, on the advice of our IRB, we never collected or recorded personally identifiable information like parent's full names, addresses, or signatures. Parents received all the appropriate documentation from the study team and the IRB, but never had to sign anything as we accepted verbal consent. Thus, while our data store includes video of young children, the activities depicted are totally ordinary and benign, and no supplemental data is stored which would facilitate connecting the video data to an individual family.

Procedure

Each family was visited by one or more researchers at home periodically through the data collection phase. The first home visit occurred in December, 2018, and the last in March, 2020. The range of the number of visits per family was 4 for the least-visited to 8 for the most-visited. The average (mean) and most frequented number (mode) of visits per family was 6. Visits were supplemented by further conversations with parents, whether by email, phone, or video chat. Home visits were scheduled when parents said their child was likely to be using media technology, though other daily-life activities were also observed, including play with traditional toys, family conversation, visits to relatives' homes, and occasional trips out for dining or entertainment. Because researchers visited participants when parents said their children would most likely be using screen media, some families were always visited at the same time of day. This may be considered a limitation, but we note that for many families, this was the only time of day when children were allowed to use screens. In addition to spending time with children, researchers also frequently communicated with parents, near-age siblings, and the occasional family friend/visitor. We employed a method of "participant observation," where the researcher became a participant in the phenomenon of interest, in our case, daily life with screen

technologies. The lead author was present for nearly all sessions. There were 78 visits by the end of the in-person data collection phase, all of which were audio and video recorded. In addition, at least one parent in each family participated in a recorded, semi-structured interview, and most parents presented additional data via informal email, phone, or video chat conversations with the research team. Data sources included audio/video recordings of each visit, field notes, interview transcriptions, researcher reflections immediately following field observations, and photos and notes on families' homes and neighborhoods. At least one parent in each family also took a quantitative survey adapted from the Common Sense census: Media use by kids age zero to eight (Rideout, 2017).

Analysis

We used an inductive process to analyze audio/video recordings from family visits. We began with qualitative memoing, a method whereby members of the research team met to systematically review recordings and other data artifacts from home visits. In keeping with this method, researchers initially viewed some portion of the total body of data recordings together, with each researcher silently memoing their own notes. After specific intervals (usually 5 minutes,) researchers would pause data playback and discuss with one another the meaning that emerged from the data (Derry et al, 2010; Engle, Conant, & Greeno, 2007). Through viewing a subset of the video data totaling over 20 hours, we noticed emerging themes related to the ecological situating of child use of media specifically, and selection of content more generally. We then transcribed audio/video data from the majority of family visits (about 45 hours) and began coding child selection of content within ecological systems, developing and revising codes as we found additional examples of child selection within an ecological framework. Transcripts were periodically cross-checked to ensure accuracy. We continued this process using transcripts

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from visits with each family, establishing agreement within the research team for examples fitting under themes until no new codes or themes were emerging from the data. (Derry et al, 2010; Guba et al., 1994). These findings were discussed with colleagues close to the study and with our participants as “member checks” (Guba et al, 1994). Findings were again iteratively modified where appropriate.

CHAPTER 3: HOW DO CHILDREN SELECT WHAT TO WATCH?

Online content is heterogeneous; varying pieces of content possess varying quality, varying functionalities (e.g., whether allowing touchscreen interactivity,) varying purposes (e.g., education or entertainment,) and are created with different ages, genders, cultures, or language speakers in mind (Vandewater, 2007). How do children and their families navigate the immense, ever-growing media landscape and make choices about what to consume, whether intentional or unintentional? The issue of content selection is important because different content carries different consequences from a developmental perspective: some content helps the developing child; other content has been found to have no benefits or even deleterious effects (Livingstone & Haddon, 2009). For example, while high-quality content tailored to a child's cognitive level can foster learning (e.g., Huber et al., 2016; Xu & Warschauer, 2020), certain content containing violence can dampen a child's healthy psychological growth (e.g., Zimmerman & Christakis, 2007). During the current coronavirus pandemic, the need to better understand child selection of content has become more urgent, because young children are relying on screen media more heavily to learn or to be engaged such that parents can work from home (Gaudreau et al., 2020). Despite an emerging body of literature that focuses on children's screen use in general, little empirical research has been conducted to explore how and why children select certain content and not others within the holistic context of daily life.

The ecological perspective provides theoretical foundations for us to understand the complex process of children's media content selection (for an overview, see Koller, Raffaelli, & de Morais, 2020). Ecological systems theory asserts that a child's development can only be understood as situated within multi-level systems including that of the child itself, their family, their community, and larger societal, cultural, and industrial factors with which the child has no

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direct contact (Bronfenbrenner, 1979). This notion requires us to simultaneously consider how individual, contextual, and societal forces, as well as the interplay among them, shape children's media selection.

Taking the ecological perspective, we conducted a year-long multi-case ethnography of 13 diverse families with 3-4-year-old children that explores (1) how individual children select content on smart screens, (2) how these selections are influenced by the child's family, friends, and immediate community, (3) how these selections are influenced by forces with which the child has no direct interaction, and (4) the features of a complex network of multidirectional influences among different ecological spheres which help determine child selection of content. Employing an ethnographic methodology allowed us to situate our investigation within children's daily lives. In this chapter, we address child selection of content on the individual level (item 1 listed above), and in chapter 4, we address systems at work beyond the individual child (items 2-4 above).

We focused on children aged 3 and 4 years because these children are in a stage where selection of digital screen media can be very purposeful, yet children are typically pre-literate and their autonomy for selecting devices or apps out of the universe of choices is still very limited. Growing up with digital technologies is common; research and policy groups have pointed to this age as an important juncture where children must be somehow protected, yet still permitted to grow in digital autonomy. For example, the 5 Rights Foundation calls for "a digital environment that is fit for childhood" and for children's use of digital technologies to always be guided by adults (Kidron & Rudkin, 2017). Thus this age range was likely to produce interesting interplay among ecological systems (e.g., the growing child, the watchful parent, the school community with its screen policies, and the children's media industry) and serve as an interesting

test of ecological systems theories. We also focused on children of this age in part because it has been cited as a research priority (Chaudron et al., 2015; Livingstone & Blum-Ross, 2017; OfCom, 2017). Research on daily life with technology among children under 5 is difficult. Common methodologies used in this space such as surveys or interviews will always be somewhat distant from the data generating process, thus much less is known in detail about the use of digital technologies for children under 5 versus other groups.

Because our aim was to more richly describe child selection of content situated in children's social ecologies, it was important for us to draw participants from distinctly different social ecologies, at least at the family and community level within our limited geographical reach. While children were drawn from a number of different communities and cultural backgrounds, we found that all of our participant families could be loosely categorized into two groups: those who are part of Spanish-speaking, working class, immigrant communities and those who are not. While we did not recruit participants intending to divide our sample in two, this division nonetheless emerged. This is important because as we set out to describe the ecologically situated way that children select screen content, we found two sets of rules. The two Americas that emerged in our data and analysis has been described in detail in other contexts by other ethnographers (Ochoa & Reich, 2020; Katz 2010, 2014; Katz & Gonzales 2018; Yardi & Bruckman, 2012), and is briefly outlined below. For this study, we note that drawing from as diverse a pool of families as we could within the scope of the project allows for more meaningful and trustworthy results.

Overall, we found that far from impressionable people susceptible to any suggestion, children consistently chose screen content for themselves which mirrored their off screen interests; ads or other suggestions for unrelated content were ignored. Rather than being sucked

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into the screen for time on end, children generally used screen media as a toy, sometimes to be shared, sometimes to be enjoyed in parallel play, and would often choose to lay screen time aside in favor of playing with another person (see Arnott, 2016). Children almost exclusively selected content designed for children, whether high or low quality. But while we found these strong, universal trends at the individual level, we also found that the world of content from which children could actually choose was dependent on their family structure, their parents attitudes toward screens, and the presence or lack of near-age older siblings. Also, devices and app ecosystems available to young children were entirely dependent on forces outside of the child's direct control. Some families lacked disposable income to spend on child-specific devices; others had strong, anti-screen beliefs and chose to withhold dedicated devices from their children. These family-level choices afforded or constrained whatever young children could choose to consume. We also found important implications for children's media selection made on the community, society, and industrial level, addressed in the following chapter. Through all of these interconnected spheres of influence around the individual child, we found two distinct patterns, according to whether or not the child belonged to one of our working class, Spanish-speaking, immigrant neighborhoods. Taken together, our findings shed light on the ecologically-situated nature of children's media content selection, which should be taken in consideration when designing digital content targeting young children.

Our study is distinguished from other studies of children's media usage in the following ways: first, rather than exclusively relying on surveys or laboratory approaches, an ethnographic method enabled us to uncover how children select media over time in natural contexts. We used multiple methods, including multi-case ethnography, semi-structured interviews, surveys, and careful field observations of families and communities which allowed us to make sense of the

media selection process by corroborating evidence from multiple sources. Second, while reductive studies have tended to focus on single group of variables that influence what content children consume, our study examined an array of ecologically relevant factors and importantly, the interconnections between them (Takeuchi, 2011; Ito et al., 2013; Edwards, 2013).

Examining children's media selection through an ecological framework

We applied an ecological perspective to very young children's media use as well as children's language, development, and education across sociological strata more generally. Linebarger and Vaala (2010) developed an ecological framework to better understand language development in infants and toddlers as it relates to screen media use. Their framework posited that "a young child's language skills develop from the reciprocal transactions between the child and the broader environmental contexts in which a child is situated or operates." They concluded that media use impacts language development, and that "the nature and degree of influence is not straightforward," but rather can be better understood by examining a host of important variables and their effects in a multilayered ecological system (Linebarger & Vaala, 2010). With respect to applications of ecological systems theory to broader aspects of child development, we found the ethnography and social history work of Shirley Brice Heath to be important to the present study. While Heath (1983) was not focused on media use, her study carefully described the social ecologies of two working class communities, one populated by Whites, another by Black people, and the strikingly different ways language was learned, used, and developed between these two communities and between both of them and the nearby cosmopolitan town. Similarly, we draw from the work of Annette Lareau (2011), who studied the daily lives and trajectories of elementary schoolchildren from different social strata. Lareau's work uncovered two distinct "typologies of differences in child rearing": one of "concerted cultivation" and one of

"accomplishment of natural growth." We did not undertake the present study hypothesizing that our participants and the patterns of media selection would fall into bins described by Bryce or Lareau, but as themes began to emerge from the data it became clear that these authors' ethnographies were highly salient to our work. Our research aims to apply ecological frameworks on important aspects of child development to the domain of media selection by young children in the digital age.

Socio-technical factors influencing children's media selection

The socio-technical factors influencing children's media selection have been studied from a range of perspectives. Scholarly work has identified the intermingled algorithmic, commercial, and personal incentives that underlie how media is shown, organized, and selected by users, including children. Walzer (2019) has argued that children's media selection is tied, in part, to the algorithmic trust of content creators on YouTube. For example, technological norms, including "reward loops" and "priming" play a key role in shaping children's interaction and are often misaligned with children's developmental needs. Young children, for example, tend to believe what they see and are only beginning to understand that here are social norms and rules to follow, making them particularly vulnerable as users. Moreover, with YouTube, traditional marketing strategies have developed into what some researchers call "persuasive technology," leveraging the interactivity of the technology and matching these with psychological vulnerabilities in specific target demographics (Burroughs, 2017; Lafrance, 2018). Some observers have argued that children who lack the media literacy are more susceptible to the commercialization of YouTube than those who were more familiar with the media world.

The work of Livingstone, Kidron, and others point to the need for developmentally appropriate design that supports children in building up individual autonomy as empowered

digital citizens. Additional research has focused on ways that caregivers enact methods of meditation affecting how children experience interactive technologies (Jiow, Lim, & Lin, 2017; Livingstone & Blum-Ross, 2017; Wisniewski, Jia, Xu, Rosson & Carroll, 2015). Mediation styles are closely connected to ongoing narratives around the role of parents and other caregivers in mediating children's relationship with technology "to mitigate negative effects and provide a scaffold for more mindful use" (Abel & Grace, 2020; Schiano & Burg, 2017). What is lacking in the current research is an understanding of how these various perspectives might operate within an ecological framework. Our research aims to address this gap through a specific focus on media selection.

Content Selection at the Individual Level

In ecological systems theory, the development of the child is understood through the interplay of different ecological levels (Bronfenbrenner, 1979). Following Bronfenbrenner's work, we organized our results into different ecological spheres: (1) that of the individual child; (2) the microsystem involving the child's immediate family and other direct contacts; (3) the mesosystem, which connects the child's immediate world to larger socio-cultural-industrial systems, and finally (4) the exosystem, which includes governments, policies, and industry players that are beyond the child's immediate reach, but which still impact the child's media selection in powerful, indirect ways. Through each of these ecological levels, we also discuss the content itself, and the multidirectional effects that individual level, content, and ecological systems have on each other.

Selection of content is not solely a product of outside forces from the individual child. On the contrary, each of our 15 child participants selected content based in part on their own individual characteristics.

Off-screen interests and on-screen selection.

Commonly, off-screen interests were reflected in on-screen selections. For example, Pedro is a 3-year-old boy who lives with his parents and two teenage sisters in a mobile home park in a predominantly Spanish-speaking, working-class, immigrant neighborhood. As we drove up to Pedro's house for the first time, we were greeted by enormous tropical plants bursting through large pots along the front wall. Close beside his mother, Pedro rushed up to their large, wooden sliding gate to let us in. As the gate slid aside, we passed into a small courtyard set up like an outdoor room. The concrete ground was covered in most places by a thin mat of plastic grass. And upon the grass were hundreds of toy cars. (We counted at least 200.) There were also two car-themed playmats and a large plastic toy truck which served as both a riding toy and a container for more toy cars. I later learned that there were an additional two outdoor storage bins full of toy cars, just for Pedro. Rather than run to his tablet for screen time, Pedro first wanted to show us some of his collection, and immediately started parking cars on one of the parking lot-themed playmats while making excited coos and whispers. (Pedro could not yet talk at the time, and was diagnosed with a speech delay.)

His mother knew that we were there to observe his screen time, and gently nudged him to take out the tablet. Eventually, Pedro chose to go inside the mobile home and sit at the small kitchen table. Two researchers gathered near while his mother prepared some fruit. His mother only occasionally glanced at Pedro's screen, and only when she wanted Pedro to show us some specific content, or when Pedro asked her to. Otherwise, Pedro was free to operate the tablet on his own. He knew how to turn on the tablet and access YouTube without help. For the remainder of the visit, Pedro used the YouTube app and almost exclusively selected car videos. The style and form of these videos was always cheaply generated computer animation. Narration was either

absent or very simple. Many of the videos were clearly designed to be educational. For example, one video showed a lineup of computer animated white toy cars sliding down water slides, one by one. As each one reached the bottom, it dunked into colored liquid and emerged the same color as the liquid. Once the car emerged, a voice would simply say the name of the color, while the text for that color appeared on screen. Pedro's mother spoke only Spanish, but Pedro watched a mix of English language and Spanish language videos. He made his selection via the toast menu on YouTube while holding the screen in landscape mode, or propping it against the utensil holder on the table. Perhaps unsurprisingly, Pedro predominantly watched car videos for all our visits over the course of several months. It is noteworthy, however, that at the start of our observations, he never played any app games. After a trip to Mexico to visit his near-age cousins, however, he returned obsessed with one particular driving game. His mother reported that his cousins introduced him to the game and helped him download it, since she herself didn't know how to download apps onto the tablet. Pedro displayed what might be termed an "extremely intense interest" in cars in early childhood (DeLoache, Simcock, & Macari, 2007). However, selecting content which connected to offline interests was a typical behavior we observed in many participants.

Tech abilities and tech availability.

Abilities in operating digital media technologies varies from child to child, and this variation in ability can also help explain selection. For example, Addy is a 3-year old girl who lives with her parents and 5-year old brother in a hilly neighborhood adjacent to a major research university. The neighborhood features impeccably clean, broad, winding streets, uniform trees, and uniform houses also. Addy's house is spacious with high ceilings and many rooms on two stories, but doesn't have much of a yard. The floor is covered in plush, new carpet, and the kids

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kick off their shoes right after entering the house. We always come to visit Addy and her family at the same time of day, because it is the only time of day when the kids are permitted to watch screens. Per their strict family routine, screen time is after the kids get home from preschool (for Addy) or Kindergarten (for her brother,) and the parents get home from their academic jobs at the university. The parents explain that this is the time the kids can watch screens because they need to work on making dinner. In this case, screens function as a nanny. Addy isn't allowed to watch on a phone or tablet at home, though sometimes her parents allow it while in the car or away from home. For this family, screen time at home is always on the big screen, located across a huge living room from the kitchen while the parents are preparing dinner, and the screen content is always accessed via an Xbox. Addy has her own off-screen interests, her own tastes, and her own personality. However, her limited ability to operate the screens available to her dramatically impact her content selection. She can only make requests of her brother, who exclusively operated the smart TV via the Xbox. It seemed that Addy was unable or unwilling to do it. During one visit, Addy's brother, Chris, mentioned that he taught her how to operate the screen in the past, but she still prefers that he do it.

Researcher1: *So who turned it on? Did you turn it on?*

Chris: *Yeah.*

Researcher1: *Okay.*

Chris: *She doesn't even know how to turn it on.*

Addy: *Because the tv is . . . Chris can control it because mom and dad teach him.*

Addy: *I have one [viewer profile on Netflix] with Chris, but it doesn't show up so...*

Researcher1: *Do you want to teach Addy, Chris? Or do you want to..*

Chris: *Yeah. I already taught her.*

Researcher1: *oh you already taught her? Ok.*

We then proceeded to watch Captain Underpants on Netflix, a show that is not designed for 3 or 4-year-olds. Chris, the 5 year old selected it, and Addy defers to his ability in selecting content for the two of them to watch together. Here, we see the interplay between individual characteristics (tech ability,) the child's microsphere (her 5 year old elder brother,) and the exosphere (the industry and society which brings us Netflix via Xbox controlled big screen TVs, along with the many factors which result in the parents decisions on screen policies and screen devices in the home.)

In Addy's case, her selection of screen content was dramatically constrained when compared to Pedro's case. It's not that Addy didn't have interests that she could have explored on line and on screens; she was very interested in Pokemon. However, a combination of factors outside of Addy's individual person worked together to determine Addy's very limited agency in this area. She is the younger sibling of a near-age older brother; her parents do not allow her to use touch screens at home, which are easier to use, and instead constrain the kids to operating a smart TV via an Xbox; and Addy is limited by her parents on time and practice to operate screens herself. In addition, the pervasive cultural voice in Addy's home is the risk-focused, dominant voice of the professional class. Perhaps this group can afford to constrain screens, because there are so many other affordances of learning for children.

Screens as toys.

None of our child participants seemed to prefer screens to the exclusion of all other activities. On the contrary, many children frequently looked up from their screens to engage the researchers or family members. Some children took this a step farther, and used screens as a prop or toy during pretend play. In this way, children were able to achieve not co-viewing, but co-play with the screen serving as one of many toys.

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For example, Imelda is a 4-year-old girl who lives with her parents, three older sisters, and a visiting aunt in a small apartment in a predominantly Spanish-speaking, working class, immigrant neighborhood. The home is situated at the rear corner of a one-story apartment complex sitting on a standard sized residential plot around the corner from her Head Start site and a local elementary school. The streets are wide, straight, and sunny. Giant ficus trees provide shade on very hot summer visits. The concrete pathway leading back to Imelda's apartment is tilted and cracked in places, and the courtyard is more dry sod than grass during summertime. In the apartment, we enter into a single main room, perhaps 15 feet square, with a double bed, a loveseat, a small kitchen table, a media console with a big screen TV, and many of Imelda's toys strewn about. These toys include a few kid-sized kitchen playsets, plus a fair amount of Barbie dolls and plush toys. All of the toys are scuffed and well worn. One researcher chats with mom at the kitchen table while another starts to film Imelda. Imelda is delighted to have guests, and immediately engages us in pretend play, asking if we'd like to eat. She sets about making pretend food and serving it on toy plates. Since mom knew we were there to watch Imelda use screens, she tries to get Imelda to sit down and open up her phone. In speaking with Imelda's mother, we find that she's not particularly interested in Imelda's screen use, and views it as just another toy. Indeed, this is how we observed Imelda using screens. On one visit, Imelda used her most frequented device, her mother's phone, to play a Dora the Explorer video on YouTube. Rather than stop her pretend play to watch the video, she instead incorporated it into her pretend kitchen play, propping it up on a toy stove while continuing to play-cook. She generally would not attend to the screen, but occasionally would refer to it, and would move it around her home as she continued in the pretend narrative of cooking for her guests, and hand it to researchers as a topic of conversation. Over the course of our home visits, we visit at different

times, because Imelda's mom doesn't have any specific time established for Imelda's screen use, and since there's no Head Start program over the summer, Imelda, her mother, and sisters enjoy a lot of free time at home. During every visit, the pattern is the same: Imelda most prefers social interaction with her guests and pretend play, and the screen is folded into that type of social play.

For Imelda, her personal preference for pretend play determines the way she selects videos as background entertainment. The use of technology in social play that Imelda displayed is very close to what Arnott described in her ethnography of preschoolers playing with technology at school (2016). However, there are affordances and limitations of Imelda's ecological situation which also determine her content selection. Imelda's family is constrained on resources for devices, and does not have dedicated devices for each child. However, Imelda is rich in toys and people to play with. Her environment presents her with affordances for certain forms of play, and for her, the limited screens that she can access are only a peripheral piece to that play.

Discussion

We observed Pedro, Addy, and Imelda each select video content via internet-connected screens, but in three very different ways, and showing meaningfully different patterns of use. What can explain how an individual child chooses what to watch? What is the extent of agency on the individual level?

Taking an ecological perspective with our sample, it would seem that no video selection can be fully explained by children's agency. While we clearly see children selecting on-screen content that suits their off-screen interests as with Pedro and cars, the video app and world of content creators also play a role in this selection (Walczer, 2019). Pedro has an interest in cars, just as some children have had early intense interests in cars from before the digital era

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(DeLoache, Simcock, & Macari, 2007). The presence of YouTube is perhaps not necessary to fuel this interest in cars. However, YouTube delivers specific content on cars to Pedro, contingent on an interplay of algorithmic, commercial, and personal factors. Pedro is not offered the entire universe of car videos; on the contrary, any video we saw him watch about cars could fit into one or two narrow video genres. The algorithm learned what types of car videos Pedro is likely to consume, and content creators, incentivized to work with the algorithm to drive views, are happy to rapidly supply a steady stream of very similar content.

Some scholars have pointed out the “persuasive technology” design elements which keep kids coming back to these apps in specific patterns of use again and again (e.g., Burroughs 2017; Daniel, 2018). We certainly witnessed patterns of use in all 15 of our child participants, and all patterns included repetition of similar or identical content. However, in our data we did not observe children being exploited by manipulative app design. Perhaps part of the reason is that every child in our sample was loved and cared for by dutiful parents. Some parents had a risk-focused view of screens to the extreme, some had an opportunistic view, and most were mixed, but loving parents abided in all homes in the study, and no child was totally unsupported in their tech use. Perhaps another reason was that educational content is so widely available. In Pedro’s case, perhaps he could have gotten lost in a morass of disturbing, inappropriate car videos, but child-appropriate, educational car videos are so common, and there was always the presence of a loving adult nearby, if not immediately engaged, to intervene if some unhealthy use pattern were to emerge. In other words, scholars who examine the app platforms and extrapolate dangerous scenarios involving addicted children should contextualize these fears with ecologically valid data: toddlers are not unsupervised on screens indefinitely, and good or benign videos are far more common than unhealthy ones.

Indeed, one important finding from this study is in illuminating the ways parental mediation, along with socio-technical factors of YouTube's operation, operate and interact in an ecological framework. Each of these concepts is itself complex, but they operate together in a further complex ecological system. The case studies above on individual level predictors of content selection as well as the case studies in the next chapter throw light on this complex interplay, and allow the reader to evaluate these factors as they work together in real world contexts.

CHAPTER 4: CONTENT SELECTION IN ECOLOGICAL CONTEXT

The Microsystem: Family Mediation

In this chapter, we address ecological systems outside of the individual child which help to explain child selection of digital screen content. We begin this chapter with exploring the microsystem, and move on to meso- and macrosystems. In systems theory, the microsystem includes those persons or entities in the child's immediate circle (Bronfenbrenner, 1994, 1995). In our study, we collected rich data on immediate family relationships, as well as some data on schools and peers. We found explicit selection on the part of the parent, as well as parental everyday guidelines, to be powerful forces guiding children's selection of content. Sibling power dynamics also played a role, but only in contexts predicted by community identification: preschool aged children in our university or artist/tech professional communities who had near-age elder siblings would watch together most of the time. However siblings in our Spanish-speaking, working class, immigrant communities sometimes would guide the 3- or 4-year-olds' selection and often would not. This observation contrasts sharply with ethnographic studies of immigrant Mexican families which find co-viewing to be the norm, and which explain co-viewing by way of smaller living spaces, fewer screens, and cultural practices of using the television for family togetherness, while limiting smaller screens because they are harder to enjoy together (Katz & Gonzales, 2016; Katz 2010). We interpret these differences in light of the special context of our study: we directly observe three and four-year-old children. It's possible that parent report methods may result in a picture of more co-viewing than exists in reality, as argued by Marsh et. al., 2018, who followed up a survey study with in-home observations of six respondent families. It's also possible that due to the further proliferation of hand held screens,

more immigrant Mexican families have more screens now, and so solo viewing may be more common than it was just a few years ago when Katz and Gonzales collected data (2016).

Parent mediation: “concerted cultivation.”

Parents are situated in their larger socio-cultural spheres. If parents ascribe to a culture which focuses on the risks of screen use for young children, and believe good parenting finds ways to enrich children without screens, then children’s selection of content may be impacted (Mazmanian & Lanette, 2017; Marsh et al., 2018; Chaudron et al., 2015).

For example, Bannon and Wendy are 4 and 3-year-old siblings, living with their parents in an older, more established residential neighborhood in a large metropolitan area. Dad is an architect and mom is an actress and theatre professor. On a Saturday morning, the family is at home in their classic 1920’s house, gathered in a large, sunken living room with huge windows streaming light. I note that while extended family do not live with the nuclear family, the mother’s parents stayed for an extended visit of a few months during the period of data collection. The living room is decorated with art on the walls (some of it which the mother made), woven rugs on the floor, and large furniture pieces. In one corner is a child-sized play table covered in Magnatiles and wooden blocks. In front of the sectional couch there is a very small media table holding a 10-year-old, 23-inch flat screen TV connected to an AppleTV, a device which allows for on-demand streaming of content from a number of content providers. Wendy, the three-year-old, is selecting content through her parents while four-year-old Bannon plays with building blocks behind the sofa. Wendy voices her desires regarding screen content while a parent operates the remote. Meanwhile, the parents explain some of their perspectives on screen use and parenting to us.

Dad: *What do you want to watch? Batman?*

Wendy: *Yeah, Batman!*

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Dad: *This one?*

Bannon: *Mmm... yeah.*

Dad: *Okay.*

Dad: *[to researcher1]But it's also kind of like, um, like you know Bannon with the Tetris, even to some extent, some things on YouTube, some things on the TV, and somethings on the phone, it's kind of a way of interacting with the world that is unavoidable. And so I guess we're trying to not be too protective about it, but at the same time responsible. We're not going to just sit here and veg out...*

Mom: *Yeah, in fact, if this would have been us at home, I would've redirected, and said "no, let's go do this instead."*

Researcher1: *Mhm. like she wants to watch batman.*

Researcher1: *This is Batman?* (Referring to a Lego Batman cartoon.)

Wendy: *Uh huh*

Mom: *...Redirect and go outside and play in the garden and then when Dad's not home, like at five o'clock, I start making dinner and if they're not playing well or at all, they'll watch that before dinner.*

Bannon and Wendy's parents are concerned about screen time risks and try to value other activities in their kids' daily schedule. As a result, the kids do not have their own devices and can only rarely use their parents' phones. Instead, the kids watch on an older model TV, and need to select content through their parents. Content available on the TV screen is limited to only Lego cartoons and PBS Kids at the start of data collection, but later the family bought a subscription to Disney+, and enjoyed watching movies together. The kids do select content, but that content is restricted by forces outside of their control. The very existence of content available and socially and culturally meaningful to this family is outside of the family's control. The father mentions the puzzle game Tetris, and notes how some level of exposure and interaction with these media products in the world is "unavoidable."

For this family, content availability is impacted by different ecological levels, and influence from different levels contributes to further restriction rather than further availability of

content. For example, the family used to allow live-action nature shows (e.g., BBC Nature) in addition to Lego cartoons and PBS kids, but Bannon, the four-year-old, expressed that the intense action scenes in these shows scared him. Thus, even though Wendy, the 3-year-old, liked these shows, the parents decided that as a family they wouldn't watch them anymore. The family used to allow limited app games, but the kids' Montessori school pushes a policy of no screens at home, save for an hour of family movies on the weekend. As a result, the parents took away all app gaming from the kids and tried to restrict TV time during the week more than they had been before. For this family, influences from either the individual child level or from the community or cultural level tend to restrict content selection options for the kids, rather than open up new options.

Throughout data collection, both parents voiced vague anxieties surrounding screen use by their children, very closely in accord with Mazmanian and Lanette's findings in "Okay, One More Episode" An Ethnography of Parenting in the Digital Age (2017). Like Mazmanian and Lanette's parent participants, these parents, too, would constantly voice concerns over screen effects on their kids, and seemed to shift around their screen policies almost every time we visited them in an attempt to make a healthier environment for their kids. Through our prolonged engagement with Bannon, Wendy, and their parents, screen restrictions became tighter and off-screen opportunities (in the form of creative toys, outdoor activities, crafts, etc.) became more elaborate. The mother reported a marked improvement in her son's behavior when they became more restrictive with him. (They used to allow him time with their phones in the very early morning, before they were awake.) The main strategy for these parents seemed to be to create many elaborate, high-quality opportunities for off-screen activity. These parents live in a two-story, architecturally interesting home. They converted a small bedroom into a dedicated play

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space for their kids, which includes no digital technologies or screens whatsoever. They also have a yard and a garden, and converted an outdoor cabana into a kind of Montessori wonderland. The mother especially takes great care to give the kids highly scaffolded off-screen activities, like specific craft, cooking, and gardening projects. As the father works outside the home and the mother works part-time remotely from home, this is a real strain on parent time and energy, but, following a pattern of parenting behaviors described by Lareau (2011) as "concerted cultivation," the parents believe that providing carefully curated off-screen activities targeted to their children is necessary for their healthy growth and development, and they have the resources necessary to follow such a strategy.

Family mediation: "accomplishment of natural growth."

Kristal's family's approach to screen time stands in stark contrast to that of Bannon and Wendy's family. Kristal is a 3-year-old girl who lives in a Spanish-speaking, working class, immigrant community. She lives in a one-room, walk up apartment in a small apartment building on a major commercial/residential street. The street has some apartment buildings and some shared homes; just at the corner a Mexican family lovingly tends cages upon cages of parakeets on their front porch. Kristal shares her home with her mother, her father, and her four older siblings. Kristal is 3, while her eldest sister is 18. Her closest sibling in age is her 8 year old brother Jose. While the family does not have much space, (the one room apartment is dominated by two large bunk beds and a double bed) each of the kids has their own digital devices, except for Kristal, who uses her mom's phone. Kristal always welcomes us with a broad smile, and can't wait to show us her skill and love of screen content. For the most part she would use YouTube, but sometimes she wanted to look at family photos. She always uses her mom's phone to access her content, but sometimes in addition casts the phone screen to a TV via Google

Chromecast. Of all our child participants, Kristal is the most adept at using YouTube, despite being one of the younger participants and not yet knowing how to read.

Kristal typically navigates by using thumbnails on the toast window in YouTube. She'll tap one thumbnail to get closer to her goal, then quickly scroll through the next set of suggestions and select another thumbnail to get closer and so on. On numerous occasions, she declared to us first what she wanted to watch, and then managed to find the content on YouTube. Even though she is preliterate, she would also occasionally use the search bar and type in gibberish. She would quickly review the search results which would appear as tiny thumbnails just beneath the search bar, and try again if nothing interested her. Eventually, selections that she wanted to watch would appear and she would tap them. We noted that typing gibberish into the search bar would never turn up results representing the full universe of YouTube videos, but rather would always include at least some results related to Kristal's viewing history, evidence that the adaptive YouTube search algorithm was at work.

Kristal has had a lot of practice with YouTube. Her mother appreciates the affordances of learning from YouTube, and reports that Kristal had learned all her letters, numbers, and colors from "el fone." While her family doesn't monitor her viewing behavior closely, there's always a member of the family within arm's reach and who will give the minimal amount of help so that Kristal can continue on her way.

Kristal watches YouTube videos on the big screen TV via Chromecast that she selected on her mom's phone. She is standing/sitting near the foot of the bed. Brother is laying on the bed beside her. Mother is sitting on a chair closest to the brother. Other sisters are out on the patio.

*Kristal: *scrolling on thumbnails of phone. Looks at the video being shared on the TV above. She puts her hand on her mouth as a reaction to what she is watching.*

*Jose: *Gestures towards her.*

*Kristal: *moves phone away from him.*

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Jose: **Leans in over her shoulder to look at the phone.*

Kristal: **Looks up to the ceiling (out of frustration because she can't find a particular video.)* Kristal: **Hands phone to mother.*

Mom: **Searches through the phone and gives it back to daughter.*

Kristal: **Ends up giving mother the phone.*

Mom: **Taps on search bar and lets the daughter pick from the suggested words list.*

Mom: **Gives phone back to daughter.*

Kristal: **Selects a video and casts it to the TV.*

For Kristal, her family members serve as a way to scaffold her own selection of content. In the transcript excerpt above, we see two types of family intervention. First, Kristal's 8-year-old brother Jose briefly monitors what she is watching in response to Kristal's reaction to the content. (Kristal put her hand over her mouth.) Since the content wasn't objectionable, Jose took no further action. Second, Kristal's mother helps Kristal to select her preferred content, and gives Kristal an opportunity to complete the search on her own, before helping a second time. We note the contrasting behaviors effecting Addy's selection of content, described earlier. Addy, a member of the University community with a near-age older sibling, Chris, does not master operation of the devices available to her and will instead defer to her older brother. Factors on multiple ecological levels around Addy serve to constrain her hands-on experience with tech.

In the above exchange we see how multiple members of Kristal's family are nearby to offer support if needed, but for the most part follow a pattern of parenting and family practices in line with Lareau's "accomplishment of natural growth" (2011). Lareau described her working class and poor participant families as allowing for more unscaffolded play time. In Lareau's work, working class and poor parents had fewer resources to contribute to paid, organized activities or buying toys or equipment, but had greater resources in terms of relatives always at hand to help keep children safe or help as needed.

The Mesosystem: Preschool Policies and Public Interest Groups

In the ecological model, the mesosystem represents the connections between those groups with which the developing child has direct contact, like family, peers, schools, and local community, and those groups with which they do not, like the US Department of Education or large industries. In the present study, important players in the mesosystem connect parents with the media industry, or connect parents with national policies, like Head Start, WIC, and other social services. According to systems theory, these influences move through the family system to impact the developing child (Bronfenbrenner 1994, 1995).

Public interest groups and online reviews. In our study, we observed screen-focused public interest groups emerge in the mesosphere. Online reviews are a good example of a mesosphere-level entity, as they connect higher level forces, like screen content, to parents who review them. Influence is bi-directional. Content influences families because families choose to bring it into the home and consume it. However families also influence content creators and other media entities, by comprising an important market segment that content creators seek to understand. In this way the family-level consumer and the exogenous media companies can be connected through mesosphere level public interest groups, online groups, and consumer reviews.

The impact of such public interests groups on child selection was demonstrated with Cleo, another resident of the university community. Cleo was three-and-a-half years old when we began our visits, and lives with her mother and father in a large, two-story house in a neighborhood tract set aside for university professors. She is an only child. Cleo has a charming front yard, with carefully placed broken pottery and native California vegetation thriving in the sun. She runs to the door when we come to visit and seems to love the attention. Cleo watches

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screens only during a specific scheduled time during the day. After school or summer camp, Cleo arrives home and has an hour of “quiet time” alone in her room without any technology. After this hour, she enjoys her screen time, limited to either watching on a Roku-enabled big screen TV or using a very old iPad with only a few apps installed. Cleo loves company but it doesn’t stop her from turning on her screens right at the beginning of her daily scheduled screen time. Screen time for Cleo is a limited commodity, so perhaps this drives her to use it whether we are present with her or not. When Cleo watches the big screen, it is almost always on the Netflix app accessed via Roku, and she requires her mother’s help to operate the device and make content selections. Her mother is always present during screen time (the large living room connects directly to the open plan kitchen and dining area) and takes great care with whatever Cleo watches. For a period during our visits, Cleo’s favorite show was Netflix’ “Chip and Potato,” an animated program for kids. As we were all watching together, Cleo’s mom explained her process for vetting the show.

Parent: *...there are a bunch of people online on the site who rate these things that disapprove of the show because there are rainbows all over the school. This gives you a sense of [the parenting out there.]*

Parent: *Oh and it is also a bad show because it encourages lying because [Chip, the main character] always says that the mouse [Potato] is a stuffed animal. She keeps it a secret.*

Researcher: *So where do you get these online discussions on it?*

Parent: *So I just saw this on Common Sense Media, which is where I usually go to have an initial check on age level appropriateness.*

Researcher: *So Common Sense Media said this about this show?*

Parent: *Not Common Sense Media, but the parent reviews. But the Common Sense Media reviews themselves are fine. They give you a basic sense of what it’s about. Um, sometimes the parent reviews are helpful, sometimes they’re wackadoodles.*

Cleo's mom took great care in reviewing all of the shows Cleo watches through Common Sense Media, a policy group which bridges parents (in children's immediate family level ecology) and content creators (on an external level from the family.) This example also raises another entity that powerfully shapes children's affordances for selection: reviews. While the official Common Sense Media review is positive and makes no mention of politicized social themes in the show, there are a few negative reviews from parents on the site which complain about the show promoting lying or homosexuality (Ashby, 2019). While preliterate children have no direct connection to online reviews, these reviews may determine what a child can and cannot access, particularly in screen risk-focused middle-class homes. If a family holds conservative Christian views, then reviews like this may result in a prohibition of this content across the entire community (Seiter, 1999). We note that influence can also move from the child out through to the exosystem, though indirectly, in the form of parent reviews. Our participant parents would sometimes make reviews and recommendations on children's media informed by how their own children respond to the content. In this way, content creators are exposed to information about how children receive their product, which in turn may serve to direct the creation of future episodes.

Preschools and screen policies at home. One important social outgrowth of Bronfenbrenner's Ecological Systems Theory was the creation of Head Start. Head Start was designed specifically to address the needs of the developing child on many interconnected societal levels. We found Head Start, other preschool systems, and social services to impact children's content selection through leveraging parent opinion and behavior. Several of our participants from our Spanish-speaking, working-class, immigrant communities attended Head Start. One of these Head Start sites propagated a cautious stance on screens to the community of

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enrolled families as recommended from their parent Head Start program. In accordance with typical Head Start practices, this view was disseminated among enrolled families via parent-teacher conversations and parent education nights. This stance reflects not the local community of Head Start families, but the dominant social and professional (risk-focused) voices in the early childhood education space. In our interviews with teachers at the local Head Start site, we found more balanced to opportunistic stances toward screen use at home, consistent with the families themselves. But even in voicing personal, more balanced opinions on screen use among preschoolers, teachers were careful to also acknowledge the risk-focused stance taken by the larger Head Start organization.

The cautious Head Start stance on screen time was not the most cautious in our sample. A Montessori preschool served members of our participants who live in technology and artist oriented communities in a major metropolitan area. This small, one site, two classroom Montessori preschool had a very strict no screen policy, whereby not only children, but entire families were forbidden from using screens at home. Only one hour of screen time per week was allowed, and that screen time must be a movie and watched together as a family. None of our participants followed the guideline to the letter, but for Bannon and Wendy's parents, the policy reinforced their own risk-focused policy. These parents looked to the school to support their own screen restricting policies at home, and more holistically, their search for a healthier home environment for their kids.

A similar example of mesosystem-level entities impacting selection comes from the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), informally known as the food stamp program. Generally, in order to receive WIC benefits, the mother participating in the program must appear in person at a WIC distribution site and prove that

certain periodic educational requirements have been met. One of our participants from a Spanish-speaking, working class, immigrant neighborhood regularly received WIC benefits. One of her required educational modules was entirely devoted to the message that screens are harmful to their children, stating as fact that screens make children hyperactive and delay cognitive development. In this case, a federally funded and managed social service is taking a clear stance on screens, and this messaging can effect screen use by young children in WIC beneficiary families.

Finally, we also observed YouTube algorithms impacting screen content selection, supporting the work of Walzer (2019) referenced above. Kristal, our Spanish-speaking, heavy YouTube user, uses her mom's phone and YouTube account. Thus two people with very different interests share an account. Occasionally, Kristal sees ads that are not targeted to children, like financial services ads. When this happens Kristal sighs, says "oh man!" and will lay the phone flat on the table while dramatically staring at the ceiling. The YouTube algorithm can be thought of as an important entity in the mesosphere, connecting the media company directly to the individual child, though perhaps not with the desired result. In this case, Kristal's screen use is interrupted by an ad which is not suited to her. The ad bores her so she looks away from the screen. In contrast, when YouTube brings her an ad targeted to her, she will usually watch it, and the ads targeted at Kristen are nearly indistinguishable from the content she is actively trying to watch.

The Exosystem: Different Market Segments and Different User Experiences

The exosystem level is inhabited by links between social systems that do not directly involve the child. In our ethnography, we focused our attention directly on the child in order to gain an empathetic understanding of the meaning of screen media to these 3 and 4-year-old kids.

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However, we still should remark here on important players in the exosystem and how we observed their impact on child selection of content.

For child selection of content, the two most relevant entities in the exosphere are industry and mass media. Movements in industry and media do not involve the child, but nonetheless impact the child's ability to select content. For example, dramatic shifts in the media landscape have made touchscreens and video apps ubiquitous today, whereas only a decade ago these were rare. Touchscreens and apps have affordances for child-directed selection of content that prior technologies did not (Barr, Linebarger, & Huston, 2017; Holloway, Green, & Stevenson, 2015; Burroughs, 2017). In our study we have seen design decisions on the part of media and technology companies impact child selection, often through a socio-cultural lever whereby certain types of parents purchase and use certain devices and apps. For example, Addy, a 3-year-old girl in the University community, selects screen content indirectly via her 5 year old brother, through the Xbox interface of a smart TV. The affordances of the display and the manner of controlling it are quite different from the experience of Kristal, the heavy YouTube user who lives in a Spanish-speaking, working class, immigrant community. Addy's family is attracted to and selects the Xbox and smart TV configuration for a host of sociocultural reasons. Kristal's family has never heard of such a set up and is not interested. As a result, these two 3-year old girls will see very different displays when selecting content during their daily, after-preschool screen time, and these different displays and the different ways they are operated result in different selections being made.

The Macrosystem: attitudes of the culture dictate children's screen environments

In the ecological framework, the macrosystem is inhabited by the attitudes and ideologies of the culture. Our ethnography uncovered two broad cultures, overlapping in many domains but

still distinct. We found these two cultures to be comprised of a dominant voice and a non-dominant voice. The dominant voice is carried by the white, educated, cosmopolitan community, and makes clear proscriptions about kids, screens, and growing up “healthy.” This voice is well represented in popular media like national newspapers, best selling books, and daytime talk shows. This voice is also represented in important professional communities, like the education and health care communities. Because of its status as the dominant voice, it is represented in big policy decisions, like Head Start screen recommendations, risk-focused educational modules to receive WIC benefits, and high-visibility missives from the American Academy of Pediatrics.

The non-dominant voice in our particular sample was that of our Spanish-speaking, working class, immigrant communities. This voice is not represented in policy, health, or education decisions, and is seen as pointedly wrong and in need of correction by the dominant voice. That correction takes the form of parent meetings at Head Start sites, well child visits to the pediatrician, and barriers to social services. These two distinct voices align with Heath’s cosmopolitan vs. colloquial worlds (Heath, 1983), or with Lareau’s descriptions of “concerted cultivation” versus “accomplishment of natural growth” child rearing approaches (Lareau, 2011).

In our data, we saw strong echoes of Lareau’s work in the form of family dynamics. In one culture, children constantly negotiate. In another, children accept directives from their parents or older relatives. For example, recall Addy from the University community and Kristal from the Spanish-speaking community. In Addy’s family, screen time is a tightly controlled commodity, only available during a specific scheduled part of the day, and withheld as punishment. The parents do not watch with their children, but are aware of everything children could be watching, and the universe of video options is tightly constrained both by people in the family and by the devices that parents strategically choose for their kids. In contrast, Kristal is

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not restricted in her screen time, and the universe of YouTube on an adult's phone is theoretically accessible. When her mother's phone is available, Kristal can use it. Many older family members are nearby to help if need be, but for the most part Kristal is allowed to explore and develop her skills with her available devices on her own. Addy's mother is focused on risks, and says, "*Can you pick one with less shooting?*" when Addy goes to select a movie trailer to watch featuring content from the Overwatch shooting/action video game franchise. Kristal's mother is more opportunity focused, and grateful that Kristal has mastered many preschool skills from watching YouTube. Addy is aware of her own capabilities and who to reach out to for help; at three years old she is already adept at leveraging her role in the family as the baby sister, and has been cultivated to understand her place in her social structure and how to gain leverage. She negotiates for more screen time almost daily, and we have observed long, quite complex arguments (e.g., "*you said yesterday that if I did such-and-such today.*") On the other hand Kristal is more capable at using her mother's phone than her mother in some ways. She knows her limitations but seems to understand that she is to expand her capabilities and figure things out for herself. Help is nearby if needed. If mom's phone rings, then Kristal surrenders it without argument. In this way the macrosystem, via two distinct cultural attitudes, has a powerful effect in shaping children's access to devices and content, and in turn an impact in what content they may select.

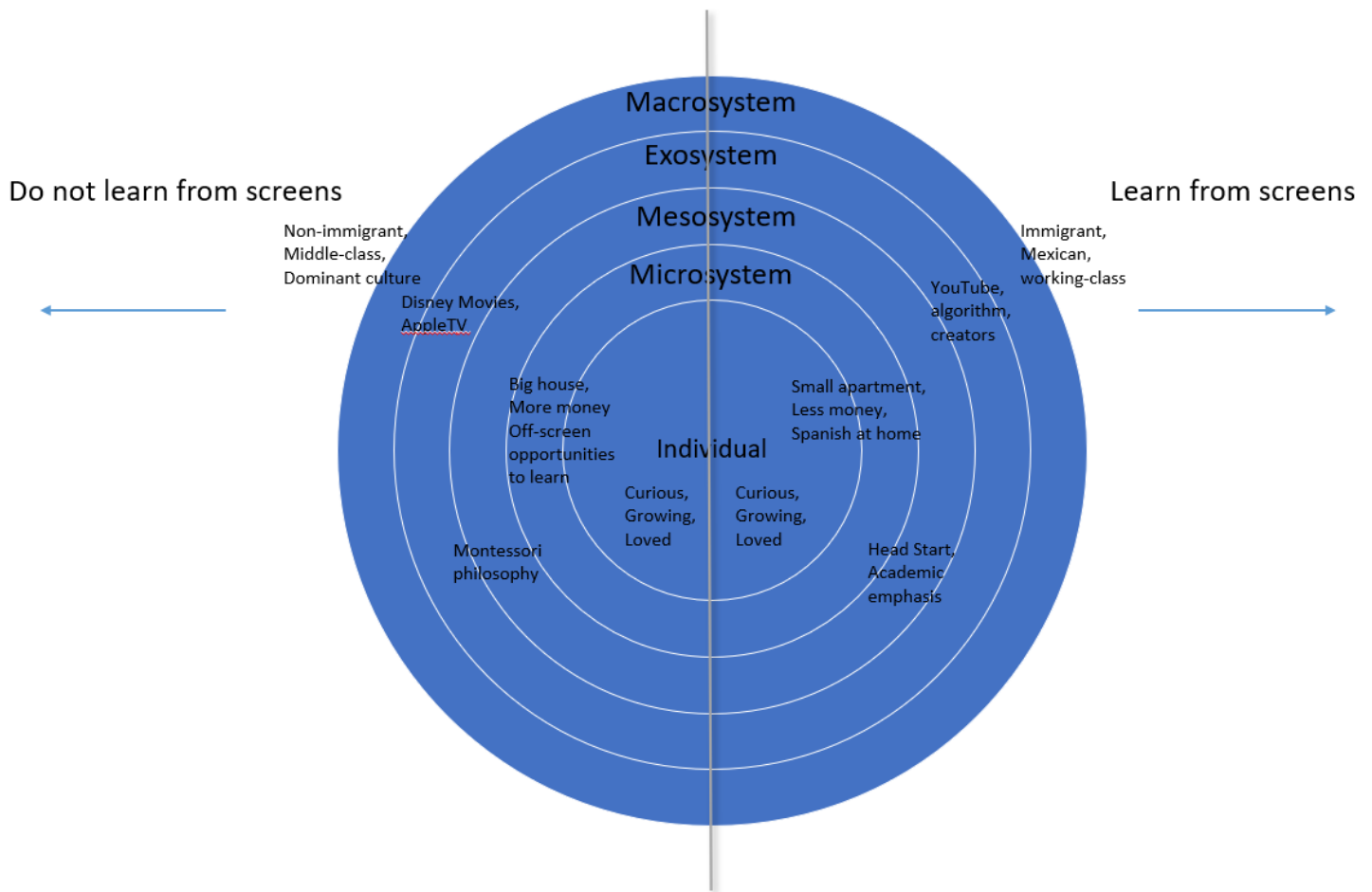


Figure 2. An adaptation of a Bronfenbrenner Ecological Systems Theory Diagram, labeled on the left with systems level factors which contribute to an outcome of not learning from screens for preschoolers, and on the right with systems level factors which contribute to an outcome of learning from screens. Factors on their respective sides group together in the data.

Discussion

The current study may be thought of as an application and test of ecologically situated theories of development in the context of children’s selection of media content. Can an ecological systems framework shed light on how and why children select the media that they do? We are unaware of any prior studies which employ multi-case ethnography examining media use in 3-4-year-olds’ daily lives. Prior studies have included fewer repeated sessions of child

observation in natural settings, and little or no direct contact with the full picture of all siblings, parents, preschools, and communities (Chaudron et al., 2015; Livingstone & Blum-Ross, 2019; Office of Communications, 2017). In our study, we attempted to recruit participants from a purposefully varied range of backgrounds. With this design, it was our hope to be able to capture a more contextualized, inter-connected picture of preschool aged children's use of media. With the year-long time span, we also hoped to observe a developmental component of selection through this age range. In this section, we discuss the interpretations of our findings and future directions.

How do children choose from the wide world of content?

Children do not select content from an infinite world of choice. Our study demonstrated how different levels of the socio-ecological system in which a child is situated greatly restrict or eliminate some choices, while thrusting others forward. The individual child does have some agency, and children select from their available choices based on their own age, stage, off-screen interests, personalities, and other individual-level factors. However, analogous to robust findings in other social science domains like heritable genetics, we find that much of the vision of limitless choice is an illusion, and factors both directly connected to and disconnected from the developing child constrain choice (Turkheimer, Haley, Waldron, d'Onofrio, & Gottesman, 2003).

Parents and siblings are closely connected to the individual child, and have a powerful impact in the ways young children select media. We found that patterns of parental and family mediation of screen content can be predicted by membership in one of perhaps two very broad social realms, one of "concerted cultivation" and another of "accomplishment of natural growth," following Annette Lareau (2011).

Forces both directly involving and disconnected from children pull children's selection choices in different directions. One such vector is in the same direction that the child would want to go according to their individual characteristics. Children recruit family members to support their interests; siblings and friends use media as common interests to inform play; YouTube algorithms suggest similar content, etc. Another vector is to pull children in new or different directions, like the culturally dominant voice in this space pulling children toward more educational content and more interactive content, and less passive or purely entertainment content. For example, on the mesosystem level, preschools tell parents to allow for less entertainment-based screen time; on the wider exosystem of media and product creators, more interactive, educational content is made available by parents' purchasing of dedicated devices or apps.

At the very center of this complex model of child selection of content is the child. The child has their own voice, their own spirit, their own way in the world. In some ways this voice finds its way up through the layers of the ecological model to inform the creation of media itself, and contribute to the massive proliferation of digital media we see today. For example, parents publish content reviews based in part on their children's response to media, and technology and media companies carry out user testing with children to attempt to make their products more competitive. According to this ecological systems model, we may see the end of uniform "mass" media and move further into the siloization and endless personalization of media.

Limitations and future work

Findings from this study suggest at two broad sociological groups, which are differentially impacted with respect to children's selection of content by the social ecology that they share. We do not mean to suggest, however, that our Spanish-speaking, working class,

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immigrant community is representative of such communities throughout the United States or even California, nor do we mean to conflate our community with those that prior ethnographers have studied (e.g., Ochoa & Reich, 2020; Katz 2010, 2014; Katz & Gonzales, 2016). Immigrant people to the United States from Latin America have important differences from working class or poor groups of White or Black Americans, participant populations of sociologists like Heath (1983) or Lareau (2011). (For an ethnographic study contrasting middle-class white and low-income Black populations' screen use, see Yardi & Bruckman, 2012). Further, the locality of this study, Southern California, has special considerations that when coupled with the Spanish-speaking immigrant demographic cannot be conflated with other low-income groups. However, we maintain that even with these well studied differences between our working-class community and other communities in similar socio-economic standing, we saw a strong pattern emerge of two different groups in our participant population. This work is meant to be richly descriptive and provide insight on the phenomena of young children selecting their own digital media content in a variety of families and communities. It is not meant to be representative.

Future steps for this research project are to investigate how screen content selection has changed among these groups and others given the pandemic shutdown of public life and resulting increase in screen use for education, entertainment, and keeping kids occupied while parents work from home.

Conclusion

While preschool-aged children conceivably face an enormous amount of choice during screen time, little is known about the factors that shape or constrain those choices for individual children. This chapter depicts an ecology of children's media content selection, which involves the interplay between the content, the child, their family, community, and societal spheres. While

devices are indeed in children's hands and children make selections mostly through their own finger tips, these choices are supported or constrained by a range of resource, culture, and policy factors specific to family and community background. As such, we propose that policy makers and technology designers are better served by an ecological perspective if they wish to understand how digital content is selected and used by children in sociocultural context.

CHAPTER 5: HOW ECOLOGICAL DIFFERENCES IMPACT LEARNING FROM SCREENS

Kids can certainly learn from screens. There is no shortage of lab studies focusing on a single show and a small number of target learning outcomes. We know young kids can learn early academic skills from Sesame Street, social-emotional skills from Mister Rogers Neighborhood, or more recently, the spinoff Daniel Striped Tiger, and form parasocial relationships with Dora the Explorer to enhance learning outcomes (e.g. Mares & Pan, 2013; Richert et. al. 2011; Thakkar et. al. 2006). In the lab, children learn from screens, especially when the knowledge tested is very close to the content appearing on screen. In addition to lab studies, some larger studies with more ecological validity have used quasi-experimental methods to test the efficacy children’s educational television (e.g., Fisch, Truglio, & Cole, 1999). But in the present effort to contextualize children’s learning via screens and digital technologies within an ecological framework (Takeuchi, 2011; Ito et al., 2013; Edwards, 2013; Arnott, 2016) the question remains *HOW*. How might children of this age range learn from screens, not in a the lab, but in the real world; not reduced to populations means and distributions, but as individuals, each set uniquely in their own family, cultural, and community ecologies? I should define here that when I say “learning” or “skills” in this chapter, I am speaking specifically of knowledge or skills that would be valued in an early education context, that is, content knowledge like numbers, letters, colors, shapes; personal skills like handwashing, tidying up; and socio-emotional skills like waiting for one’s turn or saying please and thank you.

How children learn from screens *in daily life* is a question of some social and policy importance, especially when considering YouTube. On the ground, YouTube, not content from Sesame, PBS, or Nickelodeon, dominates use among preschool aged children both when it comes to video content and screen time overall (Elias & Sulkin, 2017; see also Rideout, 2017;

Kabali et. al. 2015). To my knowledge, there are no lab studies which have focused on the efficacy of YouTube use for educational outcomes for young children. For the investigator considering such a study, how would she even choose what content to serve as stimulus? New content is published on YouTube at a rate faster than any traditional broadcaster, and new content is geared toward children more often than adults. And perhaps surprisingly, new YouTube content for children is often educational in nature. This is perhaps a reflection of the interplay of YouTube's algorithms which suggest content to users, and content creators who want clicks (Walczek, 2019; Papadamou et al., 2020; Araujo et al., 2017). Whatever the reason, the amount of available content on YouTube increases exponentially, and children may use YouTube in daily life context more than any other app (Elias & Sulkin, 2017). A hypothetical study focusing on learning outcomes from some specific YouTube videos would be missing what many scholars think should be the primary focus of investigation when it comes to children and media technologies: the interplay of different systems within and external to the child, which help to make sense of digital media use in daily life (Ito et al., 2013; Arnott, Palaiologou and Gray, 2018.) I don't want to know if a child learns if he is exposed to some specific YouTube video in the lab. I want to know what it looks like when a child uses digital screen technologies however he may, afforded or constrained in options by his own environment, and how that use might lead to learning early academic skills or not. One ecologically valid way to examine YouTube and other screen uses and educational outcomes is to use ethnographic methods, focusing on the interplay of different ecological spheres within and around the child and screen (Bronfenbrenner 1994, 1995).

Prior work. Digital technology use studies in the West are dominated by research on white, educated, middle or upper class families (Yardi & Bruckman 2012; Katz & Gonzales,

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2016). In order for research on young children and screens to be more relevant, at least for an American audience, some have argued that Mexican families should be recruited more often, as, due to demographic shifts, a greater proportion of children under 5 are now from Mexican families rather than from White families in southwestern states (Katz & Gonzales, 2016).

Families with young children are also disproportionately poor, and the wealth disparity between the poorest families and the wealthiest continues to increase in the US; thus investigators of children and technology use should pointedly study low-income families (ChildTrends, 2020).

Given the growing numbers of children in poverty, and the growing proportion of children in my region (Southwestern United States) who are Mexican or of Mexican descent, it was urgently important to me to have participant families who were both low-income and Mexican. I wanted to put findings from these families in conversation with white, middle-class families, including such families immigrated from nations other than Mexico, and such families who are not white and who may differ in meaningful ways from white families. My final participant pool (see Table 1 in Chapter 2) included working class, Spanish-speaking, immigrant families with a range of economic resources. (“Low-income” encompasses a broad range with meaningful impacts on daily life, including daily life with digital technologies.) My participant pool also included both immigrant and non-immigrant middle-class families, who spoke a primarily Chinese or English at home.

Prior work suggests that low-income families and Mexican, immigrant families may have different attitudes and uses for digital technologies versus their white, non-immigrant, middle-class counterparts (Tripp, 2011; Katz 2010, 2014; Katz & Gonzales, 2016). For one, while white, middle-class families are deeply concerned with constraining the *time* spent with screen and technology due to fears of negative outcomes like hyperactivity, online bullying, pornography,

etc. (Mazmanian & Lanette, 2017) poorer families are more concerned with dangers in their immediate communities, and spending time on screens is a way to keep children at home, and away from dangers outside the home (Livingston, 2007). While children's engagement with screens in white, middle-class families is more often seen as a singular activity, collective engagement is the norm in lower-income families, where more family members live in fewer rooms, and there may be fewer devices to go around (Clark, 2013). Collective engagement with screens and technology among these families may also be related to television viewing practices. Mexican families have been found to constrain access to more connected and personal digital devices, like smart phones and internet-connected computers, but not television, which is seen as less risky and more of a fixture for family activity (Tripp 2011). Sharing devices is certainly more prevalent in poorer families (e.g., Clark 2013, Katz, 2010, Katz & Gonzales, 2016; Yardi & Bruckman, 2012,) as are more communal decisions on tech purchases and use. For example, in families of Mexican immigrants, children who speak English and know more about digital technologies and the internet will help parents to navigate the world of device and ISP purchases (Katz 2014).

However, yet unexamined is how young children learn from screens in daily life, and how these processes may differ by socioeconomic status or immigrant status - an urgent question considering the explosion of digital screen use among very young children and the demographic shift which finds more children in poverty and from Mexican families (Lopez, Gonzalez-Barrera, & Patten (2013); Lopez & Velasco, 2011; ChildTrends, 2020). Prior ethnographic studies focusing on a single preschool aged child have illuminated certain contextualized modes of use (Harrison & McTavish, 2018; Thompson, 2016). I find these studies helpful as a prelude to my own work and in considering my findings in relation to theirs. However, in order to help fill the

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knowledge gap and develop a more complete picture on how young children might learn from screens, it was important to me to recruit from as diverse a set of families as I could within the scope of the project, and important to maintain these diverse participants within the same study, such that their experiences could be deeply observed by the same investigator and variations therein could be compared. This is the first study to address the question of learning from screens in daily life by employing ethnographic case studies with the children themselves, (rather than primarily through parents, interviews, or surveys,) by focusing on home life, and by drawing from a diverse set of participants.

Ecological Frame. Theories of socio-culturally situated learning (e.g., Ginishi and Dyson, 2009; Rogoff, 2003; Vygotsky, 1978; Wertsch, 1985) would predict that informal use of screens could be used as a tool to support learning if this use is situated in an environment that supports its beneficial use. Thus, I employ an ecological framework in interpreting data from the present study (Bronfenbrenner 1994, 1995). Specifically for this investigation, I examine variations within individual children, their families, their communities, and their society at large to explain differences in the ways these children learn from screens. Differences are striking. Analysis uncovered perhaps three bins of learning from screens, each of which is supported by similarities within and across levels of analysis for that bin. On the one extreme are children who demonstrated pathways by which they could have learned specific, early academic skills from watching primarily YouTube videos, and secondarily, recorded television programs. All of these kids were from my working-class, Spanish-speaking, immigrant families, though there is some interesting variation within this group discussed later. On the other extreme are children who really could not have learned any specific, early academic skills from watching screens, because their screen use was largely restricted to watching movies with their families, and only on

occasion. And in the middle there is much diversity, where it seems children are afforded many opportunities to learn school-readiness skills, both on screen and off. In this middle bin, we can see the role of the digital screen as just another child-appropriate toy, and like any toy, the acquisition and use of it is determined partly by the child, partly by the parent, and partly by higher levels beyond the family unit.

Screens as Opportunity and Equity

Recall Anita from the opening story in Chapter 1. Early on in my field observations, I found myself at a boisterous holiday party in a predominantly Mexican, immigrant, working-class city in the high desert, and Anita, decked out in her frilly Christmas dress, was under the dining table watching Peppa Pig yank out her father's molars on a bootleg YouTube video. Later that same evening she was watching a nonsensical, bootleg video featuring Disney characters. Surely here is a child who won't be learning academic skills from screens! Surely here is a child on the wrong side of the "digital divide," who's parents are not sufficiently vigilant of her on-screen behaviors! (On the new digital divide over use, see van Deursen & van Dijk, 2014; On disturbing videos on YouTube for kids, see Brandom, 2017; Maheshwari 2017; Subedar & Yates, 2017; Weston, 2018.) After a year of observations with Anita and her family, hanging out at their home and at the homes of relatives, and hanging out in the high desert community, it became abundantly clear that there are certain behaviors that Anita does at her grandparents house, and no where else (see Elias, Lemish, & Nimrod, 2020). Anita was three years old at the time of that Christmas gathering, and not yet in preschool. She would go to her grandparent's house pretty often, and was sometimes watched by an aunt who lived with her grandparents, but for the most part, Anita stayed at home with her mother, a homemaker. Going to the grandparents house

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wasn't terribly difficult, but at 20 minutes drive away and two other kids and a house to take care of, Anita's mother found it easier to keep her at home during the day.

Unlike at the grandparent's house, media use at home for Anita was much more regimented. Anita got to watch a block of children's television programming each day, usually in the afternoon, and *exclusively* though the big screen TV, with content streaming from a cable box DVR. (I note that for many parents, it is no longer even necessary to program the cable box DVR to record popular programs. These are now available on demand, and that is how Anita watched them.) The television programs were always either from PBS Kids or from Nick Jr., and were always educational programs. Anita would watch other screen content as well, but not *specifically* for her. For example, Anita would often watch her two school-age brothers play on an Xbox; Minecraft was the most popular game with the boys at the time. The television would also be on in the evenings, playing soccer games or Spanish-language news programs. The only screen that Anita could watch at home was the big screen TV in the main living area; she shared a room with her mom, and did not use screens in the bedroom, whether mobile or otherwise. The stark difference of screen use between her grandparents' house and her own house makes me interpret studies which collect observations of adult-child dyads with screens *in public* with some caution (e.g., Ochoa & Reich, 2020; Reed, Hirsh-Pasek, & Golinkoff, 2017). These studies come with recommendations and policy implications based on very incomplete data. The finding that phones reduce the time an adult actively talks to a child in public should not be taken to mean that language development is stunted because of screens, nor that parents nor policy makers should seek to curtail this behavior. The effect of studies like these on parents may be "vague feelings of parental inadequacy that seem to accompany a sense that one should have clearer

rules” (Mazmanian & Lanette, 2017, p. 2277). Without a full ecological picture, perhaps sweeping recommendations on parent-child screen use should be withheld.

Anita holds a special place among all cases in this multi-case ethnography: my earliest sessions with her were at the very start of my field work, and I continue to engage with the family today. Thus, while I observed her use of screens at age 3, I know that she entered pre-K a year later with literacy and numeracy abilities above her peers, and mid-way through her very first year of schooling, her teacher recommended her to a gifted program. I asked Anita’s mother how she thought Anita acquired the skills to succeed in pre-K, and Anita replied with great confidence, “she learned it all from the TV.” I probed on this issue, asking about a range of educational activities that could have happened at home. Anita’s mother was firm that she did not teach Anita how to read, and she thought Anita must have acquired those skills through television programs. She then described some of these programs in detail, like *WordWorld* and *Super Why* from PBS Kids, and described how Anita would yell out the (correct) answers to early literacy questions at the TV. Anita’s case is also special because she showed me early on the very phenomenon I hoped to see, that is, a digitod using YouTube unassisted and navigating to an inappropriate video. Thus, she served as an exemplar of the dangers of YouTube expressed by the press (e.g., Lafrance, 2017; Brandom, 2017; Maheshwari 2017; Subedar & Yates, 2017; Weston, 2018). However, she also proved to be an exemplar of children learning from screens, especially children’s television programming, and provided some context to lab studies in this area.

From a systems perspective, on the individual and family levels Anita is from a family of intelligent people (both of her older brothers have also been identified as gifted by their public schools,) and she has a curious spirit. This spirit was fostered in a way that her mother could practicably accomplish despite the time and energy costs of running a household, that is, her

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mother brought curated educational television to her on a daily basis. Cognitive ability is almost entirely predicted by genes and shared environment, not non-shared environment (e.g., Plowman & von Stumm, 2018); why do scholars of the screen debate think that screens should get a special carve-out from the most robust body of literature in all of psychological science? On the cultural level, in accord with prior research on tech and media attitudes among Mexican immigrant families, Anita's mother is less concerned with risks like cyber bullying, excessive commercialization, or exposure to inappropriate content, and leans more toward an opportunistic view, especially when it comes to academic opportunities (Katz & Gonzales, 2016). Also like Mexican families in prior studies, Anita's mother is not at all concerned with time spent with television. Television, including video on demand, cable, the DVR and the Xbox, all serve to enhance family connections and to keep the family engaged and together in the home (Mayer, 2013.) Also like many Mexican immigrant families, Anita's family uses mobile devices to connect to the extended family (Katz & Gonzalez 2016). Anita's grandparents have all their many children, in-laws, and grandchildren together on a single thread in the WhatsApp messaging app, and on a typical day there are scores of messages keeping the family together. Anita's mother posts messages there on behalf of Anita from time to time.

Anita's family was the only one in my participant pool to live in the high desert community, where the cost of living is substantially lower than the urban suburb where my other Mexican immigrant participant families lived. In this way, Anita's lifestyle seemed more "middle class" to me, despite fitting the one-earner, working-class, Spanish-speaking, immigrant family demographic. In contrast to Anita's high desert city, which is apart from Southern California urban areas, my other Mexican immigrant participant families lived in a multi-city suburban area entirely within the Southern California urban agglomeration. Rents are high, though lower than

the County average, and living spaces are small. Four participant families lived in three different cities within the urban agglomeration, close enough to one another such that the young children in these areas all enrolled in the same Head Start site at one point (though, one of the participants did not attend at that site for long.) Three of these four families lived in small apartments and one lived in a modular home park. All of the preschool-aged children had older siblings.

How toddler self-directed use of YouTube can lead to learning

Pedro and the YouTube suggestion algorithm. Pedro, the three-year-old boy who loves cars, is in one of these families. His case illustrates how a preschooler learns academic content via screens, but unlike Anita's case, not with television, and without his mother's proactive curation of content. Pedro lives in a modular home with his mother, father, and two teenage sisters. Neither his mother or father speak any English, but his sisters do. At the start of my visits, Pedro could only speak in one-word sentences, and sometimes these words were unintelligible. However, Pedro was very expressive in other ways and we got off to a great start with Pedro showing me a few hundred of his toy cars during my first visit. I discussed Pedro's case in Chapter 3, to show how children's off-screen interests predict their on-screen selections. Here, I will briefly illustrate how Pedro's self directed use of YouTube on his iPad could have resulted in learning early academic skills.

Throughout all our visits with Pedro and his mother, Pedro seemed first interested in playing with toy cars with us, and only secondarily interested in his screen time. For many of our visits, his mother had to nudge him to pick up a screen. When he did, this playtime with guests with toys flowed seamlessly into a playtime with guests with another toy: the iPad. On the iPad, Pedro naturally selected car content, and would frequently look over his shoulder at me with raised eyebrows and his lips drawn in a circle, and say, "ooo! ooo!," or later in the year, "look!

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look!” For him, our visits were a special time to spend with his guests, and he didn’t want to withdraw to a screen, he wanted to use it to entertain us with it.

Even so, eventually we were able to observe what his mother affirmed was typical screen time behavior for him: Pedro would sit on a folding chair at the kitchen table, iPad propped against a utensil holder, and browse YouTube without help. In the mean time, his mother would cook or clean in the kitchen. During the course of a year, we only ever saw Pedro on YouTube right up until near the end of our observations, when we also saw him play a driving game he picked up from his near-age older cousins while on a trip to Mexico. On YouTube, Pedro had eclectic tastes: he enjoyed simple computer animations involving cars which were clearly targeted at young children, vintage cartoons like Tom & Jerry and Loony Toons, Spanish-language music videos or simply albums without a connected video, and OmNom videos. The language used in these videos varied. For example, the vintage cartoons were mostly in Spanish or English, but sometimes in other languages we could not identify. OmNom videos were exclusively in German. (OmNom is a Russian-made intellectual property from “Cut-the-rope” fame. The little, green, circular cartoon character from the app also appears in a range of kid-targeted products, including mixed live/animated science education videos, which Pedro watched. These same videos are also available on YouTube in English or Spanish, but Pedro only watched them in German.) Thus, Pedro’s self-directed YouTube selection included both educational and non-educational content, content for children and content for a more general audience. However, his choices were dominated by the computer animated car videos, and notably, many of these were explicitly educational videos for young children.

Pedro’s car videos could be thought of in two categories. One is a robust genre on YouTube of computer animated cars crashing into walls, falling off high places, getting run over

by trains, etc. These animations are simple, with the quality in line with video game graphics from a decade ago. Many are made by recording video game play. The other is a genre of very simple computer animated educational videos, featuring cars and preschool knowledge content together. Pedro would watch these two genres during every visit (until he discovered video gaming.) He might watch a handful of these educational computer animations in a row followed by a handful of car crash animations. Both the educational and the car crash videos featured elements that attracted Pedro: cars and animation. Pedro's selection process on YouTube usually involved pulling in a menu from the right side the screen, and then scrolling through the resulting selections. As with Kristal described in Chapter 3, Pedro would use this as a search process: the first video he would select would not necessarily be the one he wanted to watch, but it could be used to bring up another set of suggestions. In this way, our participant 3 and 4-year-olds were able to use the YouTube UI as a search mechanism without being able to read.

Aided by YouTube UI and YouTube suggestion algorithms, Pedro selected and consumed many of these educational car animations. In a typical video, cars would roll down elaborate ramps, one by one, and when each car arrived at the bottom of the ramp, a number would display on the screen and a VO would be heard reading the number. ("One!" and "1" for the first car down the ramp, and so on.) Pedro watched videos of this same style and format which taught colors and letters as well, sometimes one after another. His mother didn't select these videos for him, and we never saw her intervene with his video selection. As could be expected in almost any counterfactual condition, Pedro's language ability improved through the year; this study is not suited to determine if there are any causal impacts of YouTube use on language production or any other skill. However, with Pedro we can see how self-selection of videos on YouTube can lead to a child being engaged with educational content which is fun and meaningful to him for a

prolonged period of time, perhaps sufficient time to amount to an education in these early literacy and numeracy domains.

Transmedia engagement with educational IP. We observed another pathway to educational content through child-directed screen use with three-year-old Frederik. Frederick is the youngest child in a working-class, immigrant, bilingual (Spanish and English) family. His father is Argentine, met his mother in Mexico, and they recently emigrated to the United States. Frederick has a near-age older sibling, his five year old brother Felix, whose influence dominated Frederick's screen use. During part of our field work, Frederick's maternal grandmother and a maternal aunt were visiting from Mexico and stayed with the family in a small apartment. Frederick's screen use cannot be considered without his older brother Felix. The two are inseparable, constantly interacting with one another, including when it comes to screen time. Unique in all our participant families, Frederick's family use a DVD player, and their father would rent DVD's from a public library. Frederick and Felix enjoyed this screen time much like other families would watch video on demand via other means, e.g., a cable DVR, Netflix on a Smart TV, a TV attached to a server and PC loaded with content, etc. Thus, in this case we saw strong similarities in use between an old technology (a DVD player and physical video discs) and newer technologies which supply more "on demand" video. Notably, the family *also* used Netflix. Frederick and Felix would take turns watching their favorite DVD's, with Frederick, the three-year-old, enjoying *Thomas the Tank Engine* and Felix (age five) preferring PBS' *Arthur* series. Both boys loved *PJ Masks*. The boys would also watch Netflix via the smart-TV enabled DVD player. Felix' favorite on Netflix was a French-made animated series, *Zig and Sharko*, a cartoon employing silent comedy with no speech and constant, violent slapstick. The boys' mother would often remark that she didn't like that show, but she still allowed them to watch it

on occasion. The boys would watch together, rolling around a queen mattress on the floor of the main bedroom, while their mother made them a snack and attended to other things in the house. Sometimes the mother would take this time to make Mexican empanadas, which she sold to friends and family as a side business.

One would be hard pressed to find an early educator who would designate *Zig and Sharko* as educational in any way, but much of the boys' big screen viewing time was with educational content. The boys' use of mobile devices interplayed with their large screen choices in some interesting ways. For a mobile screen, the boys shared use of their mother's iPhone. We never observed them watching their favorite TV shows on the iPhone, even though they are readily available. *Zig and Sharko*, for example, has its own YouTube channel with over 10 million subscribers. *Arthur* is available on the PBS Kids app, which the boys' mother had installed on her phone. Instead, Felix, the five year old, would select action- or puzzle- oriented app games, and Frederick would play along. One of the boys' favorite games was a side-scrolling platformer (a type action game where jumping from platform to platform is the mode of play) featuring the *PJ Masks* characters. On one particular visit we joined the family at a local Argentine restaurant and bakery, owned by a family friend. The family was joined by another Argentine family, and we all sat at three or four dinner tables pushed together, dominating the small restaurant. Frederick and his brother Felix sat with me at one end of the table. Since I had already spent many visits with the family, the boys were used to my presence and didn't expect me to entertain them. Instead, they got a hold of their mother's iPhone and started playing the PJ Masks platformer action game. They played this game off and on for over three hours while the families chatted and enjoyed a long meal. The game is an integral part of Frederick's transmedia relationship with the brand, and the touchstone product of that brand, the PJ Masks television

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show, has a highly moralizing tone and is considered educational for social emotional learning by some. For example, Common Sense Media rates the series highly for “examples of positive social behavior,” (CSM, 2020). For Fredrick, the characters and themes in PJ masks are important on many dimensions, from his relationship with his elder brother, to the occasional treat of getting to play an mobile app game while at dinner, to toys and dress-up costumes in the home, to the TV show available on Netflix. On numerous ecological levels, PJ masks entered Fredrick’s world and Fredrick encouraged more transactions with PJ Masks within and between these levels. To Fredrick, the PJ Masks character Amaya/Owlette, a super-conscientious elementary school girl, is his hero.

Off-beat YouTube style with traditional early academic content. Kristal, the tech-savvy three-year-old from one of our working class, immigrant, Spanish-speaking families, seemed to genuinely enjoy the peculiar style unique to YouTube videos for young kids. We might characterize this style as having many elements of broadcast television for kids, but with certain elements that seem not quite right, or over the top (even for a kids’ show.) Why is that person in a Pikachu costume? Why is that other person dressed as Spiderman? Why are Paw Patrol heads animated on top of people’s faces, with the people floating in mid air with a constantly changing background? It’s possible that the shoe horning of these brands and strange features into YouTube videos is done to leverage the recommendation algorithm and result in more views. It’s also possible that this same mechanism makes so many of these strange videos include early academic content (Walczer, 2019; Araujo et al., 2017). We commonly observed Kristal watching videos designed to teach vocabulary, numbers, letters, colors, and shapes. Kristal would usually attend closely to these videos and relate the on-screen content to her off-screen world of toys, other interests, and other people. While the style of these videos seemed

bizarre or cheap to us, Kristal never responded as if there is anything wrong with it. During one visit, we observed Kristal interacting with one such YouTube video while sitting in her usual spot on an adult sized office chair at the folding table in the main room:

She watches a live-action video of people making colored popsicles. The video is characterized by bright colors, constant cartoony sound effects, and exaggerated expressions. The three characters include a Filipina woman dressed in a traditional German dress, another Filipina woman dressed in a Pikachu onesie, and a person completely covered in a brown bear costume. The bear and the woman in the Pikachu onesie look around for fruit to blend while the German dress-clad Filipina cuts and blends fruit into popsicles. There is no dialogue in the entire 6-and-a-half minute video. When a popsicle emerges from the mold, the woman looks delighted and a voice-over song is heard singing, “Purple, purple, purple, purple, this is color purple” [sic]. The word “purple” also appears on screen.

At one point, characters go outside and find a bowl of avocados inside a plastic red and blue mushroom playhouse. The child intently watches with the screen held in both hands, about 10 inches from her face. During this scene, the child turns to face the researcher and says “aguacate” as the screen shows one character cut up an avocado in half. The child then angles the phone toward her mother sitting on the other side of the room, and says, “mira mama -- aguacate, por mi pa!” The mother then replies, “Si, por tu papa.”

While this video seemed strange and cheap to us, it’s clear that Kristal was intently engaged. According to criteria from Hirsh-Pasek and colleagues, YouTube in this case would have functioned as high quality educational app (Hirsh-Pasek et al., 2015). It brought educational

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content to Kristal in a way that was active, engaging, enjoyable, and socially relevant to her. By using YouTube in this way, Kristal was actively practicing English while both engaging with the app and with her family. Kristal frequently found strange videos like this to watch on YouTube, but they were frequently educational in this simple, direct way. We never heard her family members complain about the content on YouTube, or express a desire that Kristal should be using a higher quality content, more rigorously curated app instead. However, at Cleo's house in the University neighborhood, Cleo was not allowed to use YouTube, and the app was not installed on her old iPad. Instead, Cleo had access to a PBS Kids app, a Sesame app, and an e-reader, "gold standard" apps to ensure an educational experience. However, we very frequently saw these apps crash for Cleo. Aspen and Fiora, the twin girls in the Montessori preschool community also used a PBS Kids app on their Kindle Fires, and again, we frequently saw this app crash. Our data cannot suggest that one app works better than another in a representative context, but we point out that for an app to be engaging, it helps for it to work. We only ever saw YouTube work correctly.

For Anita, Pedro, Frederick, and the other kids in Spanish-speaking, working class, immigrant homes, screens were available for learning and parents did less to restrict children's pursuit of their own on-screen interests in these families versus other families in my multi-case ethnography. Recall from Chapters 3 and 4 Kristal, who loved showcasing her technological abilities with pre-literate search for specific videos on YouTube and casting her content to a big screen via Chromecast; or Imelda, who loved folding in her screen time into her real-life toy play and play with her guests. In all these cases, there was no barrier erected by the parent to restrict the simultaneous use of screens with other toys or social play. This less restrictive positioning on the part of the parents allowed the three and four-year-old children to be more expressive with

their screen choices. Other factors, like popular brands in child culture, YouTube suggestion algorithms, and the integration of long-standing kid interests (e.g., cars) with screen content, all worked together to bring children content which interested them and which also had some educational, instructional components. We spent a lot of time with parents, too, and from these families only rarely heard concerns over screen content or screen time, and we *never* heard concerns over multitasking (such as playing with screens while also playing with toys). These findings are in accord with and augment previous findings with similar populations (e.g., Marsh et al., 2015, Katz & Gonzales, 2016; Arnott, 2016). For this study, we note a stark difference in content and screen time concerns between these families and others in our participant group. A few of our middle-class families had explicit concerns over content and time, and this, along with other factors in a multi-layered ecological system, constricted kids' affordances from learning from screens.

Screens as an Indulgence

The Montessori Preschool Community. Five of my participating kids came from three families who were all part of a Montessori preschool community located in a higher-rent city within the urban agglomeration of Southern California. This city and adjacent areas are home to major production studios, big tech offices, and tech startups. Two of the three families have dads who work in tech, yet the Montessori approach to screens is extremely risk-focused. This particular Montessori preschool forbade all screens at school, limited talk about any screen based intellectual properties at school, and expected families to follow a strict no-screen use at home policy, allowing only an hour of movies watching together as a family on weekends. The orientation toward screens of this school is strikingly similar to the Montessori preschool studied by Ellen Seiter and described in her chapter, "Lay Theores if Media Effects: Power Rangers at

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Pre-school” (Seiter, 1999). While Seiter’s investigations of media lay theories mostly centered around television and movies, with some small inclusion of home computers, I observed the very same attitudes from teachers at my Montessori preschool today toward smart screens. Of note is that both for Seiter’s preschool in the 90’s and for mine today, a key role of the preschool and its teachers seemed to be the transfer of cultural capital to the children on behalf of the parents, in a manner consistent with Bourdieu. Popular screen media is seen as base by these educators, and it is their duty to instill better cultural practices and values into the children under their charge. And besides, as was true in the 90’s, children who attend Montessori preschools in the United States are from much whiter, more educated, and more affluent families versus their non-Montessori peers. They have many opportunities to learn. A foundation of the Montessori educational philosophy is in creating an environment to learn, and knowledge and skills are drawn out of the child when the child is ready. Much thought, time, and money is put into the learning environment. No wonder, then, that a Montessori educator should look down on the concept of handing a kid a phone and having them learn from it.

A methodological note: a lead research assistant on the project was also a teacher at this Montessori preschool, and recruited from this community by sharing information about the study with her administrators, fellow teachers, and school families in accordance with our IRB approved recruitment process. The research assistant was well aware of the study design and attempted to enroll families with an eye to collect as much diversity as we could within this community. Of the five children within three families recruited, two were already students at the preschool, and three more were planning to attend the next fall. This lead research assistant had built up excellent trust and rapport with these families through her care of older siblings. The level of familiarity that she had with these families allowed us to quickly build rapport in our

field work, and she herself was present for almost all home visits within this community. I should also note that my data sources include interviews with these preschool teachers.

An outdoor cabana, and other off-screen opportunities. Within this Montessori preschool community, Bannon, age four at the beginning of observations, and Wendy, age three, were able to participate. As mentioned in Chapter 3 and 4, Bannon and Wendy live in a large, old house in a nice suburb not far from the Montessori preschool site. Their mother is an artist and university instructor and their father works in a creative profession. By the time our field observations with this family began, screen use on the part of the kids was tightly restricted by the parents. They could only watch narrative kids movies and shows (e.g., Disney movies and Lego cartoons) and only on the weekend. Apart from the parents' phones and computers, there was only one working screen in the house, an old 30" TV screen hooked up to an Apple TV in the main living room. Bannon also enjoyed looking at Pinterest on his mother's phone, which his mother used as a springboard for activities they could do at home together, like crafting and cooking. Both kids loved using the family's Amazon Alexa, and the kids would constantly command Alexa to play certain songs or genres, and to increase or decrease volume.

The main living room with the TV appeared to us to be a Montessori wonderland. While the kids did attend to the TV when a movie was on, this same room also was furnished with Legos, wooden blocks, a kid-sized table for building and crafts, a shelf full of exclusively preschool books, a big fort-building kit featuring large cardboard pieces that fit together with the help of Velcro, a play kitchen, a play horse, and a large sectional couch which was employed multipurposefully in all sorts of kid play. This family is fortunate to have a big yard all around the property. Outside, there was a cabana fit for kid play, with shelves of activities and a rope swing. Bannon would often climb up a ladder to the roof of the cabana and back down again.

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After the pandemic lockdown and resulting school closures, the family also built a teepee outside, and Bannon will often take a rope hanging down from the center of the teepee and fashion himself a rope swing, and swing in it. There is a garden, and the kids plant whatever seeds they find around and carefully observe the seedlings over time. Connecting the large trees is a “ninja line,” a kind of ropes course for the kids to climb on. There is seemingly no limit to these kids’ opportunities to learn at home, *without* screens.

With the pandemic lockdown, this family has become stricter with screens and has doubled down in their efforts to build experiential learning opportunities at their house, since the kids can no longer attend the preschool. The kids have gone from weekends and movies only, to now just a single hour each weekend for movies only. The research assistant who was formerly their Montessori preschool teacher, now goes to their home as a pod teacher for two different pod groups (one at Bannon’s level, one at Wendy’s), and makes heavy use of the learning environment that the parents have set up. Screens are never used in pod instruction.

With so many opportunities to learn, why bother with YouTube? On the family level of analysis, we see this family use their talents, interests, and resources to build a Montessori-like environment in their home, including in the space where the TV lives, to support their children’s learning. These parents are encouraged and influenced to do so by the dominant cultural voice on kids and screens, a voice to which they belong and which they actively propagate. Bannon and Wendy will not be learning academic content from screens, but with educated, professional parents involved in their upbringing, learning specific content from screens is not necessary. Compare with Pedro, who was not exposed to English on a regular basis. Pedro certainly has off-screen interests and toys which enrich his learning experience and his playtime. His mother will frequently take him on walks around their neighborhood, and Pedro will excitedly point at cars

and trucks and make sounds, and later, words. But it well may be that Pedro's best chance at English language learning at home which is fun, engaging, and socially relevant to him is through YouTube.

No expectation to learn from screens. For comparison, we also had a university community family which was fairly restrictive of screens, not because they thought screen use was harmful or inappropriate for children, but because they found that screen use made their kids whine more often and generally made home life more difficult. Recall Addy from the University community, who had very low tech abilities, and would always defer to her five year old brother Kevin for help with operating screens and video selection. Addy's screen use was fairly limited: on school days, she and her brother would watch 30-45 minutes of video content while her parents prepared dinner together. The content selected was always heavily influenced by Kevin, the elder brother. Even on days when it was Addy's turn to pick, Kevin would assert his opinion and convince Addy to pick something that he wanted. During the course of our home visits, viewing selections were limited to just episodes of the Pokémon cartoon series, movie trailers for animated kids' movies, and toward the end of our observations, episodes of "Diary of a Wimpy Kid" on Netflix. The almost daily inclusion of movie trailers is unique among all our participants, and it may be because movie trailers are easily and elegantly accessible on the Xbox, which is the device the kids always used to access content. Xbox has its own video on demand interface, and it is possible to scroll through movie trailers on that interface in a way that is not possible on other viewing platforms that we've seen, like Roku or cable DVR's. But why these content options versus, say, content from PBS Kids, Sesame, or Nick Jr. as we've seen in our other participant families? It would seem that for this family and some others in the Montessori preschool and university communities, there is no *expectation that children should*

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learn from screens. And why should there be? Screen time functions in a specific way for this family, affording the parents time to prepare dinner. Thus screen time's purpose is accomplished just if the kids are distracted and quiet; they need not be educated, too. With adding on more screen time than is necessary to make dinner, the parents feel they are increasing risk for hyperactivity, whining, and "post-screen tantrums." On the community level of analysis, this is a university community family, with two parents who are academics. Addy attends a preschool in their community; the parents of most of her classmates are also academics. With so many affordances of learning, and --even better,-- with a destiny for high cognitive ability determined by genetic and shared environment factors, why bother with requiring that your children learn from cheaply made car animations on YouTube? Thus, parents in this community and of this socioeconomic strata are privileged to be able to see screens as an indulgence only. Such a privilege is not afforded to Paco's mom, who cannot speak English and thus is constrained in what she can teach Paco in English without the use of screens.

A Middle Way: Take It or Leave It

Bannon and Wendy were part of our tech- and artist-serving Montessori preschool community, and Addy was part of our university community, but other families in those two communities were not so restrictive around screens, and instead, parents and children both seemed to adopt a "take it or leave it" practice around screen use. Screens were available for children to use without so many time-of-day limitations, and were sometimes utilized when available, but often not. With respect to educational content accessed during informal screen use, this was sometimes academic but more often in "extracurricular" domains, like drawing, crafting, or legos. In each of these "middle way" families, child-directed use of screens was

social, and fit a pattern of social play with technology described in prior work (Arnott, 2016; Arnott, Palaiologou and Gray, 2018).

Education and Amazon Fire Tablet Exclusives. In the Montessori preschool community, Aspen and Fiora are twin three-year-old girls, who live with their two school-age elder sisters and parents in the same apartment complex where the preschool is housed. At the start of our home visits, Aspen and Fiora had not yet been to school, but their five year old sister was a current student at the preschool and the family knew and loved the research assistant who was also a teacher there. The father in the family works in tech, and the mother is a homemaker. Both mother and father emigrated from the Philippines, but speak only English at home. (The girls sometimes speak a little Tagalog with their grandmother, who was often there visiting when we would come by.) After winding through an enormous apartment complex occupying several city blocks, I would enter the family's apartment and was immediately surrounded by toys, sounds, multiple screens, and excited cries from the kids. This was a lively home, chock full of every manner of toy or craft or educational activity suited to each of the kids' ages. During most visits, the big screen television in the main living area was on, playing ABCmouse TV on YouTube. ABCmouse is a suite of educational apps and videos geared toward early learning. A typical video might be a catchy 2-minute animated music video about the letter "Q." There was also an animated series on Aesop's Fables. Interestingly, when asking the mother about her kids' screen time, it was revealed that she didn't consider ABCmouse playing on the big screen to be "screen time." It was just there in the background. Also, before their "tablet time," the younger girls were required to watch at least a few ABCmouse videos. The mother reasoned that she knew exactly what she was getting with the ABCmouse content, so she wanted the twin girls, not

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yet in school, to at least be guaranteed that much age-appropriate educational content before switching to more self-directed play on their own tablets.

With ABCmouse droning on in the background on the big screen, each of the girls would lounge on the large sectional sofa or on the carpet with her own screen; the three-year-old twins had their own Amazon Fire tablets. The five year old was more sophisticated and preferred an iPad, and the eldest, an advanced eight year old with the air of lieutenant mom, was texting friends on an old iPhone connected via WiFi only. The girls would often peer over at each other's screens, ask one another for help, co-play a game on the same screen, and frequently just drop their screens to play with one of the many other toys in the same area. Sometimes they would drop their screens to play with each other or with us, like when an impromptu game of hide and seek arose while one of the girl's apps froze. For these girls, "tablet time" was indeed restricted to a certain time of day, but that time was very long (from the early afternoon through dinner, and sometimes immediately before bed.) The parents also used screens as a disciplinary tool, perhaps their only disciplinary tool, and would forbid their use if the girls misbehaved. It's interesting to consider this in light of that the parents also used screens for education, and the three-year-olds were exempted from this kind of punishment. During one of our visits, the older girls were grounded from screens, so the entire visit took on a much more subdued tone, with only the little twins on their tablets, and the older girls retreating to their bedroom to do schoolwork or crafts. Perhaps for these reasons, we always saw the kids *using* their screen time.

That Aspen and Fiora had Amazon Fire Tablets in and of itself shows how ecological levels outside of the individual child can afford or constrain use, and in this case, use for educational purposes. Amazon Fire Tablets are not nearly as popular as iPads (Statcounter, 2020) but among our participant families, it seemed that the parents who bought them thought Amazon

Fire Tablets were a good way to get an inexpensive tablet for accident-prone little children, which could be more easily restricted versus an iPad. Parents in our study made use of age restrictions on these tablets such that certain content deemed not age appropriate even on the app store level is automatically blocked. For example, in another family within this Montessori preschool community, both children had Fire Tablets, but since one child was four and the other six, they could not access exactly the same content. Thus it seems that within this specific culture and orientation toward screen use, Fire Tablets may be more popular, and employing these tablets affords or constrains certain kinds of use. Aspen, for example, loved playing a Hello Kitty app which was an Amazon exclusive, not available via Google Play or the Apple App Store. This Hello Kitty app had dress up features, like the Hello Kitty apps available on other tablets, but it also had a special educational component. On the app, Aspen enjoyed playing dominoes (quantity matching) and a math game on numeral identification. While Aspen played dominoes on the Hello Kitty app, the family also had a real dominos set in the living room, and many other board games besides. In this case, having a ‘take it or leave it’ approach to screen time afforded different paths to learning the same kind of content. Numbers are on the big screen with ABCmouse, numbers are on the tablet with the Hello Kitty game, and numbers are all around in the board games available for play.

“I like to play Legos more.” Xue is a three-year-old boy in our university community. He lives with his parents, immigrants from China who work as academics, and baby brother. Chinese is spoken in the home, but everyone speaks English when I visit for my benefit. I sometimes come with a research assistant who is also part of this university community and who speaks Chinese. Xue is unique in my participant group in that he has a baby sibling, and in that dyad, *he* calls the shots when it comes to media use.

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Xue lives in a large house in a tract of professor homes. I enter his living room through a sliding glass door; the entire wall is glass and light fills the two-story living area. Peppa Pig, one of Xue's favorites, plays on a projection on the wall. Because it is so bright in the room, the projector picture is quite dim, and the volume is barely audible. For Xue, this is just background television. He barely looks at the projection during any of my visits. As with almost all of my participant families, Xue's space has screens and other toys, but unlike some other families, Xue is free to drift from toy to screen to other activity. Multitasking is allowed. Xue has a large-size iPad, and loves using a drawing app. He frequently prints these drawings himself, goes to fetch the print-out and then tapes the print to the glass wall. He also will add to these drawings with markers, in an exemplar of trans-media drawing. During our visits, however, it is clear that Xue prefers his toys to either the projector TV or his iPad, and among his toys Legos rule supreme. Upstairs, Xue uses a loft space (suitable for a home office) as his Lego play room. There is a large, low table, entirely covered with Legos. There are sacks and sacks of Lego bricks, and the walls are lined with Lego boxed sets. During one visit, there was a huge Lego pirate ship on the Lego table, and we saw the Pirate set box nearby. The father told us that he makes use of the community list serv to acquire Lego sets that other families are ready to pass on. Thus community and paternal support play a role in Xue's affordances for Lego play.

In the Lego loft area, there's another projector playing similar fare, sometimes "Bob the Builder," sometimes "Paw Patrol." Xue looks up at the projection once in a while but is much more into his Legos. When asked about it, Xue told us matter-of-factly, "I like to play Legos more. Especially I like to play Lego a lot." His skill amazes us. He is able to follow pictorial instructions to perfectly assemble Lego constructions recommended for older kids. This particular construction, the Lego Ninjago Manta Ray Bomber is 112 steps. The reader may

access the instructions at <https://www.lego.com/en-us/service/buildinginstructions/70609> to get a sense of the complexity. My research assistant tried to help Xue, but he would just say “no no no I can do it,” or “Some things I can build myself!” During our time together, the only thing he needed help with was in pulling apart the smaller Lego bricks that would get stuck together. “I need a sharp thing to pull it apart.”

I later found out from Xue’s parents that they use projectors as a way to negate a physiological risk of screens: possible detriments to vision. They did not perceive any cognitive or socio-emotional risks to screen use for Xue. Unlike some other parents in our university community pool, Xue’s parents freely let Xue multitask, including multi-tasking with screens, as when he had a TV show projecting on the wall while also drawing on the iPad. Whether downstairs or upstairs, there was always a kids show projected in the background. Projectors are hard to operate, and Xue’s parents themselves always selected what would be on the big screens, playing video content off of private servers. They were not concerned with apps on the iPad, as Xue didn’t yet know how to download apps, and he seemed satisfied during our prolonged engagement with him just drawing or taking pictures. Xue’s screen use served as alternative toys to his primary interest: Legos, and through Legos, Xue demonstrated to us his superior spatial abilities. In Xue’s case, we cannot chart a pathway from screen use to building academic skills, but we can describe a scenario where screens are freely offered along with other activities, and for Xue, Legos win, and Lego play may have helped Xue develop important early academic spatial skills.

Discussion

In this chapter, I’ve attempted to richly describe the ways that some three and four-year-olds may learn early academic skills from their screen use in daily life. These pathways vary

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considerably, with some learning primarily through traditional educational TV shows, as from PBS Kids, and others learning from cheaply made computer animations on YouTube. Other kids don't learn early academic content from screens at all; they are not afforded the kind of screen use necessary to allow this to happen, and importantly, they are afforded many other off-screen ways to learn. Not all families are concerned with "early academic skills," with some preferring that children learn through exploration, detached from early learning standards. These differences are not random, but through careful analysis of ethnographic data from prolonged engagement with all fifteen cases, differences appear to align with certain socioeconomic and cultural factors. In my sample, those children afforded the most opportunity to learn early academic skills in English are those families from immigrant, Spanish-speaking, working-class families. Children from these families certainly have many off-screen opportunities to learn, but given that Spanish is spoken at home and that academically-focused educational opportunities are not quite as robust as in my middle-class communities, these families found learning from screens to be an elegant and achievable solution. This is no small finding, as demographic shifts show proportionally more young children are from working class or poor, Spanish-speaking, immigrant families. The strategies employed by these families and by these individual children in the study could amount to a force for equity in early childhood education, and curtailing this equitable force with YouTube-restricting policy interventions aimed at families may not be advisable.

Findings suggest that participant families fit into three rough "bins" of learning from screens: there are families which see informal screen based learning as a great opportunity with low risk, there are families which see informal screen use as unnecessary for the education of their children and as an indulgence to be avoided, and then there are families who take a middle

path, where screen and off-screen activities are available to their children. Children themselves take their own positions within their ecologies in stride; how could they not? Every child in the study is loved and cared for by their families, and each one avails themselves of using technology within the bounds their environment affords them, as guided by their own tastes and personalities.

This study is ethnographic, and thus is not suited to determine causal impacts on screen practices on academic skill building, nor is it suited to report meaningful or representative frequencies. However, this study is suited to describe and interpret how children from a diverse set of families might use screens in daily life, such that the activity contributes to their learning and education. Within these bounds, this study can help to contextualize daily life screen use and thus inform questions of importance to academic and policy groups.

YouTube: a well designed learning app for kids?

Throughout this study a picture emerges of YouTube being more frequently used by some – the working class, immigrant, Spanish-speaking families – and less frequently by others. There’s also a picture emerging of how educational videos on YouTube may contribute to an education. This is a huge step. Lab studies can demonstrate educational stimuli moving the participants skill in a very narrow way, tightly aligned to the educational stimuli used, but lab studies cannot describe prolonged and adaptive use of video over time that can lead to an education. In the present study we have seen a large number of YouTube videos consumed by some kids in a natural context and we can see how long term, adaptive, and interest-driven use of YouTube could possibly contribute not only to proximal learning gains, but to the very skills needed to succeed in preschool. Pedro selected countless car videos which taught numbers, letters, and colors. His mother reported that this was a typical, daily activity for him. Over time,

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we witnessed Pedro's first words, and sure enough, he would speak aloud the target words in these videos. Kristen selected countless videos on hand washing, teeth care, waiting in line, and similar skills. She chose this content herself and seemed to genuinely enjoy it, pantomiming the behaviors along with the screen. From what we know from learning sciences, this looks like an education. Could YouTube, the subject of so many fear-based articles focusing on children accessing inappropriate or disturbing content (e.g., Lafrance, 2017; Brandom, 2017; Maheshwari 2017; Subedar & Yates, 2017; Weston, 2018), actually be a well designed learning app within certain use cases?

Of course, disturbing and inappropriate videos can be found by children on YouTube, and I have observed this on rare occasion with my participants. But educational videos likely far outnumber these disturbing and inappropriate videos posted by "pranksters" intent on tricking the YouTube filtering mechanism (Walczer, 2019; Papadamou et al., 2020). What drives the proliferation of fun, engaging, socially relevant educational content on YouTube? The development of educational videos that children want to see and engage with may result from the interplay of YouTube creators who are trying to make money off views, and the YouTube suggestion algorithm, which, perhaps inadvertently, encourages these creators to develop more short, simple, engaging, educational content (Walczer, 2019; Papadamou et al., 2020; Araujo et al., 2017). It's a curious notion that the most famously maligned app for kids may function for many as a high quality educational children's app. According to criteria from Hirsch-Pasek and colleagues, an educational app should promote active, engaged, meaningful, and socially interactive learning within the context of a learning goal. For an app to be considered educational, it need not have all of these elements, but each element should be considered when designating an app as educational (Hirsh-Pasek et al., 2015). *Within context*, I have observed

children using YouTube in such a way that supports all these “pillars of education.” Thus, in certain contexts, YouTube may indeed be considered an educational app.

Parental expectations of screen value predict child use.

But why is it that some families take advantage of YouTube as an educational app and some do not? More broadly, how is it that some families depend on screens for the early education of their children and others see screens as an indulgence, or even a vice? The answer may lie with the interplay of important variables on different levels of analysis, in particular the parent situated within their culture, their values, and their expectations over screen media. Some of my participant parents expressed positive feelings over digital screens and what their children could learn from them, a finding in accord prior studies (Marsh et al., 2015). These feelings and expectations may be important in predicting whether children get to engage with and learn from screens. “Parents’ view of the value of the task for each particular child and the extent to which they believe they should encourage their children to master various tasks” is one important component of parental belief (Eccles, 1992, p. 154), which, in this case, may be an important predictor in children’s use and learning from digital media. Parents in our working class, Spanish-speaking, immigrant families both highly valued more academically-oriented early skills, the kinds of skills taught at Head Start, and also had positive expectations regarding the affordances of technology (specifically, apps for kids on phones) for teaching and learning. On the other hand, some parents in our middle-class, non-immigrant families held totally different philosophies of early education, preferring instead that their children learn experientially with nature, high quality educational toys, or specially curated outdoor spaces. These same families had zero expectations of learning from apps, and instead viewed screens as indulgences for children at best, and the direct cause of family ills like hyperactivity or family conflict at worst.

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Most of the parents in our middle-class group however would fall into a third category of parents who think screens and apps could have educational affordances, but who also have access to many other educational toys and experiences for their children. For these parents, they generally let their child move from on-screen to off-screen activities based on child interest, and did not have particularly high expectations that their children would learn anything specific from screens. Thus, parental culture, especially the needs of education and the affordances of various educational opportunities, along with parental expectation of value from child screen use, could predict how and why young children are able to use screens for learning.

Technoference?

Reed, Hirsh-Pasek, and Golinkoff (2017) examined one application of “technoference,” pervasive interference from the presence of our digital devices, by studying how interruptions from parents’ phones impact word learning for young children in a lab setting. The study was not designed or intended as a critique of young children learning from screens, but is part of a growing body of literature which suggests we should endeavor to limit distractions from our devices, especially during parent-child time. My study provides some context to this advice. Discussion in Reed et al. suggests that parents should not have their phones at the dinner table with their three-year-old children, but in my study outside of the lab and within daily life context, I observed how a mother having her phone at a multi-family dinner allowed her two children, Frederick and Felix aged three and five, to be happy and occupied, and how their screen use during that time was part of a trans-media engagement for the boys with an educational product, *PJ Masks*. While I spent over 80 hours in the field, usually at children’s homes, and often at dinner times, I had not observed parents being interrupted by their phones while talking to their children. A typical occurrence at home involved the child engaging with a screen and drawing in

the parent, and in so doing, creating a shared experience and opportunity to learn. My study does not refute narrow findings from studies on technoference (e.g., Reed et al., 2017; Ochoa & Reich, 2020) however my study is well positioned to contextualize the phenomenon and to inform public-facing recommendations in the area of children and screen use.

Power, class, and COVID-19.

The large, powerful force driving what three and four-year-olds do and do not do on screens when it comes to learning is power, class, and culture: the middle class families don't need the screens. Their kids will be fine. The lower income families, especially if part of the non-dominant culture and if not speaking English in the home, can use some leverage points, and in this study, we've seen directly how YouTube and traditional educational television may provide that leverage. In their mission statements, institutions which serve the education of young children like Head Start or Sesame Workshop note that lower income children have more to gain from these educational interventions. A greater portion of young children live in poverty in the US compared to other developed states. Thus we see on the highest ecological level, the level of the nation, how and why lower SES families might want to leverage a free tool like YouTube, just as Head Start and Sesame are leveraged, to supplement early education in a society which, relative to other rich nations, persistently turns down the opportunity to fund early childhood.

This reticence to better fund early childhood education may change as a result of the national crisis of COVID-19. This disaster has brought the issue of daycare for the kids of working people to a higher level of visibility. I have maintained communication with my participant families after the pandemic lockdown and have also extended that communication to include their preschool administrators and teachers. While this data is still being analyzed, it would seem that the middle class families were all faced with a greater disruption to their daily

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lives versus the working class, Spanish-speaking families. For the middle class families suddenly deprived of daycare, the pandemic was a huge wake-up call that their need of daycares or preschools was only peripherally about educational philosophy and educational opportunities. The dire need is not for some specific educational philosophy, but for someone else to watch your kids so you can work. For the working class, Spanish-speaking, immigrant families, the pandemic shutdown of preschools was less of a disruption of daily life. Their preschools are all publicly funded, and will be there for them when society re-opens. They have other opportunities for childcare since there are more family members in the home and nearby to help, and each of my participant families from this group had a mother whose primary job is as homemaker. Findings from this study might predict that for this group, the “summer slide” effect of the pandemic might not be as pronounced (as compared to within-group counterfactuals) as it may be for children from the middle-class.

CHAPTER 6: CONCLUSION

Closing Thoughts

In 2018 in the midst of my graduate training and very near to the time when I was to propose a dissertation, I dropped my dissertation plan, put all my prior work on hold, and changed tack to an entirely new research program which would require execution of a new (to me) set of research methodologies. For me, it was the obvious choice. While I loved all my prior projects, including a project in differential psychology using advanced quantitative methods, and including a randomized controlled trial of a spatial training intervention of my own design, I knew I needed something more. My prior projects left too many questions unanswered. I could perform sophisticated tests of competing theories of cognitive development, but I couldn't know any of the kids who contributed to the data set used in the study. I couldn't even see the stimuli or assessments used. I didn't know where any of the schools were. How was I to interpret my findings, then? How was I to empathize with the children who contributed their own cognitive measurements to the data set? Without any contextual information, am I to make a claim on how kids' cognitive abilities are organized and differentially change over time?

The answer, of course, is yes. All such studies use de-identified data. Data sets are purposefully stripped of all context. Scholars take their findings and then sometimes make up contextualized stories to illustrate the findings and indicate potential impacts of the work. But for me, a scholar in training, that wouldn't do. I needed to enlarge my understanding of epistemology and phenomenology, and come much closer to the data generating process than a nationally representative dataset would allow.

My brother asked me why his toddler son, my nephew, preferred to watch nonsensical, bootleg Thomas the Tank Engine videos over much higher quality content, and I immediately

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saw an opportunity to address a question of high importance to children and society while also employing ethnographic methods and enriching my abilities as an investigator.

Now at the end of my field work for this study, I sense the way that ethnographic methods and ecological frameworks have improved my thinking is similar to the ways that ethnographic methods and systems thinking can improve future research on kids and technology. A similar argument was made by Ito and colleagues of the Digital Media and Learning Research Hub in “Connected learning: An agenda for research and design.” Research on digital learning should consider the complex interconnections between the different spaces that children, learning, and digital technology occupy. In chapter 1, I interpreted the contemporary history of the kids and screens debate both in academic circles and among lay theories. Academic studies on the screen time debate are dominated by quantitative studies. Many studies lack sufficient context to be interpreted with confidence. These studies bleed into lay theory discourse among parents, educators, and policy makers, and I have described the complex interplay of different ecological levels which transmit vague screen fears into the home and digital, learning, and play lives of kids.

For three and four-year-olds, there is no “screen” time. While internet connected smart screens do indeed have affordances not offered by earlier technologies, in a child’s life, a screen functions in a way that is not clearly distinguishable from a toy, a book, a lesson, a social moment, even an education. The blurring of the lines separating “screen” from “education” from “family” has only progressed during the COVID-19 pandemic lockdown and resulting necessity for social distancing. And yet, the American Academy of Pediatrics still holds to their vague, risk-focused recommendations (AAP, 2020).

This work contextualizes the use of digital screens in the daily lives of participant three and four-year-old kids. Contexts vary. Sweeping recommendations from policy groups, educational organizations, and social organizations do not make sense when offered as “one size fits all.” To restrict screen time for some of the children in this study would be to restrict their primary way to learn English before attending preschool, and would damage one way that the new “digital divide” seems to be an equitable force! It was the poorer children, not the middle-class children, who learned more academic skills from screen use. To offer a vague recommendation that parents shouldn’t have their phones on when spending ‘quality time’ with their kids would have made some important family dinners impossible in this study. And to talk of screen addiction or cyber bullying would make no sense with this population. Screen use for three and four-year-olds is highly contextualized, and the interplay of ecological factors which influence that use is highly complex. Perhaps what the kids and screens debate needs is to embrace this complexity (as many parents already have), eschew broad recommendations, and carefully look and listen before hitting the tech panic button.

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