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UNIVERSITY OF OREGON
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University of Oregon McNair Scholars Program Research Journal

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**University of Oregon
McNair Scholars Program
Research Journal**

2014

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**Abstracts by McNair Scholars
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**Body Connectivity and Mobile Technology Use:
The Role of the Body in a Digital Age**

Geo Bitgood
Psychology

Faculty Mentor: Jenifer Craig
Dance

Despite the growing presence in our daily lives of mobile screen technologies, such as smartphones and tablets, there is a clear deficiency in research regarding the somatic effects of these devices. Using a correlational analysis, this research project examines the relationship between the levels of use of these technologies and both body awareness and body dissociation as measured by the Scale of Body Connection. Given the unprecedented influx of these technologies and the limited understanding of their impact on the body-mind connection, the results of this research may provide insight into the consequences of modern mobile technology use and help lay the groundwork for additional investigations, particularly in the field of somatic therapy.

Exotic Sexuality: Examining the Effect of Exotic Dancing on Women's Sexuality

Amber P. Bryan

Women's and Gender Studies

Faculty Mentor: Lamia Karim

Anthropology

Exotic dancing has been studied widely in the fields of anthropology, sociology, psychology, and women's and gender studies. Scholars such as Bernadette Barton and Katherine Frank have argued that women become exotic dancers because they are suffering from repetition compulsion, which causes dancers to follow intimacy scripts both at work and outside of work. However, these arguments have not adequately addressed the issue of how the profession may affect the sexuality of the women working in the exotic dancing profession. My research has examined and compared the voluntary sexual encounters of women before becoming dancers to their voluntary sexual encounters after becoming dancers. Of particular interest for this study was the rarely acknowledged issue of whether working as an exotic dancer affects women's sexual interest in other women. Through ethnographic and empirical methodologies, my research has shown that working as exotic dancers may cause changes in women's sexual interest in other women and the level of sexual encounters in which the women are involved.

Personality Impressions on Twitter

Tad Falk

Psychology

Faculty Mentor: Sanjay Srivastava

Psychology

Mentor: Nicole Lawless

Psychology

This study examined the extent to which participants agree on their impressions of Twitter users based only on information presented in the user's Twitter profile. Participants ($n = 220$) evaluated a random selection of Twitter users' profile pages. Multilevel modeling techniques were used to separate perceiver and target effects in order to estimate trait level agreement. On average, participants agreed most about the degree of each user's thoroughness, intelligence, social economic status, and arrogance. Participants agreed least about the degree of each user's assertiveness, artistic interest, nervousness, and sense of humor. The findings of this study support existing literature regarding the ability of third party observers to make consistent judgments of strangers based on the limited amounts of information present on social media websites. This study also extends previous literature to Twitter, a microblogging social media platform and one of the most popular social media websites in the world.

Accessing Long-Term Memory— What Pupil Dilation Can Tell Us About Search Processes: An Exploratory Study

Marina P. Gross

Psychology

Faculty Mentor: Nash Unsworth

Psychology

Our study used a delayed free-recall task to investigate the role of pupil dilation in long-term memory. Previous studies have shown the validity of pupil dilation as a proxy for attention and effort. For the first time, this study used pupillometry to investigate encoding and retrieval processes as well as the primacy effect. Participants learned seven lists of ten words each for later recall. Using eye tracking, we analyzed pupil size during both learning and retrieval. Results revealed a close relationship between pupil dilation and recall behavior. When pupils were large, participants recalled words rapidly and more accurately. Furthermore, attention during encoding, indicated by pupil size, peaked with the first item and then decreased during each successive trial. These findings are consistent with primacy-gradient models. Additionally, we provide new evidence on the primacy effect. Pupil dilation for the first item on each list was much larger and followed a different pattern than any other item during encoding. Our data suggest that, in addition to rehearsal, increased attention to the first item on the list may play a role in participants' superior recall of that item.

New Pt(II) Complexes for the Investigation of Copper-Mediated Degradation in Pt-Bound RNA Click Reactions

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Chemistry

Faculty Mentor: Victoria DeRose
Chemistry, Institute of Molecular Biology

Mentor: Jonathan White

Chemistry

Small-molecule binders, such as the platinum(II) anticancer drug cisplatin, can be used to probe cellular RNA structures and functions. We focus on the functionalization of Pt complexes with azide and alkyne moieties that may allow for the subsequent purification and high-throughput sequencing of Pt-RNA adducts in the copper-catalyzed Huisgen cycloaddition reaction. Because of the reactive nature of the necessary Cu catalyst, it is speculated that Cu is facilitating observed RNA degradation in model reactions, thus lowering the efficiency and usefulness of the post-treatment click modifications. Three new Pt(II) complexes that vary in linker length from the platinum center to the copper-catalyzed click reaction site are synthesized to probe the possible influence of click-mediated Cu recruitment on cleavage of the oligonucleotide. Results highlight the need for further investigation of additional and undesired copper-mediated reactivity as well as improved yield of Pt-bound RNA click reactions.

Maintaining Compassion and Harmony: An Analysis of Three Interreligious Communities in Bali

Sunny Rae Harrison
Anthropology

Faculty mentor: Lamia Karim
Anthropology

Compassion triggers an emotional response to suffering and a desire to help. Theories of religion and compassion suggest that social barriers may perpetuate a strained relationship between Hindus and Muslims in Bali; that strained relationship may suggest a lack of compassion (Geertz, 1973 and Nussbaum, 2001). However, by examining three interreligious villages in Bali, this research explores how compassion and harmony are conceptualized and maintained differently. I conclude that the conceptualization of compassion may correlate to the existing harmonious state in each village and its related social and economic development. This research adds to the general effort to understand how interreligious societies conceptualize, foster, and maintain harmony and therefore compassion.

A Modern Migration: The Consequences of Senegalese Migration to the West

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Journalism

Faculty Mentor: Vera Keller
Honors College

The migration of Senegalese men to the West has numerous consequences for Senegalese society. Important problems arise for families that experience financial hardships in a culture that expects men to be breadwinners. Also, families face problems arising from extended parent-child separations. Moreover, as males look for more opportunities abroad, their migration creates a brain drain from Senegal. The Senegalese government has created cooperative efforts with the European Union to reduce immigration to Europe for the benefit of all countries concerned. This research explores how Senegalese migration is expressed in pop culture, particularly songs and soap operas (most translated from their original Wolof), and analyzes how the Senegalese government and the West are dealing with the mass emigration.

The Perception of Parents' Participation in Therapy for Children with Communication Disorders

Lan Marberry

Family and Human Services

Faculty Mentor: Karrie Walters

Family and Human Services

Faculty Mentor: Daniel Close

Family and Human Services

Faculty Mentor: Eileen McNutt

Speech Language Pathologist

The broad purpose of this study is to learn more about parents' perceptions and their experiences while having their children receive services and treatment therapy for communication disorders. The data for this study were obtained through direct interviews with five families with children who have received speech or language interventions from Early Childhood CARES. Our goal for this study is to help the parents find support and resources within the community to enhance their children's success both at home and in school. The implications of our findings may suggest ways to improve our understanding of how to provide interventions for children with early speech impairments or language delays while providing information to improve the awareness of parents about the specific needs of their children.

Beyond Depression: Mothers with Comorbidity Differ in Neural Response to Infants' Cry

Heidi Martinez

Psychology

Faculty Mentor: Heidemarie Laurent

Psychology

Mentor: Rosemary Bernstein

Psychology

Previous research has demonstrated that mothers with major depressive disorders show blunted striatal and prefrontal activation in response to the distress cues of their own infants. However, little research has explored these effects in mothers with comorbid anxiety disorders, which may further explain mood-disorder related parenting deficits. We hypothesized that mothers with comorbid depression/anxiety would have different neural responses to their infants' cries when compared to mothers with depression alone and to mothers with no psychiatric diagnosis. During functional neuroimaging, a group of 22 high-risk mothers listened to blocks of their own infants' cries and a control sound. Comorbid mothers showed more activation in Heschl's gyrus and insula than mothers with depression alone and less activation in the anterior cingulate gyrus and prefrontal cortex than the control group. These results support the need to identify appropriate interventions for mothers whose children are at risk for intergenerational depression and anxiety.

aPKC Induces Polarization of Numb by Disrupting Cortical Targeting Mechanisms

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Biochemistry

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Chemistry, Institute of Molecular Biology

Mentor: Matthew Bailey
Chemistry

The polarization of cellular components is important for the organization and maintenance of tissues during the development of multicellular organisms. A cell can asymmetrically divide along an axis of polarity to generate daughter cells with different developmental fates. *Drosophila* neuroblasts, the neural stem cells of the developing fruit fly, establish an apicalbasal polarity during the onset of mitosis and asymmetrically divide to segregate cell fate determinants into specific daughter cells. However, much is unknown about the processes the neuroblast undergoes to establish the polarity of these cell fate determinants. Polarity is established by the kinase activity of one of the apically polarized components: atypical protein kinase C (aPKC). Numb is a substrate of aPKC, and sitespecific phosphorylation of Numb is necessary for its basal polarization. We have shown that aPKC phosphorylation disrupts cortical targeting for Numb in cultured cells. Using phosphor-dead and phosphomimetic mutants of Numb, we investigate the mechanisms for specific aPKC phosphosites in regulating Numb localization. We predict that our findings will have implications for the mechanisms behind kinasedependent cell polarity.

Using Mice as Models to Investigate Neuronal Response in the Thalamic Lateral Geniculate Nucleus

Eric Goytia Nummedal

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Mentor: Wayne Tschetter

Institute of Neuroscience

My research investigates response properties of neurons in the thalamic Lateral Geniculate Nucleus (LGN), a midbrain structure that relays visual information from the retina to visual cortex. Measurements rely on extracellular recordings in awake mice that are head-fixed but free to run on a floating ball. That technique permits simultaneous cellular recording and monitoring of each animal's running speed as it views visual stimuli designed to probe cellular response properties such as preference for a bar of light at a specific orientation (orientation), or movement in a particular direction (selectivity). Data suggest that orientation- and direction-selective cells are present in the retina and project to LGN, thus leading to the hypothesis that these features will also be conserved in LGN neurons. By allowing animals to run freely during recording, we can test the effect of a switch in behavioral state (locomotion) on visual processing in LGN. Previous research shows that this switch in behavioral state can cause cells to increase their activity in the visual cortex. We test this hypothesis in mouse LGN neurons while exploring the repertoire of visual features and how behavioral state can modulate those features.

Cetacean Hunting at the Par-Tee Site (35CLT20): Ethnographic, Artifact, and Blood Residue Analysis Investigation

Gabriel Sanchez

Anthropology

Faculty Mentor: Jon Erlandson

Anthropology, Museum of Natural and Cultural History

Mentor: Eirik Thorsgard

Tribal Historic Preservation Officer

Cultural Protection Program of

The Confederated Tribes of Grand Ronde

Anthropologists have long believed that Native Americans on the Northern Oregon Coast did not actively hunt cetaceans, but archaeological evidence suggests otherwise. My project utilizes ethnographic data, comparative artifact analysis, radiocarbon dating, and blood residue analysis to investigate whether whales may have been hunted during prehistoric times along the Northern Oregon Coast. An artifact from the Par-Tee site (35CLT20), a humpback whale (*Megaptera novaeangliae*) phalange with an embedded bone harpoon point, provides evidence of whale hunting. The dimensions of the embedded harpoon point were determined using computed tomography (CT) scanning to complete the comparative analysis. Based on comparative analysis, three harpoon typologies were selected for blood residue analysis. Blood residue analysis confirmed the use of the leister harpoon for trout, salmon, and steelhead fishing. In addition, this project will provide a time marker for active or opportunistic whale hunting within Oregon using C14 dating.

Exploring the Basis for Sequence-specific RNA Binding by Pentatricopeptide Repeat Proteins

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Faculty Mentor: Alice Barkan

Biology, Institute of Molecular Biology

Pentatricopeptide repeat (PPR) proteins are sequence-specific, RNA-binding proteins that help regulate the gene expression in both mitochondria and chloroplasts. These proteins are often defined by their tandem arrays of degenerate 35-amino-acids, repeating units that bind and mediate organelle transcript processing and stability. Despite our current understanding of PPR proteins, much remains to be learned about the mechanism by which these proteins function and bind to their targets. This paper describes PPR102, a pentatricopeptide protein in maize, with the hope of shedding more light on binding mechanisms. Using a ribosomal profiling assay, it is possible to quantify the abundance of ribosomes at every position on every chloroplast open reading frame (ORF). Because the hypothesis is that each PPR protein aids in the translation of several chloroplast RNAs, any differences between the ribosome footprint of the mutant containing a null-ppr102 allele and the footprint of a wild-type allele will provide information about possible binding sites for PPR102. An in vivo PPR-footprint assay may also help to determine potential PPR102 targets.

Characterizing the Neuromuscular Effects of Tribendimidine in the Nematode Worm *Caenorhabditis elegans*

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Biochemistry

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Biology, Institute of Neuroscience

Mentor: Kristin Robinson

Institute of Neuroscience

Parasitic nematode (roundworm) infections cause a major disease burden globally. The increase in resistance to the existing anthelmintic (anti-nematode) drugs reveals a need for new, more effective drugs. In the past 30 years, only tribendimidine, developed by the Chinese Center for Disease Control and Prevention, has entered human clinical trials, but little is known about its mechanism of action and potential resistance pathways. Studying tribendimidine by examining its effect on the pumping of the pharynx of the nematode *Caenorhabditis elegans* (*C. elegans*) may provide insights into the drug's targets and mode of action. Microfluidic devices, developed by the Lockery and Weeks laboratories at the UO, allow measurement of pharyngeal pumping frequency in electropharyngeogram (EPG) recordings. Those recordings reveal the electrical activity of both muscles and neurons of the pharynx and give distinct readouts of compounds from different drug classes. My hypothesis is that tribendimidine will show effects on EPG recordings similar to levamisole, a compound in the same drug class. Characterizing the effects of tribendimidine on EPG activity in *C. elegans* is important for validating the EPG method as a tool for developing more effective anthelmintic drugs for animal and human health.

**Post-Traumatic Sexuality:
Reclamation of Sexuality and
Eroticism After Colonization**

Naduah Wheeler

English

Faculty Mentor: Quinn Miller

English

Faculty Mentor: Gordon Sayre

English

This paper investigates the intersectionality of queer studies and Native studies by examining how historical and cultural trauma have affected Native relationships to land and time as well as how those relationships contribute to the expression and understanding of indigenous sexuality. Through a study of the poetry and quilts of Cheryl Savageau, this paper examines how Native people are able to reclaim their sexuality and empower themselves after a history of violence and colonization. By exploring the repurposing of colonial language, history, and borders characteristic of Savageau's work, this essay examines some of the literary methods Native people, particularly Native women, use to reclaim their sexuality and autonomous bodies.

Selected Papers

Personality Impressions on Twitter

Tad Falk
Psychology

Faculty Mentor: Sanjay Srivastava
Psychology

Mentor: Nicole Lawless
Psychology

The creation and increasing popularity of social media websites have changed the way people around the world interact with one another. Instead of face-to-face exchanges, people now often interact using technology-based mediums, such as social media websites. These websites provide individuals the ability to share their identities with others, whether close friends or complete strangers, without ever engaging in face-to-face interactions. This change in interaction style raises many questions regarding the kind of information people use to make judgments of others and how they do so. Having our information available to the world allows others, such as potential employers, business contacts, new friends, and even potential romantic partners, to get to know us without ever needing to meet in person. Thus, it is important to understand which types of cues people use when forming judgments and whether these judgments are consistent across various observers.

Past research on face-to-face interactions has investigated these questions quite extensively, but fewer studies have addressed the issues in the social media environment. This study investigates whether a

person's Twitter (social media) profile can convey a coherent and interpretable impression to observers. The study also investigates the type of information, such as personality or physical qualities, observers of a Twitter user's profile agree about, if any.

Thin Slicing

Previous research has investigated how people can make judgments of others with limited information and the degree to which consensus is achieved for such judgments. The act of making judgments from limited information about other people has been studied through a methodology called thin slicing, which involves drawing inferences about other people based on short excerpts of social behavior (Vartanian et al., 2012). In other words, thin slices represent small windows of information taken from a larger social context. Since initial judgments of others are largely based on first impressions, thin slicing helps us understand how we arrive at such judgments and to what degree these judgments agree with other observers or with how people perceive themselves.

In a meta-analysis of thin slicing literature, Ambady and Rosenthal (1992) found that thin slices of social behavior shorter than 30 seconds were just as informative as those that were close to 5 minutes in duration. This held true across clinical and social psychology studies as well as across different forms of social contexts. The different forms of social contexts included in the study were: nonverbal, which comprised visual (depictions of the face, body, or face and body) and vocal (tone of voice); verbal, which comprised speech and transcripts; and audiovisual, which combined visual and verbal (Ambady & Rosenthal, 1992). Results from this study suggest that more information does not lead to more informative inferences, nor does the kind of context used have an impact on inferences made.

Gosling, Ko, Mannarelli, and Morris (2002) investigated the extent to which observers can use information from a person's environment to make inferences regarding what that person is like. The study was based on the idea that people leave traces of themselves in spaces they regularly inhabit. To investigate that idea, researchers had observers rate an individual's personality based on that individual's personal environment (office space or bedroom). Observer impressions were then compared to an individual's self-report and reports from that individual's friends. The results indicated that observers could consistently and accurately form impressions of another person's personality. More specifically, observers showed highest consistency and accuracy in inferring openness (i.e., having broad interests, imaginative, insightful), conscientiousness (i.e., organized, thorough, thoughtful), and extraversion (i.e., sociable, assertive, and energetic), but to a lesser degree in agreeableness (i.e., kind, sympathetic, or affectionate) (Gosling et al., 2002). These findings suggest that people do not need to meet in person to form certain personality impressions but that they can, in fact, form these impressions with as little information as observing a personal environment.

The findings of the earlier studies provide support for the notion that neither in-person nor extended periods of contact are necessary to form accurate and consistent judgments of other people. Other studies have reported similar findings using online environments. Vazire and Gosling (2004) investigated whether previous findings regarding the ability of people to form accurate judgments of others with limited amounts of information would extend online to personal websites. More specifically, they explored whether personal websites would provide information necessary for observers to make inferences regarding the creator's personality as well as the accuracy of such inferences and whether the inferences reflected the creator's ideal-self (i.e., an overly positive representation of the creator).

The authors' accuracy criteria consisted of self-reports and informant reports. By comparing impressions that observers made based on personal websites with self-report data available from the website creators and informant report data from people who knew the website creators well, the researchers found that observers formed consistent inferences about the creator of a personal website. In addition, the researchers also used self-reports from the website creators regarding their ideal-selves. After controlling for accuracy (self and informant ratings), the authors correlated the ideal-self reports with the observer reports. Vazire and Gosling (2004) found that inferences made by observers were representative of the creators' true personalities rather than their ideal selves.

Vazire and Gosling (2004) compared their findings to the previous study conducted by Gosling et al. (2002) regarding personal environments. The comparison revealed that both physical and virtual environments convey roughly the same amount of information across personality traits. Vazire and Gosling concluded that "observers can learn at least as much about someone from viewing their website as they can from the person's bedroom, office, or a thin slice of behavior" (Vazire & Gosling, 2004, p. 129). Their findings provided evidence that previous (off-line) findings can be generalized to a person's online presence.

The personal websites that Vazire and Gosling (2004) examined are flexible in their customization, meaning that a website creator had a great deal of control when making the site, just as a person would have control when decorating an office or bedroom. This factor may imply that personal websites closely represent the offline environment. However, because thin slicing research has been validated for aspects of the online environment, it is necessary for researchers to explore other settings in which generalizations may be made. As with personal websites, social media websites are a platform where people can share personal information

with others. The difference with social media websites is that they provide a less flexible environment, one in which all users have limited options for customization. On social media websites, users fill out templates that are the same for all users rather than creating an entirely unique site. This homogenous nature of social media websites provides a uniquely uniform environment to extend generalizations about thin-slice research. Using social media websites will help researchers control for environmental aspects that have been highly variable in past studies.

In an effort to incorporate the variety of findings of multiple disciplines into one source, Wilson, Gosling, & Graham (2012) performed a literature review on Facebook research. The researchers cited studies in which observers rated Facebook users' personalities based only on their profiles. The observer ratings were compared to a user's ideal-self rating as well as an accuracy criterion that consisted of a user's self-report and reports from informants who knew the user offline. The results indicated that observer ratings correlated strongly with the accuracy criterion but not with the ideal-self ratings. This result suggests that Facebook profiles convey information necessary for observers to form accurate impressions and that Facebook users are portraying their offline personality fairly well (Wilson et al., 2012). In addition to these findings, Wilson et al. (2012) also cited research that has investigated how narcissists portray themselves on Facebook. Since narcissists typically practice self-promotion offline, it would make sense for narcissists to practice self-promotion online as well. Results showed that narcissists did portray an idealized personality but that observers saw through the facade and judged the user as narcissistic (Wilson et al., 2012).

Therefore, the research to date has shown a progression of validating the notion that people can indeed make well informed impressions of other people's personalities, even with small amounts of information, whether

from face-to-face interactions or social media websites.

Current Study

The current study focused on generalizing past findings related to thin slicing research to Twitter, a microblogging service and one of the most popular social media sites in the world (Qiu, Lin, Ramsay, & Yang, 2012). Research shows that microblogs are generally used for sharing information such as daily routines, inner feelings, events, and brief conversations. What makes Twitter unique compared to other highly popular social media websites (such as Facebook) is that information is intended to be shared over a large network rather than restricted to a set group of “friends” (Qiu, Lin, Ramsay, & Yang, 2012). Twitter, like other social media websites, uses specific terminology: “tweets” are short messages users share with their subscribers; subscribers on Twitter are “followers.” Just as a person has “followers,” they also “follow” other people, companies, events, and celebrities.

Methods

Participants

Participants were recruited through the Amazon Mechanical Turk (MTurk) marketplace ($N = 131$) and the University of Oregon Human Subjects Pool (HSP; $N = 89$). Altogether, 220 participants took part in the study: 37.3% male, 62.7% female, with an age range of 18 – 69 ($M = 29.14$, $SD = 11.13$). For an individual breakdown of demographics for HSP and MTurk, refer to Tables 1, 2, and 3 below. The study was issued in the form of an electronic survey. Participants from MTurk received compensation of approximately \$4.00 per hour for their participation, and HSP participants received partial course credit.

Table 1 *Sex, Age, English as First Language, Social Economic Status*

	Sex		Mean Age	Age Range	English First Language		Mean(SD) SES ladder (scale range: 1-10)
	M	F			Yes	No	
Sona	15	74	20.3	18-47	78	12	6.37 (1.6)
MTurk	67	64	35.2	19-69	119	12	5.02 (1.7)
Total	82	138	27.75	18-69	197	24	5.7 (1.65)

Table 2 *Ethnicity (may select more than one)*

	Black	Asian	Hispanic	Native American	White	Other	Non-White %
Sona	3.3%	19%	8%	2.2%	69%	4.4%	36.9%
MTurk	5.3%	15%	2%	1%	80%	0%	23.3%
Total	8.6%	34%	10%	3.2%	149%	4.4%	60.2%

Table 3 *Twitter and Other Social Media Use*

	Twitter Usage			Other Social Media Usage		
	Mode	Median	Mean	Mode	Median	Mean
Sona	Never	Never	> 1x/Month - 1x/Month	Daily	Daily	Daily
MTurk	Never	2-3x/Month	2-3x/Month	Daily	Daily	2-3x/week

Materials

In terms of this study, “target user” refers to the Twitter users whose profiles were part of the data used for stimuli. A Twitter “profile,” which comprised pictures, a username, a short statement, recent activity, and frequency of activity, refers to the stimuli presented to independent observers (participants). The target user data was pulled from an existing data set gathered by the Department of Computer Science at the University of Oregon. Target user data was randomly selected from the original pool

and was required to meet particular parameters to be included in this study. Those parameters included having at least 20 tweets, at least 25 followers, at least 25 friends, English as the set language, and located in a North American time zone. Target user data was manually screened for organizations or group pages that consisted of more than one entity. This screening helped to ensure that the target users were real individuals and to block those who may have diluted social networks (such as celebrities and others who may have an unusually high number of followers).

The personality measure used in this study was the Big Five Inventory-10 (BFI-10; Rammstedt & John, 2007). The BFI-10 is a well-validated measure of the human personality factors of extraversion, agreeableness, conscientiousness, neuroticism, and openness. The principal advantage of using this measure is that it offers reliable measurements in much less time than other Big Five Inventory models. Questions in the survey that were part of the BFI-10 asked participants to indicate the degree to which they agreed with posed questions and, in that way, to rate the target user. These questions were answered on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree).

Participants were asked additional questions regarding the targets perceived likability, intelligence, humor, arrogance, attractiveness, materialism, age, social economic status, gender, and race. Participant demographic information was also recorded.

Procedure

Participants were recruited to the study via MTurk or the University of Oregon Human Subjects Pool. After agreeing to participate, participants received instructions and a brief overview describing the study and what it would entail. When they began the study, participants were shown a target user's Twitter profile information (see Figure 1). After participants were shown one of the stimuli, they were asked to assess the type of person they

perceived the particular Twitter user to be. This consisted of the BFI-10 and additional questions regarding personal qualities. Participants went through this process four more times (all with random sets of profiles). After participants finished assessing five stimuli, they filled out the demographic portion of the study, were thanked for their participation, and were accredited their monetary or academic credit compensation.

Figure 1 Twitter Profile Stimulus



Analytic Strategy

Analysis of the data used SPSS Mixed in a random effects ANOVA in which the variance components for observers (participants) and target users were estimated separately. All models were tested using restricted maximum likelihood estimations. This multilevel model with random effects for profile and observer allowed us to obtain estimates of variance attributable to profiles and observers. Following Shrout and Fleiss (1979) and Shrout (1993), those variance components were then used to calculate intraclass correlations (ICC), which were used as the measure of consensus. The ICCs can range from zero to one, with zero indicating no agreement and one indicating perfect agreement.

Results

The primary focus of this study was to examine the degree to which third party observers could gain a sense of Twitter users' personality characteristics. The personality characteristics included the BFI-10 measure and additional questions that served to tease apart nuances of personality the BFI-10 did not quite capture. Since it was important for observers never to have seen or reportedly know the target users who were part of this study, cases in which observers indicated knowing a particular target user were excluded from the analysis ($n = 17$)¹. The ICCs were calculated for two distinct categories: target consensus and observer effect. Target consensus refers to how much of the variability in the ratings was due to the target user profile itself (i.e., the extent to which observers agreed with each other about a particular target); observer effect refers to how much the variability of the ratings was due to the observer rating the

¹ These 17 instances represent single observations of one participant rating one target. Because all participants indicated that they knew no more than one of the targets that they rated (and each participant rated each target), removing these observations does not change the number of participants.

profile (i.e., the extent to which particular observers made idiosyncratic ratings of a target). With the exception of openness, target consensus was greater than the observer effect for all of the Big Five factors. The average degree of consensus across all Big Five factors was .22, whereas the average observer effect was .13. (Refer to Table 5 for the means of each factor.) These means were computed by transforming correlations using Fisher's *r*-to-*z* procedure before averaging the ICCs. (For the complete set of variance estimates and ICCs for all measured personality characteristics, refer to Table 4.)

Discussion

This study examined the degree to which independent observers could agree on personality judgments of Twitter users. Supporting previous research, results of this study indicate that independent observers can indeed form consistent judgments of social media users with a limited amount of information. Results of this study also provide additional findings regarding personality characteristics that have not been included in past research. Across the board, the amount of variance attributable to the targets was higher than that attributable to the observers, indicating that variance in the judgments was largely due to information provided by the profiles rather than independent observer biases. In line with past research, certain characteristics of the Big Five Inventory showed higher rates of target consensus than others. More specifically, conscientiousness showed the highest rate of target consensus followed by agreeableness and extraversion. Neuroticism showed a relatively low rate of target consensus but was still higher than observer effect, a result that is in agreement with past literature. The most distinct difference between results from past research and this study was that openness had a large observer effect and low target consensus. It is unclear why this discrepancy occurred, but its occurrence may provide an avenue for future research to investigate.

Table 4 *Variance Estimates and Consensus*

Big Five Factor	Characteristics	Variance Estimates				ICC	
		Perceiver	Target	Residual	Total	Target Consensus	Observer Effect
Extraversion	Reserved	0.10	0.17	0.75	1.02	0.17	0.10
Extraversion	Outgoing	0.08	0.16	0.56	0.80	0.19	0.11
Agreeableness	Trusting	0.07	0.17	0.53	0.77	0.22	0.08
Agreeableness	Cold	0.17	0.18	0.75	1.10	0.16	0.15
Conscientiousness	Thorough	0.10	0.26	0.55	0.91	0.28	0.11
Conscientiousness	Lazy	0.10	0.21	0.61	0.92	0.23	0.11
Openness	Imagination	0.17	0.13	0.60	0.90	0.15	0.19
Openness	Few artistic interests	0.23	0.10	0.80	1.14	0.09	0.21
Neuroticism	Nervous	0.08	0.08	0.64	0.79	0.10	0.10
Neuroticism	Relaxed	0.08	0.13	0.57	0.78	0.16	0.11
	Age	5.18	44.63	18.11	67.92	0.66	0.08
	Arrogant	0.11	0.33	0.83	1.28	0.26	0.09
	Impulsive	0.12	0.21	0.64	0.98	0.22	0.13
	Funny	0.14	0.10	0.64	0.88	0.11	0.16
	Center of attention	0.12	0.26	0.76	1.14	0.23	0.10
	Intelligent	0.13	0.25	0.52	0.89	0.28	0.14
	Assertive	0.07	0.07	0.74	0.88	0.08	0.08
	Liking	0.12	0.17	0.50	0.79	0.22	0.15
	Attractive	0.15	0.18	0.48	0.81	0.22	0.18
	Self-Esteem	0.07	0.13	0.73	0.93	0.14	0.07
	SES	0.72	0.80	1.41	2.93	0.27	0.25
	Trustworthy	0.08	0.17	0.51	0.76	0.22	0.10

Note: Variance estimates were obtained using REML estimation. Target consensus indicates the degree of agreement among multiple raters of a single profile. Observer effects indicate the amount of variance in ratings attributable to a given rater.

Table 5 Big Five Mean ICC

Factor	Mean ICC	
	Target Consensus	Observer Effect
Extraversion	0.18	0.10
Agreeableness	0.20	0.12
Conscientiousness	0.26	0.11
Openness	0.12	0.20
Neuroticism	0.13	0.10
Total	0.22	0.13

Note: Means computed by transforming correlations using Fisher's r-to-z procedure before averaging the ICCs.

The exploratory nature of this study sought to see if past literature regarding social media websites and thin slicing would also generalize to Twitter. Future research may be able to tease apart the different aspects an observer sees and uses to make judgments. In addition to the Big Five personality factors, other, more nuanced, characteristics were also examined in this study. The highest rates of target consensus were seen in perceived age of target user, intelligence, social economic status, and arrogance. Age was significantly higher than all the other characteristics but not surprisingly so as a majority of the profiles shown to observers included profile pictures. The other three characteristics that showed high target consensus, however, are quite interesting. The notion that independent observers similarly judge a Twitter user's intelligence, social economic status, and arrogance may be unsettling to some people. These results show that complete strangers can make inferences about aspects that not only define a person's personality but also reveal how people identify with themselves and others. The lowest rates of target consensus were seen in perceived assertiveness, sense of humor, and target user self-

esteem. This indicates that the target user profiles did not convey enough information for independent observers to come to a consensus on these characteristics.

The results of this study show that thin slicing research (the ability of an observer to make reliable judgments from small pieces of information) is generalizable to Twitter. Just as previous studies of other social media have found, Twitter provides enough information for an independent observer to gain a sense of what a particular user is like. The observer does not need to meet the Twitter user in person or even witness that person's body language. These findings imply that a Twitter user profile alone conveys a distinct impression to potential employers, business contacts, new friends and even potential romantic partners. In addition to previous research, this study also extends the literature by introducing personal qualities, other than the Big Five, for which independent observers can form coherent impressions. The next step in this research will be to tease apart aspects of Twitter that convey useful information to observers. This could be done by looking at Twitter users' social networks (friends and followers) to explore whether the people surrounding the users are genuinely indicative of who the users are and what they are like.

References

- Ambady, N., & Rosenthal, R. (1992). Thin slices of expressive behavior as predictors of interpersonal consequences: A meta-analysis. *Psychological Bulletin*, 111(2), 256–274. doi:10.1037/0033-2909.111.2.256
- Gosling, S. D., Ko, S. J., Mannarelli, T., & Morris, M. E. (2002). A room with a cue: Personality judgments based on offices and bedrooms. *Journal of Personality and Social Psychology*, 82(3), 379–398. doi:10.1037/0022-3514.82.3.379
- Qiu, L., Lin, H., Ramsay, J., & Yang, F. (2012). You are what you tweet: Personality expression and perception on Twitter. *Journal of Research in Personality*, 46(6), 710–718. doi:10.1016/j.jrp.2012.08.008
- Rammstedt, B., & John, O. P. (2007). Measuring personality in one minute or less: A 10-item short version of the Big Five Inventory in English and German. *Journal of Research in Personality*, 41(1), 203–212. doi:10.1016/j.jrp.2006.02.001
- Shrout, P. (1993). Analyzing consensus in personality judgments: A variance components approach. *Journal of Personality*, 61(4), 769–788.
- Shrout, P., & Fleiss, J. (1979). Intraclass correlations: Uses in assessing rater reliability. *Psychological Bulletin*, 86(2), 420–428.
- Vazire, S., & Gosling, S. D. (2004). e-Perceptions: Personality Impressions Based on Personal Websites. *Journal of Personality and Social Psychology*, 87(1), 123–132. doi:10.1037/0022-3514.87.1.123
- Vartanian, O., Stewart, K., Mandel, D. R., Pavlovic, N., McLellan, L., & Taylor, P. J. (2012). Personality assessment and behavioral prediction at first impression. *Personality and Individual Differences*, 52(3), 250–254. doi:10.1016/j.paid.2011.05.024
- Wilson, R. E., Gosling, S. D., & Graham, L. T. (2012). A review of facebook research in the social sciences. *Perspectives on Psychological Science* 7(3), 203–220. doi: 10.1177/1745691612442904

Accessing Long-Term Memory – What Pupil Dilation Can Tell Us About Search Processes: An Exploratory Study

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Memory research has been conducted for more than a century and has led to a general understanding of how memory functions. In 1890, James suggested a two-component memory system consisting of primary (PM) and secondary memory (SM) systems. He theorized that PM holds all the items of which we are consciously aware, while SM holds all remaining memories. Baddeley and Hitch (1974) expanded James's idea by proposing a multi-component working memory system that regulates the various memory storage systems. Cowan's focused attention model (1995) then suggested that all information is stored in just one multi-dimensional memory system, and that the key issue is whether certain memories are currently activated (as cited in Unsworth & Engle, 2007). He suggested that our awareness of memories simply relies on focused activation of a particular memory, often referred to as working memory capacity (WMC). Much research has investigated how pupil size correlates with WMC and mental effort during both simple problem-solving as well as complex tasks. In most of these studies, researchers reported mean differences in pupil size. Although this is a necessary start, it does not allow for detailed understanding of how search processes work. Our research is interested in providing more detailed insight into the levels of activation in relation to

pupil behavior by investigating pupil dilation during the learning and later retrieval processes. This will be the first study to investigate step-by-step pupil dilation during the recall process.

A large body of evidence has shown that pupil size is a reliable indicator of arousal state, overall attention levels, and mental effort. (For a comprehensive review of the pupillary system, see Beatty & Lucero-Wagoner, 2000.) In 1964, Hess and Polt showed that pupil size is strongly related to task difficulty. Their research focused on asking participants to solve mathematical problems. The researchers measured pupil size before trials (baseline) and during recall to determine the mean difference between both phases. Hess and Polt found that during each trial, pupil size gradually increased while participants tried to solve each problem reaching maximum dilation just before giving an answer, a clear indicator of mental effort. They also reported an almost perfect correlation between pupil size and task difficulty; the more difficult a math problem was, the more participants' pupils dilated.

Kahneman and Beatty (1966) further explored Hess and Polt's findings by presenting evidence for the impact of memory load on pupil size. Participants showed significantly higher pupil dilation for 7-word memory trials than for 4-word trials. Participants also reported intensive rehearsal during the 2-second pause between the presentation of the last word and the initiation of the recall phase. This rehearsal was evident in maximum pupil dilation. During the presentation of to-be-learned words, pupil size gradually increased and reached maximum dilation during the short pause before recall. The pupil then gradually decreased with each reported word to slightly lower than baseline levels before eventually returning to baseline condition in time for the next trial. It therefore appears that pupil dilation is a direct measure of cognitive load and quite possibly shows the amplitude of cognitive processes during both encoding and retrieval mechanisms.

More recent studies have suggested possible control over how much effort can be exerted during a task (Heitz, Schrock, Paye, & Engle, 2008; Gilzenrat, Nieuwenhuis, Jepma, & Cohen, 2010). More specifically, Heitz et al. (2008) showed that individuals could be enticed to put forth more effort and work harder at a task when given feedback and a monetary incentive. They reported a higher performance in the feedback and reward condition than in the control condition. The researchers showed that in the control group, high-functioning WMC individuals have more control over their attention levels and thus outperform low-functioning WMCs. More importantly though, their results revealed that both high- and low-functioning WMC individuals could be enticed to put forth more effort and that both had the ability to control their attention.

As Gilzenrat et al. (2010) suggested, an individual's control over attention is important in increasing our understanding of reduced attention functioning in individuals suffering from attention deficit disorder. The researchers reiterated the findings of Heitz et al. and suggested that individuals might have more control over their attentive states than was previously assumed. In their experiment, Gilzenrat et al. gave participants an escape option: Individuals had the choice to reset task difficulty once the trials became too hard for them to solve. As with other studies, pupil diameter gradually increased with task difficulty and, interestingly, reached maximum dilation right before the participant chose the escape option. More importantly, trials immediately following the escape showed a closer-to-baseline pupil size that first increased with performance only to decrease again with an increased task difficulty. Gilzenrat et al. clearly showed how participants could willfully reset their attention level by starting fresh with a lower difficulty trial. During their experiment, participants repeated this pattern continuously. With increased numbers of trials, participants also chose to escape more often and earlier, a sign of

overall decreases in attention and task interest levels.

To our knowledge, Engle (1975) was the first to highlight this phenomenon in detail. In his experiment, Engle gave participants lists of words to remember for later recall. During the trial, the pupil size of the participants rapidly increased with the first few words and then became relatively stable. After participants received a cue to initiate recall, their pupil diameters increased again, a possible sign of intense search effort. During recall, pupil size decreased with each item recalled. This pattern was repeated in all trials but with decreasing amplitude. It appears that over time, overall attention levels decrease and never quite reach the intensity of the first trial. This might be a sign of lack of novelty as well as participants' decreased interest in the task at hand.

The phenomenon of decreasing attention levels within trials deserves more study. Many studies have demonstrated primacy and serial position effects (Rundus & Atkinson, 1970; Murdock, 1962; Deese & Kaufman, 1957), but none have done so using pupil dilation as a proxy for attention. The power of primacy effects is largely attributed to the number of rehearsals each list item receives (Rundus, 1971). Thus, early list items and especially the first item benefit greatly as participants have more time to rehearse these earlier items. Given that participants' attention levels decrease over the course of a trial (Murphy, Robertson, Balsters, & O'Connell, 2011), the probability of recall is not only a function of serial position (Murdock, 1962) but also of attention. Although the list position of an item is strongly associated with successful recall as first and last items are more likely than middle items to be recalled (Deese & Kaufman, 1957), it is worth investigating what role attention plays in this context. Because of possible fatigue or lack of interest within a trial, participants put forth less effort and attention as the trial continues. Theoretically then, later items receive less attention than earlier items and cannot be recalled

as effectively in a delayed free recall task.

Previous research has shied away from a detailed analysis of pupil size during the recall period, something that this exploratory study aims to provide. It is possible that said fluctuations were harder to detect with technology available during earlier experiments, such as Engle's (1975). With modern advances in pupillometric technology, we can measure pupillary changes with much better precision, resolution, and timeliness. If we can compare attention as reflected in pupil size fluctuations during the encoding process and the attentive states during the retrieval process, we will likely detect links not only between these two processes but also learn more about how exactly the retrieval mechanisms work. In the present study, we expect to reveal distinct pupil dilation patterns during both the learning and recall phase. Specifically, we expect the pupil to increase during the learning phase, increase before the onset of recall, and then decrease during retrieval. Furthermore, this exploratory study investigates known primacy effects. Could the likelihood of accurate recall of the first word be associated with pupil size, and with that, attention levels?

Method

Participants

For this exploratory study, we recruited 22 participants from the Human Subjects Pool and the research cohort at the University of Oregon. One participant had to be excluded because of an inability to maintain eyes on screen during the recall (typing) phase, thereby invalidating the pupil data for that session. A second participant was excluded because of a hardware failure shortly after the start of the experiment. Both of the excluded participants received class credit. The remaining sample consisted of 20 participants ($M_{Age} = 22.05$, $SD = 4.15$). Of the participants, 15 were undergraduate students who received class credit for their participation.

The remaining 5 participants were drawn from the researcher's cohort of undergraduate students who volunteered their time.

Materials

Participants received seven lists of ten words each. We randomly selected the words from the Toronto Word Pool, a collection of English words commonly used in memory research (Friendly, Franklin, Hoffman, & Rubin, 1982). The distractor task for this delayed free recall task consisted of eight randomly created three-digit numbers.

Procedures

After participants provided basic demographic information and gave informed consent, they sat with a keyboard in front of a computer monitor located in a dimly lit room. The monitor, a *Tobii T120*, integrates an eye tracker into a 17-inch computer monitor (Tobii Technology, Stockholm, Sweden). The researcher calibrated the eye tracker before starting the experiment. In this delayed free recall task, common nouns were individually presented on the screen for 3 seconds each. After each list and before recall, participants engaged in a 16-second distractor task in which they saw three-digit numbers appear for 2 seconds each. Participants were required to sort those digits in ascending order out loud. After the distractor task, recall was initiated by three question marks (???). Participants had 45 seconds to recall, in any order, as many words from the current trial as possible. Without taking their eyes off the screen, participants typed their responses, pressing the "enter" key to record each response and clear the screen. Prior to the real lists, participants completed two practice lists with letters to become familiar with the task. Each participant's score consisted of the number of items recalled correctly, independent of recall position.

While participants engaged in the delayed free-recall task, pupil diameters were recorded for both eyes at 120 Hz using the eye tracker.

Pupil data was processed and analyzed using the *Tobii Studio* software (Tobii Technology, Stockholm, Sweden). Baseline pupil diameter was assessed prior to the experiment and prior to each trial. In addition, task-evoked pupillary responses were assessed as the difference between peak pupil dilation following stimulus onset and each trial's baseline pupil diameter. The entire experiment lasted approximately 20 minutes. Afterwards, participants were properly debriefed and, depending on recruitment method, received thanks for volunteering their time or class credit.

Results

Before analyzing the data, all blinks and artifacts were removed and replaced by using a linear interpolation algorithm. On average, as Table 1 shows, participants recalled 5 out of 10 words from each list ($SD = 1.67$), or 35 of the 70 words overall ($SD = 11.72$).

Table 1. Performance Scores: Words recalled accurately

	Min	Max	Mean	SD
Average per list (out of 10)	3.00	8.43	5.00	1.67
Average overall (out of 70)	21.00	59.00	35.00	11.72

We chose the left eye for data processing. We collapsed all pupil and serial position data across all lists and ran within-subject analyses. Pupil size fluctuated greatly between participants as the descriptive pupil data show (see Table 2).

Table 2. Pupil Size (mm)

	Min	Max	Mean	SD
Baseline	2.74	4.50	3.26	0.44
Encoding Phase	2.61	4.59	3.22	0.45
Recall Phase	2.90	4.70	3.40	0.45

The within-subjects repeated analysis of variance (ANOVA) revealed that the first item was significantly more likely to be recalled first over any other item, $F(9, 171) = 32.48, p < .001, \eta^2 = .63$ (see Fig. 1).

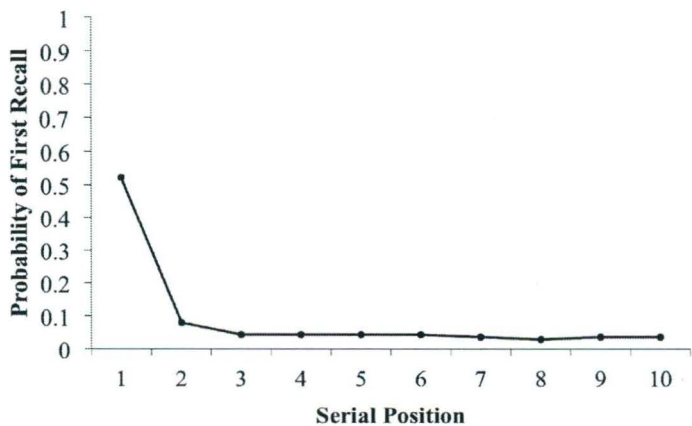


Figure 1. Probability of first recall. Congruent with existing research, the first word learned was likely to be the first item recalled.

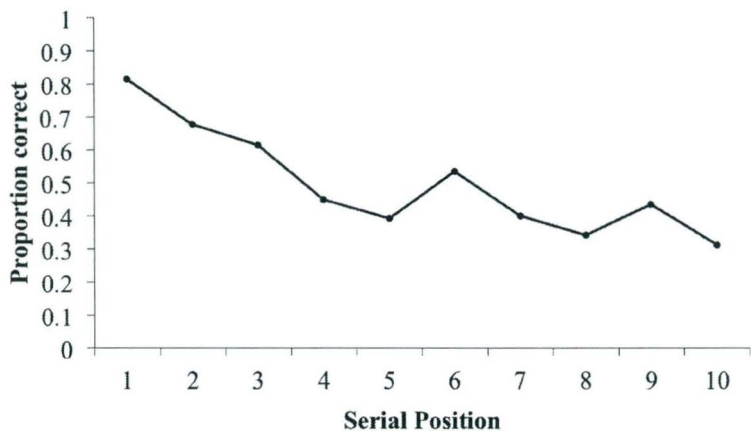


Figure 2. Accurate recall by serial position. Mean proportion correct recalled words as a function of serial position.

More importantly, the first item was also significantly more likely to be accurately recalled than any subsequent items, $F(9, 171) = 18.06$, $p < .001$, $\eta_2 = .49$ (see Fig. 2).

To investigate the pupil's role in the encoding and recall phase, we first analyzed the pupil response each word solicited by serial position. We found that the first item of each list corresponded to a higher pupil dilation than the other items, $F(9, 171) = 2.06$, $p < .05$, $\eta_2 = .10$ (see Fig. 3).

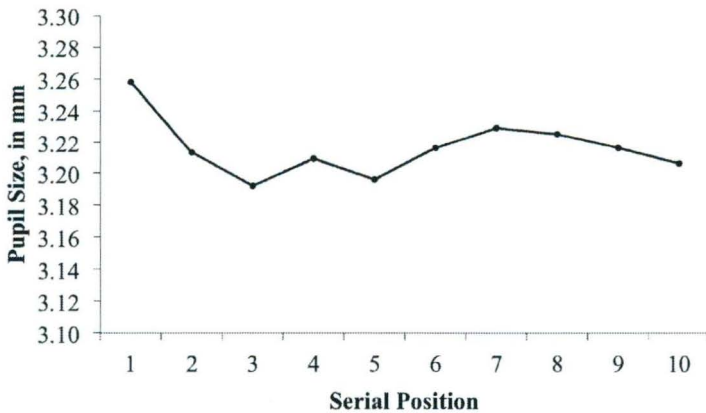


Figure 3. Pupil size during encoding. Mean pupil size as a function of serial position during encoding.

We investigated the pupil's behavior during the encoding phase by breaking down the 3 seconds each item was presented on the screen into 200 ms subintervals. Collapsing all single items, analysis revealed a distinct pattern of pupil behavior during the encoding phase, $F(14, 266) = 13.27$, $p < .001$, $\eta_2 = .41$ (see Fig. 4a). Specifically, pupil size initially decreased before increasing continuously during the entire encoding period. When considering each word individually, data analysis revealed that this general pattern fits with most items on the list except for the first item whose pattern will be investigated in future studies (see Fig. 4b).

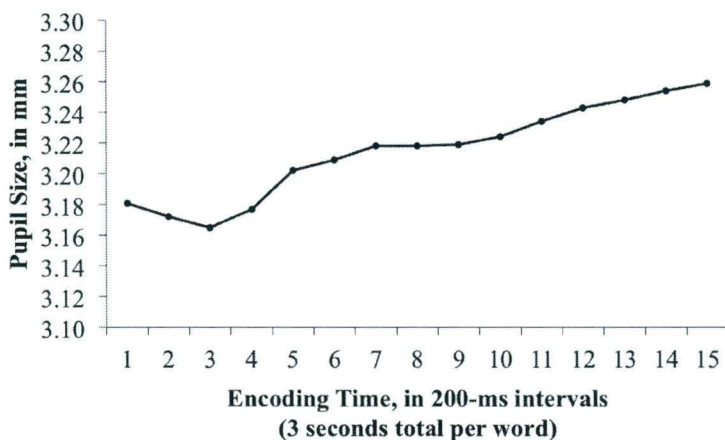


Figure 4a. Mean pupil size during single word encoding (means collapsed over all items). Pupil size is displayed as a function of encoding time, divided into 200-ms subintervals. Words were presented on screen for 3 seconds each.

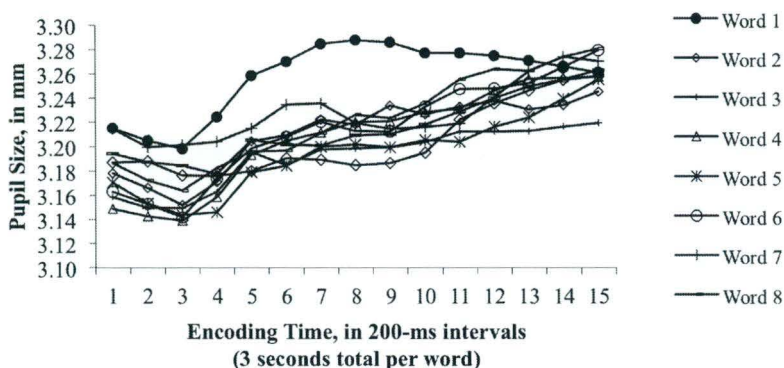


Figure 4b. Mean pupil size during encoding per each word. The pupil behavior is different for the first item when compared to all other items. Future studies will investigate this pattern further.

Turning our attention to the recall phase, we divided the 45-second recall phase into 2-second subintervals and collapsed all recall phases. A distinct pattern emerged for the pupil's behavior during the recall phase, $F(22, 418) = 17.27, p < .001, \eta^2 = .48$. Our data analysis revealed a sharp increase in pupil dilation at the beginning of the recall phase, the pupil remained large for some time before gradually decreasing over the 45-second recall period (see Fig. 5a).

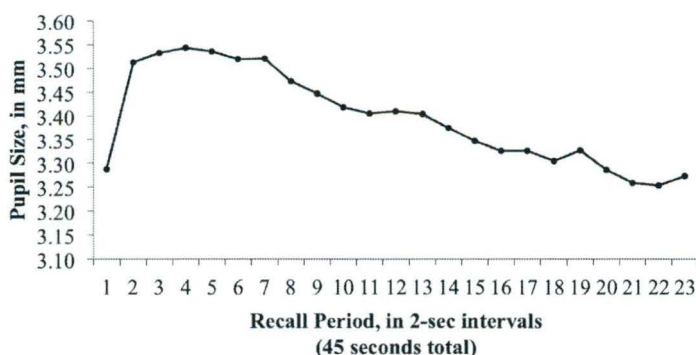


Figure 5a. Pupil size during recall. Pupil size during recall period as a function of time. The 45-second recall period is broken down into 2-second sub-intervals.

Interestingly, this pupil pattern was similar to the pattern of words recalled over recall time. The pattern of number of words recalled was also collapsed across all trials and revealed a significant result, $F(44, 836) = 10.24, p < .001, \eta^2 = .35$. Like the pupil, the number of words recalled peaks shortly after onset of the recall period and decreases thereafter (see Fig. 5b).

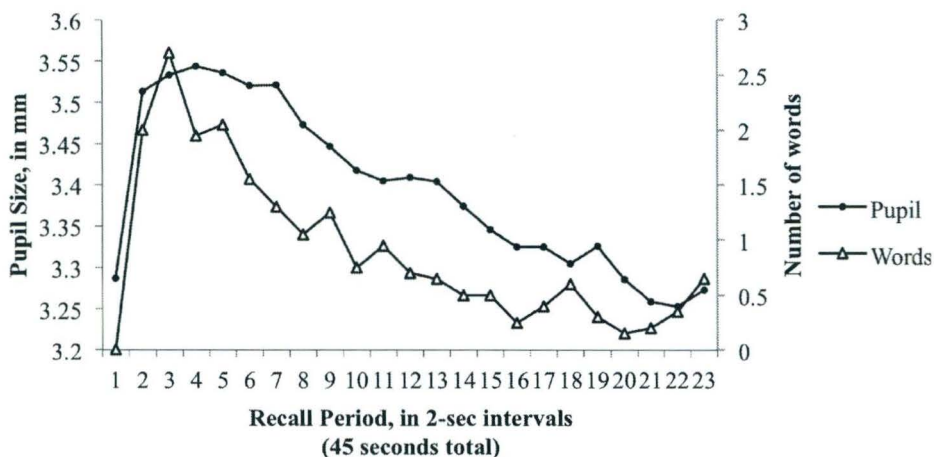


Figure 5b. Pupil size and number of words recalled. Mean number of words recalled as a function of time compared to pupil size during recall. Note: for ease of comparison, we converted the number of words recalled into a 2-second interval.

Discussion

For the first time, this study used a delayed free-recall task to investigate the role of pupil dilation in long-term memory. Our data analysis revealed known results by confirming primacy and probability of first recall effects. As expected, the participants were more likely to first recall the first item of each list. Likewise recall of the first item was overall more accurate than the recall of any other item. Previous research assumed this occurred because of the increased number of rehearsals the first item of a list receives (Rundus, 1971). We found, however, that the first item received more pupil dilation than subsequent items. Although rehearsal is clearly part of the process, a higher attention level at the beginning of the task also seems to be important. Participant attention peaked at the beginning of each list and decreased over the course of each trial. This pattern repeated over all trials to a diminishing degree. These findings appear to parallel results in immediate recall tasks that are consistent with primacy-gradient models (Page & Norris, 1998). In that context, the recall of items depends on the

activation each item solicited. The item soliciting the greatest activation, in our case pupil dilation, was recalled first and then followed by the item of next greatest activation during learning. Perhaps participants simply try harder at the beginning of each trial or when the beginning of a new word list acts as a reset for attention. Future studies will have to investigate the successful recall of the first item in further detail.

For this exploratory study, we were most interested in the relationship between learning and retrieval behavior. The data reveal distinct patterns for both the encoding and recall periods. As participants began to learn each new word list, their pupils constricted slightly only to increase, gradually but continuously, over the course of each learning period. Although the rate of increase was more rapid at first, it slowed toward the end of the learning phase. Often participants rehearsed intensely, which could explain a continuous increase in pupil size as the rehearsal list became longer and longer. Independent of the strategy used to learn each list of words, committing items to memory in a rapid fashion became more effortful as the task progressed. Only a few items can be actively maintained in the working memory system. Once a participant was presented with more items than the temporary storage system could hold, typically between three and seven items at a time, he or she had to decide whether to spend resources on rehearsing earlier items or add new items to the rehearsal list. This decision required not only effort but also an increasing amount of attention, which in turn is reflected in pupil dilation.

Interestingly, the onset of recall revealed an even greater taxing of the memory system. With the onset of recall, participants' pupils dilated sharply, and remained dilated at a higher level before gradually decreasing to slightly below baseline. The rapid increase in pupil size may be attributed to an intense search effort, which many self-report studies have previously suggested. It is plausible to interpret the increase in pupil size as

a search effort because the participants in our study had been distracted by another task before being able to recall the learned items. To our surprise, participants' pupil size was actually larger at the onset of recall than at the end of the encoding phase, indicating that search processes are much more effortful than learning itself. Although good memory recall is related to the efficient storage of memories, for example by using elaboration on existing knowledge, it seems to be more important to generate the correct retrieval cues to access those memories. In a delayed free-recall task such as ours, participants had to generate their own retrieval cues, an element that requires a fair amount of cognitive resources, as indicated by a larger pupil size.

Overall, we had hypothesized that pupil dilation during learning would be indicative of recall behavior, a pattern that became apparent when comparing pupil behavior to the number of words recalled over time. It appears that pupil dilation closely mirrors recall behavior, for the pupil increased sharply after onset of the recall period. Maximum pupil dilation at first coincided with the number of words recalled. Participants recalled more words early on, as is typical in memory research. More interestingly, however, the pupil decreases in a comparable fashion with the numbers of words recalled. As the pupil size decreases, fewer words are recalled, perhaps indicating a decrease in the intensity of a participant's search effort. Future studies need to investigate in more detail how the pupil dilation during encoding is related to the pupil dilation during recall. Does a high pupillary response predict earlier or more accurate recall later? Does successful recall demand a high level of attention? Understanding how we divide and maintain attention will ultimately help us understand memory and attention failures and cognitive deficits typical in ADHD and other attention disorders.

Because of the exploratory nature of this study, a follow-up study is warranted to reveal possible systematic individual differences between high- and low-scoring individuals. It remains unknown if a higher pupillary response is predictive of the quality of encoding. Additionally, it would be interesting to examine the inter-word response time and pupil behavior during the recall phase to explore further the controlled search processes between each word.

References

- Baddeley, A. D. & Hitch, G. (1974). Working memory. In G. H. Bower (Ed.), *The psychology of learning and motivation: Advances in research and theory* (vol. 8, pp. 44-89). New York: Academic Press.
- Beatty, J., & Lucero-Wagoner, B. (2000). The Pupillary System. In J. T. Cacioppo, L. G. Tassinary, & G. G. Berntson (Eds.), *Handbook of Psychophysiology*, 2nd ed. (pp. 142-160). New York, NY: Cambridge University Press.
- Cowan, N. (1995). *Attention and memory: An integrated framework*. Oxford, England: Oxford University Press.
- Deese, J., & Kaufman, R. (1957). Serial effects in recall of unorganized and sequentially organized verbal material. *Journal of Experimental Psychology*, 54(3), 180-187.
- Engle, R. (1975). Pupillary measurement and release from proactive inhibition. *Perceptual and Motor Skills*, 41, 835-842. doi: 10.2466/pms.1975.41.3.835
- Friendly, M., Franklin, P. E., Hoffman, D., & Rubin, D. C. (1982). The Toronto Word Pool: Norms for imagery, concreteness, orthographic variables, and grammatical usage for 1,080 words. *Behavior Research Methods & Instrumentation*, 14, 375-399. doi: 10.3758/BF03203275
- Gilzenrat, M., Nieuwenhuis, S., Jepma, M., & Cohen, J. (2010). Pupil diameter tracks changes in control state predicted by the adaptive gain theory of locus coeruleus function. *Cognitive, Affective, & Behavioral Neuroscience*, 10(2), 252-269. doi: 10.3758/CABN.10.2.252
- Heitz, R., Schrock, J., Payne, T., & Engle, R. (2008). Effects of incentive on working memory capacity: Behavioral and pupillometric data. *Psychophysiology*, 45(1), 119-129. doi: 10.1111/j.1469-8986.2007.00605.x
- Hess, E. H., & Polt, J. M. (1964). Pupil size in relation to mental activity during simple problem-solving. *Science*, 143, 1190-1192. doi: 10.1126/science.143.3611.1190
- James, W. (1890). *Principles of psychology*. New York: Holt.
- Kahneman, D., & Beatty, J. (1966). Pupil diameter and load on memory. *Science*, 154, 1583-1585. doi: 10.1126/science.154.3756.1583
- Murdock Jr, B. (1962). The serial position effect of free recall. *Journal of Experimental Psychology*, 64(5), 482-488.

- Murphy, P., Robertson, I., Balsters, J., & O'Connell, R. (2011). Pupillometry and P3 index the locus coeruleus-noradrenergic arousal function in humans. *Psychophysiology*, 48(11), 1532–1543. doi: 10.1111/j.1469-8986.2011.01226.x
- Page, M. P. A., & Norris, D. (1998). The Primacy Model: A New Model of Immediate Serial Recall. *Psychological Review*, 105(4), 761–781. doi: 10.1037/0033-295X.105.4.761
- Rundus, D. (1971). Analyses of rehearsal processes in free recall. *Journal of Experimental Psychology*, 89(1), 63–77.
- Rundus, D., & Atkinson, R. C. (1970). Rehearsal processes in free recall: A procedure for direct observation. *Journal of Verbal Learning and Verbal Behavior*, 9(1), 99-105. doi: 10.1016/S0022-5371(70)80015-9
- Unsworth, N., & Engle, R. W. (2007). The nature of individual differences in working memory capacity: Active maintenance in primary memory and controlled search from secondary memory. *Psychological Review*, 114(1), 104–132. doi: 10.1037/0033-295X.114.1.104

The Perception of Parents’ Participation in Therapy for Children with Communication Disorders

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Introduction and Background

Successful participation in speech and language therapy is essential for the success of many children with communication disorders. Parents have in-depth knowledge about their child’s social communication skills, and such knowledge is vital for planning a detailed, personalized, and successful intervention. According to The Individuals with Disabilities Education Act (IDEA), in fall 2003 there were 6,068,802 children in the United States who received services for special needs; of those children, 1,460,583 (24.1%) received services for speech or language disorders (American Speech-Language-Hearing Association, 2008).

Research suggests that parents’ active participation in therapy, as a part of treatment, is related to better outcomes for their children’s communication development (Hurst, 2010; Justice & Ezell, 2001). Parent

participation also positively impacts social development and schooling innovation (Baxendale, Lockton, Adams, & Gaile, 2013). In the Hurst study (2010), the speech-language clinicians emphasized the benefits of parental participation. In another study, one parent reported that “the speech therapy benefitted me more at the time ... the therapist just explained to me how to deal with each problem, you know, how to help him” (Glogowska & Campbell, 2010, p. 24).

Purpose

Given findings in the literature about the benefits of parental involvement, the purpose of this exploratory, qualitative study was to discover parents’ perceptions of supports and obstacles to their participation in speech therapy for their children with communication disorders. The analysis was limited to the parents of children involved with therapy in the Early Childhood CARES program at a communication class in Eugene, Oregon. Questions pertaining to supports and obstacles were designed to elicit responses regarding parental stressors, transportation issues, available resources and supports, faced obstacles, possible additional supports and resources, and participants’ current interactions with the speech-language therapist. Responses to the questions provided data for the two components related to the purpose: (a) perception of supports and (b) perception of obstacles.

Method

Qualitative research helps to uncover the viewpoints of participants and their relationship to the world by analyzing the content and context of their responses and any information they might add without prompting (Rossman & Rallis, 1998). Coding interview data leads to the discovery of these points of commonality and an analytical framework. According to Marshall and Rossman (2011), coding is the process of a formal

method of discovering salient themes in a collection of data that allows a researcher to determine general issues from the data. Through the process of open coding, the researcher proceeds line-by-line through interview data, labeling segments of the recorded speech with descriptive characterizations. As more generalized patterns appear, the codes may be linked to each other to form broader concepts. These concepts then inform or help determine the themes (Marshall & Rossman, 2011).

Procedure

Qualitative, semi-structured interviews and surveys offered a way to explore the experience of parents who participate in therapy. The speech-language therapist provided additional information by summarizing each child's progress and describing relationships with parents; therefore, she was a participant to this research. However, the therapist was not present at any of the interviews with parent participants. The data collection was conducted at the Eugene Communication Classroom, where I also was involved in an internship. The relationship and connections at EC CARES added depth and understanding to the data analysis and to the research in general.

Recruitment began by sending a written recruitment letter, along with the preview package, to families with children receiving services at the Eugene Communication Classroom. The first five families who responded and met the criteria were selected. The speech language pathologist at Early Childhood CARES supervised the interview process. At the beginning of the interview, the researcher explained the procedures of the study, the rights of the participants, and reviewed the written consent form to ensure the full comprehension and agreement of each participant. (See appendices A-D for the interview protocols and consent forms.) After a participant agreed to the study and signed the consent form, the researcher continued

by introducing the questionnaire created for this study. The questionnaire examined varying levels of parent interaction and involvement, as well as the home environment for the children with communication disorders. The interview lasted approximately 60 minutes at each child's home or at a location arranged by the interviewer and parents. As the speech-language therapist is the primary teacher in the classroom, she was interviewed to obtain her perceptions of supports and obstacles that impact parent participation in therapy.

Along with the interviews, the children's profiles were reviewed to learn more about each child's background and treatment plan. As part of the consent form, parents gave permission for their child's profile to be reviewed. That form clearly outlined the specific materials to be reviewed in the profile. The children's profiles are located at the communication classroom associated with the study. With the additional permission of the classroom teacher, the researcher could review the children's profiles. The data gathered from ECC included assessment forms and student learning goals provided by classroom teachers. Student's confidential medical information was not collected for this project. After the interview with parents of each child, the researcher reminded them of the need to review their child's profile as part of the learning process. Although parents could withdraw their consent at that point, none did so. Each family received a \$30 Target gift card to thank them for their participation in the research project. No additional compensation was part of this study.

Significance of the Study

This study is significant both in practical and academic terms. First, it provides a better understanding of how parents view the resources made available to them and provides insight into their views of obstacles. Administrators and therapists may use the knowledge gained in this study

to adjust the program and better meet the needs of clients. The researcher hopes that knowledge gained from this project will help produce more positive therapeutic outcomes in the future. Second, this study may contribute to a growing body of knowledge about the roles of parents in treatments of children. Research suggests that children benefit from parents who are able to learn from therapists and use therapeutic strategies in the home setting (Baxendale et al., 2013; Glogowska & Campbell, 2010; Hurst, 2010; Roberts & Kaiser, 2011). Some of the results from this study echo these findings.

Limitations

The results are relevant to the Early Childhood CARES program in association with the Eugene Communication Classroom. The primary limitation of the study is that it was not possible to generalize the results associated with the themes of this study to a broader population of families participating in the therapies of their children. Because the results reflect other studies in which the value of transferring therapeutic skills to parents has been supported, analytic generalizations can be made. However, the value of the results are limited to those participating in this specific program.

Demographic Profile of Participants and Therapist

Although socioeconomic status, gender, native language use, and race and ethnicity factors were not examined in the current study in detail, it is helpful to understand some characteristics of the participants and their children. Of the five interviews, four were with single individuals. One interview was conducted with the father and mother present. The four interviews of single parents were with mothers; therefore, five women and one man participated. Two participants did not complete high school, three had high school diplomas, and of those three, one was pursuing a

bachelor's degree at a university. Two participants, both women, were Hispanic and indicated that two languages were spoken in the home. Although bilingual factors were discussed, they were not explored in depth because of the limitations of the data. The other four participants were White and spoke only English. Because all interviews were conducted in English, all participants, regardless of country of origin, had a working command of the English language. One participant indicated that her child was being home schooled, while the children of all other participants were enrolled in some other school or program. All participants indicated that their children had been enrolled in the Easy CARE program between the ages of two and three, and all had been in the program for approximately two to three years. Finally, the therapist was a White female with more than 30 years of experience as a trained speech language therapist.

Data Collection

My established and continuing relationship as an intern with the families and staff of the Early Childhood CAREs served as an important connection for this study in large part because of the proximity and access that I had while conducting the research. Data was collected through qualitative interviews with parents who have children with communication disorder and the classroom teacher, using open-ended questions included on the structured interview guides (Appendices A and B). Information regarding the services was also gathered after permission was granted from the participants in therapy. Interviews required 60 to 90 minutes and took place at a family's home or another predetermined spot. These interviews commenced after the University of Oregon Institutional Review Board approved the research proposal and continued for approximately a month and a half after the study began.

Results

Theme 1: Transfer of Therapeutic Strategies from Therapist to Parent

Four of five participants expressed a strong interest in trying to facilitate the application of speech therapy strategies outside the classroom. They either (a) showed an awareness and interest in specific technical issues related to articulation and in improving their child's speech directly, or (b) expressed a satisfaction with or desire for more therapist-to-parent instruction. For example, regarding (a), P1 stated, "I showed her you need to bite your lip for the 'f' sound." Regarding (b), P4 remarked, "I would like to have more advice on how to improve his [child's] speech." Also, P3 remarked that "one would be telling us how to, like, teach [our child] to speak the right way and explain it." P1 indicated that she had learned to teach pronunciation from the therapist and that it had helped her feel more comfortable conveying the correct information to her child. Taken together, the theme of transference of therapeutic skills to the parent was important. The interview data suggest that there were varying degrees of support in this area, but two parents expressed a strong interest in having more support.

Theme 2: The importance of Outside Support

In their interviews, participants indicated several types of outside support that they felt were helpful, could be added, or could be improved. The specifics of these supports varied greatly from participant to participant. For example, P1 felt a family support group could help exchange ideas and connect with other parents "because sometimes you feel alone in it." She also stated that "communication is great in the classroom, but outside it is difficult for families to connect." Similarly, P2 was enthusiastic about a family support group for parents to exchange information and ideas. In contrast, P3 was more interested in an outside social group for her child to

help him “see that other kids are in a different spot, and it’s not just him.” Participants P5 and P6, the mother and father of one child, echoed P3’s sentiments: “Another group would be great. There are not a lot of kids his age around here.” The participants’ statements, therefore, indicated support for at least one outside support group that would either assist with the child’s socialization or help parents connect with each other to exchange information.

Theme 3: Parental Stress Associated with Emotional Vulnerability at Time of Enrollment

All participants indicated one or more emotions before their child entered the Early Childhood CARES program. After coding the interviews, expressions of stressful emotions emerged and showed that parents felt fear, worry, guilt, and confusion. The examples below illustrate how those emotions emerged.

P1: [For my child] to be able to say how she was feeling instead of screaming or throwing a tantrum. It took stress off me, so I didn’t feel like I was failing as a parent. That was a big stress.

P4: My most concern ... I felt guilty because my son does not speak too much, and I feel afraid about his self-esteem.

P6: We were worried. I hated school. I was a little “oh my God” he was going down the same road. I was, “oh my God.”

In all instances, parents felt relief to see his or her child’s improvement after being enrolled in therapy. Parents did not express stress about the current situation, which suggests the positive effects of the therapy was enough to relieve stress and indicates a positive support through therapy alone. However, the interview data also suggest that parents may need to

receive positive emotional support while their child is enrolled because that is when parents appear to be most vulnerable to negative emotions.

Perspectives from the Speech-Language Pathologist: Intersections with Theme 1

The interview with the speech-language therapist who works with the children of the participants of the study revealed ideas that inform theme 1. The therapist emphasized the importance of the transference of therapeutic strategies to parents. She noted that she and others in similar positions had formal training to help parents and that “we send home material that shows the strategies. We demonstrate the strategies we are working on.”

The therapist emphasized a hands-on approach to this transference of strategies. When prompted to provide her view on which resources were important, the therapist said, “I think parents learn a lot by watching our interaction with the kids ... we can tell them about the strategies. We can give them handouts about the strategies. But I think that having them see us do it [therapy] with the kids is really what helps communicate the strategy best.”

When asked about the biggest obstacle parents faced, the therapist mentioned parents' limited time resources. In order to overcome this problem, the therapist again emphasized the importance of providing parents with tools applicable in the home. “The practice can be built into the routines they are doing at home,” she said. Accordingly, whether eating, doing laundry, playing, or dressing, parents can incorporate language lessons into these daily tasks. This integrated approach not only allows parents to take on active roles in support of their child's therapy at home but also allows them to incorporate therapeutic strategies into their busy schedules. Further, the therapist emphasized that children from one to five years of age learn more by engaging in concrete, meaningful

routines compared to more abstract activities, such as pronunciation drills.

Although the therapist and the parents discussed a variety of specific topics during their interviews, both discussed items that informed theme 1. The fact that Theme 1 emerged from both the parent's and therapist's interview data suggests that it is perhaps the strongest shared theme to emerge from the data. The therapist also noted parents might face confusion when the child transitions to kindergarten because the learning process is less intensively centered on the family during kindergarten. The therapists felt elements associated with the transition could function as an obstacle, and her goal was to assist in the transition by actively taking part in the transition.

Conclusion

In a review of 18 studies that examined parent-implementation of speech-language therapy strategies, Roberts and Kaiser (2011) found that parents who learned and applied therapy strategies outside the classroom effectively improved the communication development of their children. Results from the current analysis suggest that both parents and therapist are acutely aware of the importance of parents being able to understand and apply communication strategies outside the classroom. The therapist viewed the primary obstacle as parents' limited time, whereas parents showed mixed perceptions of their understanding of strategies. Two parents desired better understanding of therapeutic strategies, and two other participants indicated some degree of competence when applying strategies. This mixed result suggests that the skills therapists are imparting to the parents constitute a valuable resource, but that resource may not be adequately utilized by parents. One recommendation would be that the Early Childhood CARES program increase emphasis on transference of strategies to parents and make available more strategies that focus on how to teach.

In addition, whereas the therapist focused on the importance of the post-therapy transition of children into kindergarten to ease the stress and confusion of parents, parents indicated that their primary stress occurred as they entered their child in the program. This difference seems to be logically consistent with the fact that participants' children were not yet in a transition, so that the parents' considerations were focused on their current or previous experiences. Theme 2 and the comments of the therapist suggest that most of the stress parents experience is at the time of entrance and after the exit of the child from the program. These results suggest that the program should have processes centered on those two important periods to mitigate potential stress and confusion.

Appendix A

Semi-Structured Interview Protocol: Interview Parents

Introduction: Thank you for taking the time to talk with me today. My name is Lan, and I am conducting a study that looks at your experience and perceptions about your participation in therapy. As we discussed, I will record our conversation. Is it okay if I turn on the recorder now? [Start recording] If I ask a question that you are uncomfortable answering, you can say, “skip it” or “ask me later.” We can end our conversation at any time. At the end of our conversation, I will give you a \$30 Target card as a thank you for helping with this study. This is a onetime compensation; it will be given to you at the end of our conversation even if you wish to withdraw before completing the interview. Do you have any questions before we get started? [Answer questions, if any.]

Let’s get started by talking about you and your child.

Basic Information

1. How old is your child?
2. How many children do you have under your care?
3. How long does it take you to travel to the Eugene Hearing and Speech Center?
4. How long does it take you to travel to the speech-language-hearing clinic?
5. How old was your child when you first became concerned about his/her speech or language development?
6. How long has your child received services from the Early Childhood CARES?
7. Does your child receive speech or language services from additional sources (other school speech-language pathologist, private clinician)? If so, what services?

8. What is your highest level of education completed or received? If currently enrolled, what is the highest level attended or degree received?
9. Can you briefly explain the main reason(s) that your child is receiving treatment?
10. Does your child have an Individualized Education Plan (IEP)/Individualized Family Service Plan (IFSP)? If so, how often do you attend your child's IEP/IFSP meetings?
11. What are the main stressors that you and your family face as you cope with children who have communication disorders?
12. What are the main obstacles that hinder your participation in therapy?
13. What are the supports and resources that currently help you to participate in therapy?
14. What additional support or resources do you feel would help you to participate more actively in therapy?
15. How do you currently work with speech language pathologists to help your children with communication at home?

Appendix B

Semi-Structured Interview Protocol: Interview Teacher/therapist

Hello, [teacher] Ms.Eileen McNutt; thank you for your time and support for participating in my research. I am seeking your comments to complete each student's information. There is no direct benefit from this interview. All information from the interview, including audio recordings, will be kept in locked file at Eugene Communication Classroom until it is transcribed and converted to Electronic files. Those files will be kept on a password protected flash drive, saved in password-protected document, and kept in a locked filing cabinet at EC Cares. The researcher and staff will have access to the data. If you have any questions, please stop me anytime during our interview.

1. How long have you worked with children who have communication disorders?
2. What are the teaching and training methods that help your students and their parents achieve their goals?
3. How often do you communicate with the parents of your students?
4. What obstacles do you face as you seek to engage a parent's participation in therapy?
5. What resources do you think are most helpful for the families?
6. Do you have time and funding to help the children to continue their education?
7. What are the various ways you involve parents in therapy?
8. How do you overcome obstacles that the parents may experience?
9. How do you learn about a parent's needs and possible obstacles?
10. As a teacher/therapist, what suggestions would you offer to policy makers to help improve the lives of children with communication disorders?

Appendix C

CONSENT TO TAKE PART IN STUDY: Parents

Invitation: I invite you to participate in an interview as part of a research study conducted by Lan Marberry, a student from the University of Oregon's Family and Human Services Program. The purpose of the study is to learn about your experiences participating in therapy for your child with communication disorders. There is no direct benefit for participating in this research. All information from the interview included audio recordings will be kept in a locked file at Eugene Communication Classroom until it is transcribed and converted to electronic files. Those files will be kept on a password protected flash drive, saved in password-protected document, and kept in a locked filing cabinet at EC Cares. The researcher and staff will have access to data. I am inviting you to participate in this study because your child is currently receiving intervention or has received services in the past with the Early Childhood CAREs.

What are you being asked to do?

1. Participate in one 60 minute interview with a researcher for this study. There is no cost to participate in the study. You do not have to answer any questions that make you feel uncomfortable.
2. Allow the researcher access to your child's profile at EC Cares for the following specific information: diagnosis, intake report, treatment plan.

What are the risks in participation? This research involves only minimal risks. One potential risk to you for participating in this research study is possible discomfort when discussing issues about obstacles your family may have faced. Another potential but minimal risk is a possible breach of confidentiality. However, there will be no physical risk in this study.

What are the benefits of this research? Participating in this research gives you a unique opportunity to share your experiences about supports and obstacles you have experienced at EC Cares. At the end of this study, this researcher will provide EC Cares with a summary of the reported supports and obstacles, with all information integrated and names and identifying information removed. This summary has the potential to improve services at EC Cares and help EC Cares better meet the needs of families. Your participation will also help improve future supports and help future parent participants. By talking with us, you will help give a voice to an often-underrepresented population.

Will others know what you say? No. We will audio record and type the interview for study. When we type the interview, we will use “participant #1,” “participant #2,” and so on to protect your identity. We will not connect your name to any comments you make during the interview. We will use the designated number if we quote you or use your comments. We will delete the audio recording after transcribing the interview. We will keep the interviews confidential.

How is my information protected and how will it be used? All information from the interviews, including audio recordings, will be kept in a locked file at Eugene Communication Classroom until it is transcribed and converted to electronic files. Those files will be kept on a password-protected flash drive, saved in a password-protected document, and kept in a locked filing cabinet at EC Cares. Only research staff will have access to the data. All identifying information will be removed from the data, and the data will be destroyed 6 months after the interview with parents. Only de-identified data will be reported in any documents or presentations developed from this research.

Can I withdraw my participation? Yes. Your participation is voluntary;

you may withdraw participation at any time during the study. You will receive a \$30.00 gift card even if you withdraw from the study early.

If you have any questions? Please contact the researcher Lan Marberry at (408)-338-9294. You may also contact my faculty supervisors Karrie Walters at (541)-346-5176 or teacher Eileen McNutt at (541) 684-5603. If you have questions regarding your rights as a research subject, call the Research Compliance Services, at the University of Oregon, Eugene, OR 97403, (541)-346-2510. This office oversees the research to protect your rights and is not involved with this study.

By giving verbal consent, you are saying that you:

- ☐ Have read and understand the information above.
- ☐ Willingly agree to be interviewed.
- ☐ Willingly agree to have your interview audio recorded.
- ☐ Willingly agree to allow access to your child's profile at EC Cares.
- ☐ May withdraw your consent at any time.
- ☐ May discontinue participation without penalty.
- ☐ Received the compensation for participating.
- ☐ Received a copy of this form.
- ☐ Are not waiving any legal claims, rights, or remedies.

Parent's signature Date

Witness Date

I agree for my interview to be audio recorded and to be used for research purposes as described above. I understand that the recording will be destroyed in six months.

Parent's signature Date

Witness Date

Appendix D

CONSENT TO BE INTERVIEWED: Teacher/ therapist

Invitation: I invite you to participate in an interview as part of a research study conducted by Lan Marberry, a student from the University of Oregon's Family and Human Services Program. The purpose of this study is to learn about parents' participation in therapy for their children with communication disorders. I am inviting you to participate in this study because your students received services in the past with the Early Childhood CAREs.

What are you being asked to do? Allow 60 minutes of your time to participate in an oral interview with a researcher for this study. There is no cost to participate in the study. You do not have to answer any questions that make you feel uncomfortable.

What are the risks of being interviewed? Any research may involve minimal risks. One potential risk to you for participating in this research study is possible discomfort when discussing issues about obstacles your family may have faced. Another minimal risk is a possible breach of confidentiality. However, there will be no physical risk for participating in this study.

How is my information protected and how will it be used? All information from the interview including the audio recording will be kept in a locked file at Eugene Communication Classroom until it is transcribed and converted to an electronic file. That file will be kept on a password protected flash drive, saved in password-protected document, and kept in a locked filing cabinet at EC Cares. Only research staff will have access to the data. All identifying information will be removed from the data and data will be destroyed 6 months after the interview with parents. Only de-identified data will be reported in any documents or presentations

developed from this research.

What are the benefits of this research? Your assistance will help the researcher collect complete information about each student. The study may provide insights that benefit your understanding of the effectiveness of your work and help professional to improve the services they offer to parents who have children with communication disorders. By talking with us, you will help to give a voice to an often-underrepresented population.

Can I withdraw my participation? [Yes.] Your participation is voluntary; you may withdraw participation at any time during the study.

If you have any questions? Please contact the researcher, Lan Marberry, at (408)-338-9294. You may also contact my faculty supervisors Karrie Walters at (541)-346-5176. If you have questions regarding your rights as a research subject, call the Office for Research Compliance Services, at the University of Oregon, Eugene, OR 97403, (541)-346-2510. This office oversees the research to protect your rights and is not involved with this study.

By giving verbal consent, you are saying that you:

- ☐ Have read and understand the information above.
- ☐ Willingly agree to be interviewed.
- ☐ Willingly agree to have your information from your interview be used in writing.
- ☐ May withdraw your consent at any time.
- ☐ May discontinue participation without penalty.
- ☐ Received a copy of this form.
- ☐ Are not waiving any legal claims, rights, or remedies.

Teacher's signature _____ Date _____

Witness _____ Date _____

I agree for my interview to be audio recorded and to be used for research purposes as described above. I understand that the recording will be destroyed in six months.

Teacher's signature Date

Witness Date

References

- American Speech-Language-Hearing Association. (2008). Incidence and prevalence of communication disorders and hearing loss in children – 2008 Edition. Retrieved from <http://www.asha.org/research/reports/children/>.
- Baxendale, J., Lockton, E., Adams, C., & Gaile, J. (2013). Parent and teacher perceptions of participation and outcomes in an intensive communication intervention for children with pragmatic language impairment. *International Journal of Language Communication Disorders*, 48 (1), 41-53. doi: 10.1177/1525740110384131
- Glogowska, M., & Campbell, R. (2000). Parent views of involvement in preschool speech and language therapy. *Communication Disorders Quarterly*, 33(2), 96-110.
- Hurst, N. (2010). Parental participation in speech and language therapy (Master's thesis). Available from ProQuest Dissertations and Theses database. (UMI No. 1480981)
- Justice, L.M., & Ezell, H.K. (2001). A needs assessment: Perceptions and Practice of student speech-language clinicians regarding parental involvement. *Contemporary Issues in Communication Science and Disorders*, 28, 64-73.
- Marshall C., & Rossman, G. B. (2011). *Designing qualitative research* (5th ed.). Thousand Oaks, CA: Sage.
- Millard, S.K., Nicholas A., & Cook F.M. (2008). Is parent-child interaction therapy effective in reducing stuttering? *Journal of Speech, Language and Hearing Research*, 51(3), 636-650.
- Roberts, M., & Kaiser, A. (2011). The effectiveness of parent-implemented language intervention: A meta-analysis. *American Journal of Speech-Language Pathology*, 20, 180-199.
- Rossman, G. B., & Rallis, J. (1998). *Learning in the field: An introduction to qualitative research* (3rd ed.). Thousand Oaks, CA: Sage.

Beyond Depression: Mothers with Comorbidity Differ in Neural Response to Infants' Cry

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Mothers without any added disorder often feel overwhelmed and stressed at times, but that normal, expected stress increases with a major depressive disorder. Normative stress and fears of parenting inefficacy and child safety may be further compounded by an anxiety disorder, especially because of the common overlap between the two. An fMRI study by Heidemarie Laurent and Jennifer Ablow published in 2012 showed blunted responses in subcortical motivational systems as well as the action-oriented, planning, and emotion-regulating areas of the prefrontal cortex of mothers with depression when listening to recordings of their own infant's cry, a response that differed from that of healthy controls. Greater relative right frontal EEG alpha asymmetry has been found in patients with major depression and anxiety as compared to either those with depression only or the controls (Bruder et al., 1997). That result is in contrast to greater relative left frontal asymmetry associated with approach behaviors in mothers without this comorbid condition, as noted in studies by Field and colleagues (2003) and Killeen and Teti (2012). These differences highlight the possibility that a comorbid anxiety disorder

could be related to differential neural responses in those suffering from a depressive disorder.

Although this literature sheds some light on the neural basis for difficulties associated with both maternal depression and anxiety, it does little to address the ubiquitous issue of comorbid depression and anxiety, especially as those conditions may relate to parenting. Thus, the current study addresses the need for research on maternal brain response in mothers who are suffering from both depression and anxiety.

LITERATURE REVIEW

Comorbidity of anxiety and depression and relevance to mother-infant well-being

Anxiety and depression co-occur quite often in the clinical setting, despite their separate diagnoses (Grohol, 2013). Meta-analysis suggests that adults with both depression and anxiety show a global deficit in emotion recognition (Demenescu, Kortekaas, den Boer, & Aleman, 2010) that may partially explain the relationship depression and anxiety have with empathy and its role in infant attachment. Both classifications of disorders contribute to attachment problems between parents and infants by affecting the neural circuitry for regulating emotions, motivation, attention, and empathy. These areas are regulated by specific subcortical and cortical (especially prefrontal) circuits that are, in turn, activated by infant stimuli (Swain, Lorberbaum, Kose, & Strathearn, 2007). According to attachment theory, maternal behavioral response directly impacts infant attachment, which, when adversely affected by aberrant parenting, is related to neurotic symptoms and personality disorders (Bowlby, 1977).

Problems in affective response related to maternal depression and anxiety

Mothers with depression exhibit systematic errors in recognizing and

interpreting affective stimuli. For example, postpartum women with major depression have been found less responsive to negative emotion-eliciting stimuli compared to healthy controls (Gollan, Hoxha, Getch, Sankin, & Michon, 2013). Some researchers have related generalized anxiety disorder to an anxiety-related bias in negative information processing (Bradley, Mogg, Millar, & White, 1995), and mothers specifically show this bias in interpreting their children's behavior (Youngstrom, Izard, & Ackerman, 1999).

Depressed mothers have reported difficulty in differentiating the types of cries from their infants, an important aspect of communication between mothers and their infants (Frizzo, Vivian, Piccinini, & Lopes, 2013). The difficulties discriminating and responding effectively to negative emotion signals may, in turn, be explained by deficits in neural response.

People with depression tend to exhibit an attentional bias towards sad faces, but because of the high occurrence of co-morbid generalized anxiety disorder in studied samples, it has not been determined if this attentional bias stems from depression or anxiety (Joormann & Gotlib, 2007). Negative bias in maternal interpretation of children's behaviors in Youngstrom, Izard, and Ackerman's study (1999) support further investigation into the role of comorbid anxiety.

Brain response to infant emotion cues related to depression, anxiety

Lorberbaum and colleagues (1999) established the feasibility of using fMRI to measure the neural responses of mothers to the sound of infant cries and found statistically significant activity extending from the right subgenual anterior cingulate cortex to the right medial prefrontal cortex. Laurent and Ablow (2012, 2013), in their fMRI studies, found that many areas were associated with a mother's response to the cry of her own infant, especially the para/limbic and prefrontal regions that showed activation

in mothers with no history of psychopathology but showed no signs of activation in mothers with a history of perinatal depression. Also, non-depressed mothers showed greater activation than depressed mothers in medial thalamic and ventral striatal areas. More severe current depression related to hyporesponse in the anterior cingulate cortex, a region that, for depressed mothers, showed less activation in response to their infant's distress faces (Laurent & Ablow, 2012, 2013). Together, these findings suggest mothers suffering from depression fail to show responses to their infants' distress cues in neural circuits supporting emotion regulation and motivated approach behavior.

Although researchers had not previously addressed anxiety in this sample, increased stress reactivity (indexed by hypothalamic-pituitary-adrenal response) related to decreased activation to their infant's cry in periaqueductal gray, right insula, bilateral orbitofrontal cortex, and anterior cingulate-medial prefrontal cortex (Laurent, Stevens, & Ablow, 2011). In a sample of mothers studied early in the postnatal period, anxious thoughts correlated with activation to infant cry in subcortical areas associated with obsessive-compulsive behaviors (Swain et al., 2008). Finally, EEG studies show that a shift toward greater relative right frontal activation in response to infant emotional stimuli, which may support empathic processes is associated with lower maternal anxiety (Killeen & Teti, 2012). Still, inconsistent reports support the need for further investigation into maternal anxiety and associated brain region activation.

Why we need to examine maternal response that differs with a comorbid anxiety diagnosis

Donna Karl (1995) observed high-risk mothers in natural environments and measured infant cues and the maternal behavioral response as well as observed affect. She characterized maternal response as 1) under-

responsive 2) good enough or 3) over responsive. Interestingly, none of the mothers in the sample who placed in the “good enough” category reported anxiety, although most of the mothers in that category suffered from depression. Anxiety, however, was associated with under-responsive mothers, and the only mother who was over-responsive was both depressed and anxious. While only one mother met criteria for the over-responsive category, 80% of intrusive maternal responses were depressed. The study does not show the proportion of anxious mothers who make up the intrusive category of responses. Although Karl notes that the small sample size does not allow for a comparison of depression and anxiety in relation to maternal response, the pattern noted above indicates further research may find a difference in maternal responsiveness from mothers who are co-morbidly diagnosed with depression and anxiety (Karl, 1995).

Given evidence that depression and anxiety differentially affect the ability of mothers to respond to their infants, as well as the lack of available research on neural mechanisms, the current study was designed to address possible differences in neural response to infant cues related to comorbid anxiety and depression vs. depression alone.

THE CURRENT STUDY

This study consisted of a reanalysis of existing data collected as part of a larger research endeavor by Laurent and Ablow (2012). These data were collected in a sample of low-income mothers at risk for parenting difficulties. Half of the mothers were diagnosed with major depressive disorder, and half were healthy controls. All of the mothers in this data set who were categorized as having depression also had a comorbid condition; a subset of mothers had anxiety disorders, allowing a direct comparison of depression/anxiety vs. depression vs. control mothers. We hypothesized that the neural response to “own infant cry” of mothers with depression

and anxiety would differ significantly from the response of both mothers with depression without anxiety and healthy control mothers. Areas of differential activation were suspected to include subcortical motivational systems, as well as cortical regions involved in self-regulation, as defined by previous research.

METHODOLOGY

All methods for data collection are presented below as reported by Laurent and Ablow (2012).

Participants

A community sample of primiparous mothers of 15- to 18-month-old infants was recruited from the Women, Infants, and Children (WIC) program. Mothers who indicated interest by responding to a flier were contacted for further screening. After consenting to participate (per IRB-approved guidelines), they were screened for MRI contraindications and psychopathology using the Structured Clinical Interview for the DSM-IV (SCID). To be in the “depressed group,” a mother had to meet criteria for a major depressive episode (MDE) during the perinatal period and report ongoing symptoms at least at the level of minor depression. To be in the “non-depressed group,” a mother could not meet criteria for any axis I disorder. All mothers who met the criteria agreed to participate, but the final sample ($n = 22$, 11 per group) represents the subset of those screened into the study ($n = 34$) who were eligible to complete the study. Reasons for discontinuation included new pregnancies, failure to complete a well-baby visit, or the lack of an infant cry at the visit.

The majority of mothers (77%) were Caucasian, but 14% were African American and 9% were Latina. Most had experienced a vaginal delivery, although 18% had babies by caesarian section. Although 64% had some form of post-high school education, only 18% had completed college.

Mothers tended to be young ($M = 24.1$ years, $SD = 4.1$) and low SES (32% reporting household income $< \$10,000$ per year, 36% $\$20,000$ – $\$40,000$, 32% $> \$40,000$). A minority (36%) were married. Non-depressed mothers did not differ from depressed mothers on any demographic variable, including marital status, but non-depressed mothers were more likely to report being in a stable married or cohabiting relationship with the biological father of their infant [$n = 8$ vs. 3 of the depressed group, $X^2(1) = 4.54$, $p = 0.03$].

Mothers in the depressed group all reported the onset of major depressive disorder (MDD) prior to the perinatal period ($M = 14.3$ years, $SD = 2.9$); thus, they represented a group prone to recurrent depression, and symptoms were not unique to perinatal events. The range of chronicity/severity varied from two fairly limited MDEs (two mothers) to too many occurrences to count (3 mothers). Six mothers reported significant (past) suicidality (four attempted, two planned). During the perinatal period, three subjects had a MDE only during pregnancy, and three others only postpartum. The remaining five mothers reported being depressed both during pregnancy and postpartum. In keeping with the less controlled but ecologically valid community sampling approach, depressed mothers were allowed to have comorbidities, although MDD had to be the dominant current complaint. Of the mothers who had MDD, 7 were also diagnosed with an anxiety disorder, while the other 4 did not qualify for an anxiety diagnosis.

Three of the depressed mothers reported having begun antidepressant (SSRI) treatment (duration 2–4 weeks). Dropping these cases did not alter the pattern of results in the previous study; therefore, in the interests of retaining balanced groups and reflecting a range of treated/untreated depression syndromes, they were kept in analyses.

Stimulus collection and presentation

Researchers attended the participants' 18-month well-baby visits and recorded infant cry sounds following injections. To create the cry stimulus, researchers recorded twenty-one seconds of crying (maximum amplitude set to 1 dB) from the beginning of each infant's cry. Comparison of depressed and non-depressed group cries revealed non-significant differences in fundamental frequencies. In addition to the participant-specific stimulus, a cry sound from an unfamiliar infant was collected (using the same procedures) and presented to all participants. A non-cry control sound was developed by editing a rising and falling tone to have a fundamental frequency within the range of a normal infant's cry, 400–600 Hz and 1 dB maximum amplitude (Zeskind & Lester, 1978).

The stimulus protocol was created as a block design and presented with the Presentation 10.0 program. The protocol consisted of two 9-minute runs. Each run contained six repetitions of own infant cry, other infant cry, control sound, and rest. Sound blocks were 23 seconds (2 seconds pause, 21 seconds sound), and rest blocks of 21 seconds. Multiple presentation input files dictating different orders of blocks within runs counterbalanced stimulus presentation within and across experimental and control groups. Participants were simply instructed to listen to the sounds to allow the most natural range of response to cry. Sounds were presented via earphones in the scanner, and a sound check carried out before each scan to ensure audibility.

Scanning

Magnetic resonance imaging was carried out with a 3T Siemens Allegra 3 magnet. A standard birdcage coil was used to acquire data from the whole brain. Sessions began with a shimming routine to optimize signal-to-noise ratio, followed by a fast localizer scan (FISP) and Siemens Autoalign routine, then the two functional runs and anatomical scan.

Functional

T2*-weighted gradient echo sequence, 64 X 64 voxel matrix, TE = 30 ms, TR = 2000 ms, flip angle = 80°, 32 contiguous slices thickness = 4 mm; 273 volumes per run.

Structural

T1-weighted 3D MP-RAGE sequence, TI = 1100 ms, TR = 2500 ms, TE = 4.4 ms, 176 transverse slices 1.0mm thick, 256 X 176 matrix FOV = 256 mm.

ANALYSIS

All analyses were conducted using FSL 4.1. At the within-participant level, response to own infant cry was tested with the contrast of activation during own cry > control sound blocks. At the between-participant level, contrasts based on psychopathology group were tested (i.e. control > depression only and depression + anxiety, depression + anxiety > or < depression only). Because of the limited number of women within each group, fixed-effects analysis methods were used. Although results cannot be generalized to the wider population, the fixed-effects analysis does allow for a description of patterns within this sample.

Preprocessing steps included motion correction with MCFLIRT, non-brain structure removal with BET, spatial smoothing using Gaussian kernel 5-mm FWHM, intensity normalization using grand mean scaling and high-pass temporal filtering (sigma $\frac{1}{4}$ 65 s). Data for the within-subject time series were analyzed using FILM with local autocorrelation correction, and boxcar models describing onset/offset of each sound stimulus were convolved with a double-gamma basis function. Functional data were registered to the participant's own high-resolution structural image (6 df) and to a standard brain (Montreal Neurological Institute template; 12 df)

using FLIRT. All data were checked for excessive motion ($>1\text{mm}$) and artifacts (Laurent & Ablow, 2012).

Within-participant and group-level analyses were carried out using FEAT v.5.98. For each participant, two explanatory variables (EVs) modeled signal associated with own infant cry and control sound; zero for both stimuli EVs corresponded to rest. Contrasts of parameter estimates (COPEs) for own cry $>$ control sound tested primary hypotheses regarding response to own infant cry. First-level COPE images were averaged across runs using fixed-effects analysis. These served as inputs to higher level group analyses, conducted using FLAME to model random effects components of mixed-effects variance. AlphaSim was used to determine cluster size needed, in conjunction with intensity threshold $P < 0.005$, to achieve a false discovery rate (FDR) of 0.05 for whole-brain analyses (Cox, 1996 as cited in Laurent and Ablow, 2012). Using these criteria, activation clusters exceeding 16 voxels, or 615 mm^3 , were considered significant in group analyses. (Laurent & Ablow, 2012).

For the group-level analyses, tests directly compared response between groups (depressed $>$ depressed + anxiety, depressed + anxiety $>$ depressed, control $>$ depressed + anxiety, and control $>$ depressed).

RESULTS

Depression $>$ Depression + Anxiety

Group differences when the response to own infant cry was greater than to the control sound revealed that mothers in the depressed-only group activated more to their infant's cry than comorbidly diagnosed mothers in two cortical clusters: one included the lingual gyrus, temporal occipital fusiform cortex, and parahippocampal gyrus; the other was located at the frontal pole, concentrated in the right hemisphere (see Figure 1). Refer to Table 1 for a complete listing of activation area differences by group comparison.

Depression + Anxiety > Depression

The reverse comparison, when the response of the comorbid group was greater than the depression group showed widespread differences in activation. Comorbid mothers activated more in several prefrontal and temporal cortical areas, such as the inferior frontal gyrus, pre-central gyrus and supplementary motor area, and Heschl's gyrus in both the left and right cerebral cortex (see Figure 2). Greater activation was also seen in the insula and in subcortical areas such as the thalamus and putamen.

Control > Depression + Anxiety

The control group activated more than the depression + anxiety group in key subcortical motivation and prefrontal regulatory areas. The inferior frontal gyrus activated more for the control group, as did both the left and right nucleus accumbens (see Figure 3). The anterior cingulate gyrus also activated more for the control group than the comorbid group.

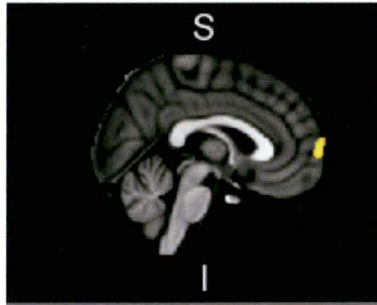


Figure 1. Frontal pole activation in depression group > depression + anxiety group as seen in the right hemisphere, sagittal plane.

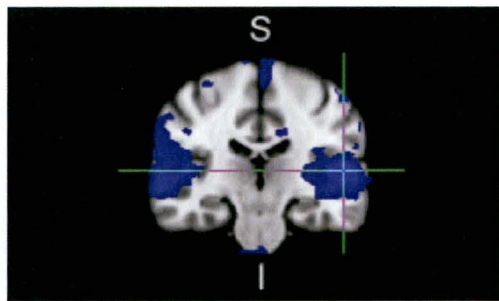


Figure 2. Difference in activation by depression + anxiety > depression. Crosshairs located at Heschl's Gyrus in the Temporal Lobe, left hemisphere, and coronal plane.

Control > Depression

As expected, based on previous comparisons, the control group activated more than the depressed group in Heschl's gyrus, the pre- and post-central gyri, the frontal pole, and the cingulate gyrus. Cortical peak activation extended into subcortical areas, including the thalamus, putamen, and nucleus accumbens (see Figures 4 and 5).

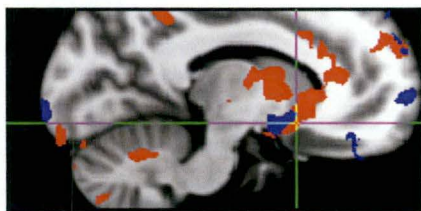


Figure 4. Red color shows activation of control > depression; blue shows activation of control > depression + anxiety. Crosshairs located at the left accumbens where both comparisons showed significant activation. Sagittal plane, right hemisphere.

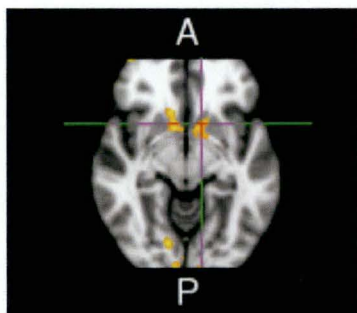


Figure 3. Activation in the left and right accumbens for the group comparison of control > depression + anxiety, as seen in the axial plane.

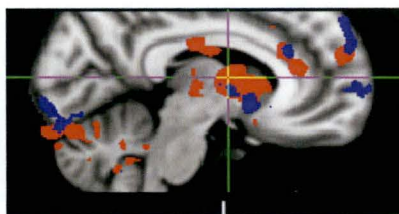


Figure 5. Red color shows activation of control > depression; blue shows activation of control > depression + anxiety. Crosshairs located at the right thalamus. Activation extends into the caudate. Sagittal plane, right hemisphere.

DISCUSSION

In the current study, mothers with a comorbid anxiety disorder showed differential activation to their infants' cry when compared to mothers with depression and no anxiety disorder. Overall, the comorbid group exhibited a greater neural response than the depression-only group, but they also showed a few areas of lesser response. As predicted, the control group

activated more than both of the other groups. These findings suggest that the effect of an additional anxiety diagnosis may attenuate the effects of depression on the mother's brain response to her infant.

Mothers with depression alone showed more activation in the lingual gyrus and the temporal occipital fusiform cortex than comorbid mothers. These areas are associated with object and facial recognition, suggesting that mothers with anxiety do not associate their babies' crying with their babies' faces to the same degree as mothers without anxiety. Furthermore, activation in the parahippocampal gyrus suggests that mothers may be thinking more about how the babies' cries fit in a social context, although further research is needed to determine if these findings are consistent with behavioral or subjective thought differences.

When the contrast was reversed, mothers with depression and anxiety showed significantly more activation in several prefrontal, temporal, and subcortical areas than mothers with depression only. Heschl's Gyrus in the temporal lobe is associated with auditory processing of speech. This result may suggest that the cry is being appropriately interpreted not simply as than noise but as speech. Even at 18 months when verbal communication has typically begun to develop, a cry may express more than the child is able to communicate with speech. For the mothers with depression and anxiety, this speech auditory processing appeared to be more prevalent than for the mothers with depression alone. Activation in Heschl's gyrus also spread to the Planum Temporale, which is involved in locating sounds in space. This may indicate that the mothers are asking, "Where is my baby, and what is my baby trying to tell me?"

Comorbid mothers also showed more activation in paralimbic and subcortical areas important for social-emotional functioning. The frontal orbital cortex is involved in processing internal states, especially emotion. The insula is also implicated in subjective emotional responses and in

empathy, especially for pain. Empathy for pain is appropriate in this context because of the method used to obtain the cry sound from the baby. Therefore, the attentional bias of anxiety in these comorbid mothers may give mothers an increased awareness of the distress communicated in their babies' cries.

Additionally, comorbid mothers activated more in the primary motor cortex and supplementary motor area. Activation in these regions is consistent with planning or imagining movement. The specific motor area identified here has been associated with the arm and hand, possibly suggesting that these mothers were thinking more about holding or moving toward their baby. Further research examining behavioral maternal response in these populations could determine if the activation in the arm and hand regions is associated more with comforting or intrusive behaviors.

Mothers with anxiety also showed more activation to their infant's cry in the thalamus. This area activates as part of a basic parental response and had previously been shown to be more active in control compared to depressed mothers in this sample. While the mothers with anxiety typically activated more than mothers without anxiety, they still did not activate as much as the control group, a result that was expected, based on behavioral differences seen in mothers suffering from depression and the underlying neural activation as examined in the original study.

Control mothers showed widespread areas of greater activation than the depressed group but they only activated more in a few areas when compared with the comorbid mothers. These few areas, however, are crucial to effective and sensitive parenting. Compared to the mothers with depression and anxiety, control mothers activated more in the inferior frontal gyrus, an area associated with language processing. This difference suggests that control mothers are thinking more about what their baby is

trying to say than are the mothers with depression and anxiety. Indeed, the relative increased activation in the inferior frontal gyrus is associated with “mirroring” speech vocalization. This is a good illustration of the way in which the mothers with the comorbid anxiety diagnosis are activating more than the mothers with just depression, and in turn the control mothers are activating more than the mothers with the comorbidity. Paying attention to what the child is trying to communicate is part of sensitive parenting, a skill that is often negatively impacted by depression and anxiety.

Another important area involved in emotion and attention regulation processes, the cingulate gyrus, activated more for the control mothers than the comorbid mothers. While the mothers with depression and anxiety showed greater overall activation to their children’s cry sounds as compared to the mothers with depression without anxiety, they did not show the same degree of activation as the control mothers. Monitoring salient cues and regulating one’s own response is another important aspect of sensitive parenting. Mothers with depression and anxiety may appear to be paying more attention to their infant’s cry than mothers with pure depression, but without adequate resources for regulating their attention or emotional reaction, these mothers may be displaying the intrusive behaviors such as those found in Karl’s study (2005).

Differences in sensitive parenting between mothers with no psychiatric diagnoses and those with depression, including those with comorbid anxiety, may also be related to the differences seen in responsivity of the nucleus accumbens. Greater activation in the striatum—the nucleus accumbens, putamen, and caudate—imply a greater infant-related reward and approach motivation in the control mothers than in mothers with depression. Depression often results in a lack of motivation, and these findings are consistent with past research on the effects of depression. The fact that mothers with depression and anxiety showed no difference in this

area compared to depression alone suggests this component of maternal response is not as differentially maintained as the response interpretation components discussed above, and anxiety may be more universally blunted by the experience of depression.

Musser, Kaiser-Laurent, and Ablow (2012) examined the behavioral response of these mothers to their infants in an earlier study to determine the neural correlates related to sensitivity. Overlap between certain regions may help to explain why depressed mothers often show less sensitivity to their infants. For example, those mothers who showed more activation in the inferior frontal gyrus, an area that was found to be more responsive in the control group of the current study, were more sensitive to their infants' cues in the observed interactions. In fact, the left anterior insula and temporal pole associated with a trend in greater intrusiveness showed greater activation for mothers with depression and anxiety as compared to mothers with depression without anxiety in the current study. Future research will shed more light on neural correlates of behavioral differences between depressed vs. depressed and anxious mothers.

A limitation of this study is the restricted sample size and associated fixed effects analysis. Those factors precluded strong statements about application to clinical populations. Future research in larger and more varied samples is necessary to detect and interpret effects of depression comorbidity with specific types of anxiety disorders as well as other common comorbidities such as substance use and trauma-related disorders.

Despite these limitations, the current study contributes to research literature supporting a qualitative difference between depression and depression with anxiety. The neural mechanisms underlying maternal behavior are affected by the comorbid illness in several key frontal, temporal, and subcortical areas, suggesting differences in emotional information processing and affective regulation for those mothers

suffering from an anxiety disorder in conjunction with major depression. Considering the implications of these processes for parental sensitivity, parent child interactions, and child behavioral outcomes, understanding these differences may lead to more effective interventions.

References

- Bowlby, J. (1977). The making and breaking of affectional bonds. I. Aetiology and psychopathology in the light of attachment theory. An expanded version of the Fiftieth Maudsley Lecture, delivered before the Royal College of Psychiatrists, 19 November 1976. *The British Journal of Psychiatry*, 130(3), 201–210. doi:10.1192/bjp.130.3.201
- Bradley, B. P., Mogg, K., Millar, N., & White, J. (1995). Selective processing of negative information: Effects of clinical anxiety, concurrent depression, and awareness. *Journal of Abnormal Psychology*, 104(3), 532–536. doi:10.1037/0021-843X.104.3.532
- Bruder, G. E., Fong, R., Tenke, C. E., Leite, P., Towey, J. P., Stewart, J. E., ... Quitkin, F. M. (1997). Regional brain asymmetries in major depression with or without an anxiety disorder: A quantitative electroencephalographic study. *Biological Psychiatry*, 41(9), 939–948. doi:10.1016/S0006-3223(96)00260-0
- Demenescu, L. R., Kortekaas, R., den Boer, J. A., & Aleman, A. (2010). Impaired attribution of emotion to facial expressions in anxiety and major depression. *PLoS ONE*, 5(12), e15058. doi:10.1371/journal.pone.0015058
- Field, T., Diego, M., Hernandez-Reif, M., Schanberg, S., & Kuhn, C. (2003). Depressed mothers who are “good interaction” partners versus those who are withdrawn or intrusive. *Infant Behavior and Development*, 26, 238–252.
- Frizzo, G. B., Vivian, A. G., Piccinini, C. A., & Lopes, R. S. (2013). Crying as a form of parent–infant communication in the context of maternal depression. *Journal of Child and Family Studies*, 1–13.
- Gollan, J. K., Hoxha, D., Getch, S., Sankin, L., & Michon, R. (2013). Affective information processing in pregnancy and postpartum with and without major depression. *Psychiatry Research*. Retrieved from <http://www.sciencedirect.com/science/article/pii/S016517811200786X>
- Grohol, J. M. (2013, May 7). DSM says no to anxiety-depressive syndrome, yes to autism revisions - World of Psychology. *Psych Central.com*. Retrieved May 7, 2013, from <http://psychcentral.com/blog/archives/2012/05/09/dsm-says-no-to-anxiety-depressive-syndrome-yes-to-austim-revisions/>
- Joormann, J., & Gotlib, I. H. (2007). Selective attention to emotional faces following recovery from depression. *Journal of Abnormal Psychology*, 116(1), 80–85. doi:10.1037/0021-843X.116.1.80
- Karl, D. (1995). Maternal responsiveness of socially high-risk mothers to the elicitation cues of their 7-month-old infants. *Journal of Pediatric Nursing*, 10(4), 254–263. doi:10.1016/S0882-5963(05)80022-3

- Killeen, L. A., & Teti, D. M. (2012). Mothers' frontal EEG asymmetry in response to infant emotion states and mother-infant emotional availability, emotional experience, and internalizing symptoms. *Development and Psychopathology*, 24(1), 9–21. doi:10.1017/S0954579411000629
- Laurent, H. K., & Ablow, J. C. (2012). A cry in the dark: depressed mothers show reduced neural activation to their own infant's cry. *Social Cognitive and Affective Neuroscience*, 7(2), 125–134. doi:10.1093/scan/nsq091
- Laurent, H. K., & Ablow, J. C. (2013). A face a mother could love: Depression-related maternal neural responses to infant emotion faces. *Social Neuroscience*, 8(3), 228–239. doi:10.1080/17470919.2012.762039
- Laurent, H. K., Stevens, A., & Ablow, J. C. (2011). Neural Correlates of Hypothalamic-Pituitary-Adrenal Regulation of Mothers with Their Infants. *Biological Psychiatry*, 70(9), 826–832. doi:10.1016/j.biopsych.2011.06.011
- Lorberbaum, J. P., Newman, J. D., Dubno, J. R., Horwitz, A. R., Nahas, Z., Teneback, C. C., George, M. S. (1999). Feasibility of using fMRI to study mothers responding to infant cries. *Depression and Anxiety*, 10(3), 99–104. doi:10.1002/(SICI)1520-6394(1999)10:3<99::AID-DA2>3.0.CO;2-#
- Musser, E. D., Kaiser-Laurent, H., & Ablow, J. C. (2012). The neural correlates of maternal sensitivity: An fMRI study. *Developmental Cognitive Neuroscience*, 2(4), 428–436. doi:10.1016/j.dcn.2012.04.003
- Swain, J. E., Lorberbaum, J. P., Kose, S., & Strathearn, L. (2007). Brain basis of early parent–infant interactions: psychology, physiology, and in vivo functional neuroimaging studies. *Journal of Child Psychology and Psychiatry*, 48(3-4), 262–287.
- Swain, J. E., Tasgin, E., Mayes, L. C., Feldman, R., Todd Constable, R., & Leckman, J. F. (2008). Maternal brain response to own baby-cry is affected by cesarean section delivery. *Journal of Child Psychology and Psychiatry*, 49(10), 1042–1052. doi:10.1111/j.1469-7610.2008.01963.x
- Youngstrom, E., Izard, C., & Ackerman, B. (1999). Dysphoria-related bias in maternal ratings of children. *Journal of Consulting and Clinical Psychology*, 67(6), 905–916. doi:10.1037/0022-006X.67.6.905
- Zeskind, P. S., & Lester, B. M. (1978). Acoustic Features and Auditory Perceptions of the Cries of Newborns with Prenatal and Perinatal Complications. *Child Development*, 49(3), 580–589. doi:10.2307/1128224

Table 1 Activation in mothers' response to infant cry by group differences

Group contrast	Region	L/R	X	Y	Z	Z _{max}	Volume (mm ³)
Depression > Depression + Anxiety	Frontal Pole	R	2	66	7	4.35	876
	Lingual Gyrus extending to Temporal and Occipital Fusiform Cortex, Parahippocampal Gyrus	L	-20	-43	-15	3.86	1539
Depression + Anxiety > Depression	Frontal Pole	L	-44	41	-7	4.77	4488
	Middle Frontal Gyrus extending to Inferior Frontal Gyrus	R	40	31	27	3.69	1437
		L	-43	31	27	4.54	1338
	Insular Cortex extending to Frontal Orbital Cortex, Putamen	R	27	21	-1	4.68	2592
	Precentral Gyrus extending to Inferior Frontal Gyrus	L	-36	12	22	4.08	822
	Supplementary Motor Cortex	L/R	1	0	66	4.82	1523
	Precentral Gyrus, Middle Frontal Gyrus	R	41	-1	55	4.85	3256
	Superior Frontal Gyrus	L	-16	-2	75	3.97	670
	Thalamus	L/R	-1	-8	2	4.43	1529
	Postcentral Gyrus	L	-57	-15	44	4.91	4530
	Precentral Gyrus	R	32	-16	68	4.3	724
	Heschl's Gyrus (includes H1 and H2),	R	49	-19	8	9.44	42469
	Planum Temporale	L	-54	-23	8	10.2	45589
	Precentral Gyrus	L	-6	-23	78	4.25	1508
	Superior Parietal Lobule	L	-29	-56	55	4.06	1831
	Frontal Pole	L	-13	45	47	4.51	2465

Table 1 Activation in mothers' response to infant cry by group differences

Group contrast	Region	L/R	X	Y	Z	Z _{max}	Volume (mm ³)
Control > Depression + Anxiety	Frontal Pole	L	-13	45	47	4.51	2465
		R	19	40	50	4.73	7706
	Frontal Medial Cortex	L	-5	43	-23	3.95	1223
	Anterior Cingulate Gyrus	R	6	29	23	3.81	891
	Inferior Frontal Gyrus	R	57	21	19	4.38	1173
	Superior Frontal Gyrus	R	10	19	66	3.97	2183
	Nucleus Accumbens, Putamen, Caudate	L	-11	11	-8	3.72	823
		R	9	10	-6	3.7	1769
	Supramarginal Gyrus, extending to Angular Gyrus	R	46	-46	45	4.18	781
	Occipital Pole	L	-11	-105	-7	4.54	2454
Control > Depression		L	-8	61	24	4.14	654
	Frontal Pole	R	45	54	-7	3.25	827
	Superior Frontal Gyrus	L	-4	29	59	3.67	1045
	Supplementary Motor Cortex	L/R	1	-1	70	5.33	4697
	Precentral Gyrus	L	-53	-13	45	5.17	3802
		R	33	-16	68	4.21	1005
	Heschl's Gyrus (includes H1 and H2)	R	49	-19	7	11.4	129550
	Postcentral Gyrus, extending to Superior Parietal Lobule	L	-30	-37	67	3.77	978
	Precuneous Cortex extending to Posterior Cingulate Gyrus	L	-13	-47	38	3.91	843

Beyond Depression: Mothers with Comorbidity Differ in Neural Response to Infants' Cry

Cetacean Hunting in Oregon: Perspectives from Tillamook and Clatsop Ethnographic and Ethnohistorical Records

Gabriel Sanchez
Anthropology

Faculty Mentor: Jon Erlandson
Anthropology, Museum of Natural and Cultural History

Mentor: Eirik Thorsgard
Tribal Historic Preservation Officer
Cultural Protection Program of
The Confederated Tribes of Grand Ronde

Project Summary

The Tribal Historic Preservation Office in the Land and Culture Department of the Confederated Tribes of Grand Ronde Indian Community of Oregon (CTGR) is creating an ethnographic and ethnohistorical database to quantify ethnographic data related to the Northern Oregon Coast. Specifically, the area of interest is the historic land and sea base of two distinct tribes, the Salish speaking Tillamook and the Chinookan speaking Clatsop, who lived near the mouth of the Columbia River. As an intern in the Tribal Historic Preservation Office of the CTGR, I helped analyze and organize the previously created ethnographic database. The purposes of the database are to provide quantitative figures in the interpretation of oral histories and pursue the validation or negation of the ethnographic data through archaeological investigations. These ethnographic data were recorded using Geographic Information Systems (GIS) software to provide a geographic representation of the material.

Because of the high prevalence of ethnographic information related to cetaceans (whales, porpoises, and dolphins) and the long-held anthropological perspectives asserting that the hunting of whales was not carried out by Oregon's coastal tribes, I sought to investigate the ethnographic data to further understand the use of cetaceans in the region. The current project is important owing to the limited understanding of cetacean use within Oregon and the potential that such species were hunted in antiquity. The summary is directed toward anthropologists working along the Pacific Northwest Coast and is grounded in the theory of maritime adaptations of coastal hunter, gatherer, and fisher peoples exhibiting maritime adaptations along the Pacific Rim of North America.

Introduction

In this paper I explore the importance of whales and other cetaceans to prehistoric people who inhabited the northern Oregon Coast from the mouth of the Salmon River northward to the mouth of the Columbia River. This area is thought to be associated with the Tillamook and Clatsop tribes, both exhibiting maritime adaptations. Maritime cultures are considered to have acquired a large portion of their caloric or protein intake from marine resources. Historically, anthropologists have recognized as whaling cultures in the Pacific Northwest only communities located farther north in Washington (Makah, Quinault, and Chehalis) and on Vancouver Island, British Columbia, (Nuu-chah-nulth and Ditidaht) (Losey and Yang 2007; Underhill 1978). However, ethnographic and ethno-historical data document the practice of whale hunting and scavenging occurring along the Oregon Coast. For example, a historical reference of whale hunting by the Siuslaw (located south of the project area) states:

It took about a year to make one of those graceful, powerful war canoes, a craft in which they journeyed 75 to 100 miles into the ocean on whaling expeditions, catching whales weighing 60 to 80

tons. In towing these heavy loads they formed the canoes into a long chain for added power (Knowles 1965:9).

Such historical accounts provide anthropologists the opportunity to speculate that whaling could have occurred along the Oregon Coast during pre-historic times.

Recently, Robert Losey and Dongya Yang (2007) demonstrated that opportunistic whale hunting was conducted by the inhabitants of the Par-Tee site, located in Seaside, Oregon. Losey and Yang found a broken elk bone harpoon tip imbedded within a humpback whale (*Megaptera novae-angliae*) bone. A DNA analysis of the harpoon tip demonstrated that the elk DNA matched the unmodified elk bone within the larger site collection, suggesting that the tool was made and used locally (Losey and Yang 2007:669). However, Losey and Yang did not address ethnographic and ethno-historical data relevant to whale hunting among the Tillamook and Clatsop tribes, data that suggest whaling may have occurred historically in the region.

This paper expands on the research initiated by Losey and Yang (2007) by analyzing ethnographic and ethno-historical data pertaining to whales, whale hunting, and whale scavenging among the Tillamook and Clatsop Tribes.

Maritime Adaptations on the Northwest Coast

The Oregon Coast comprises a portion of the kelp forests that run discontinuously from Japan to South America. Research has demonstrated that the peopling of the Americas likely occurred along this rich resource belt often termed the Kelp Highway or the Pacific Rim Highway (Erlandson et al. 2007; Erlandson and Braje 2011:29). This research suggests that maritime cultures within Oregon may have significant time depth. However, current understanding of ancient coastal sites beyond 5000 years is

limited in Oregon because of sea level rise, tectonic forces, tsunamis, and erosion (Erlandson et al. 1998), all of which appear to have destroyed or altered the older portions of the archaeological record.

The Oregon Coast is part of the Pacific Northwest Coast Culture Area that encompasses the area from Cape Mendocino in Northern California to Yakutat Bay in Alaska (Aikens, Connolly, and Jenkins 2011:211; Lightfoot 1993:167). Differences exist between the Northern and Southern Northwest Coastal regions. In Alaska and segments of British Columbia the bordering mountains are steep and high. Although generally lacking coastal plains, those coastal areas include numerous offshore islands and protected marine waters. This results in coastal areas that are more accessible to coastal peoples than inland terrestrial areas. In contrast, California, Oregon, and Washington contain much larger areas of unprotected, high energy coastlines with less imposing coastal mountains and coastal plains, making terrestrial species more available (Aikens, Connolly, and Jenkins 2011:212–213; Drucker 1955:5; Moss and Erlandson 1995:6–8). Thus, in studying subsistence practices within different coastal areas, anthropologists expect to find a higher emphasis on marine species where terrestrial species are more limited.

Anthropologists differ in their interpretations of maritime culture or maritime adaptations and the prerequisites for defining these cultural patterns. One implication is that maritime groups lived near and attained a significant portion of their subsistence from the sea, possessed seaworthy watercraft, potentially hunted large sea mammals, and obtained some foods from resources beyond the littoral zone (Workman and McCartney 1998:361–362). Often, extensive sea mammal hunting, deep sea fishing, semi-sedentary villages (containing semi-subterranean houses), and the accumulation of large shell middens have been considered hallmarks of maritime cultures (Lightfoot 1993:175; Workman and McCartney

1998:364). These cultures, often termed “complex hunters, gatherers, and fishers,” live relatively sedentary lives based on large-scale food processing and storage, the presence of large houses, complex technologies, higher populations, the ability to affect their surrounding environment, the accumulation of large shell middens, and developed social complexity characterized by occupation specialization and social stratification (Ames 1999:25–28; Aikens, Connolly, and Jenkins 2011:212–217; Butler and Campbell 2004:328; Lightfoot 1993:178; Erlandson et al. 1998:9). The features outlined above are evident in the Northwest Coast and the project area.

Shellfish use, suggested by the well-developed middens, becomes apparent in the Northwest Coast around 5000 BP (Lightfoot 1993:173; Workman and McCartney 1998:364). The oldest known fish trap associated with mass storage of fish on the southern Northwest Coast is dated to ca. 2400 BP (Erlandson et al. 1998:15; Tveskov and Erlandson 2003). The specialized sea mammal hunting technology (i.e., the composite “toggling” harpoon) is present on the central Northwest Coast by 3000 BP, with barbed bone dart points present between 6000 BP and 5000 BP (Workman and McCartney 1998:365). The oldest large rectangular structure on the Northern Oregon Coast (Palmrose site 35CLT47) has been dated to 2600 BP and 1700 BP (Phebus and Drucker 1979:9; Connolly 1992; Aikens, Connolly, and Jenkins 2011:247). It was not until the Late Holocene (~3500 years ago) that a vast majority of archaeological sites along the southern Northwest Coast exhibited the prerequisites for complex hunters, gatherers, and fishers with maritime adaptations (Erlandson et al. 1998:9–10; Moss and Erlandson 1995:14). The dearth of old sites along the Oregon Coast makes it difficult to understand the deeper history of the evolution of maritime cultures in the area.

Ethnographic Background

The Tillamook and Clatsop peoples inhabited a large geographic area that extended from near the mouth of the Columbia River (Clatsop) and continuing south to the Siletz River (Tillamook) (Verne 1975:123; Jacobs and Seaburg 2003:2; Aikens, Connolly, and Jenkins 2011:216). During the historical era, the interface of these two tribes was located near the present location of Seaside, Oregon (Lewis et al. 1904:vol. 3; Jacobs and Seaburg 2003:2). It is unknown if this boundary extends back to pre-contact times, or if this was a recent phenomenon caused by population loss and displacement. However, the Clatsop and Tillamook people shared a close cultural connection, and members of both groups often intermarried (Jacobs and Seaburg 2003:4; Arbolino et al. 2005:6). During the historical period Clatsop tribal members also adopted the Tillamook language (Boas 1894; Jacobs and Seaburg 2003:4; Arbolino et al. 2005:6). Today members of the Tillamook and Clatsop are represented at the CTGR, the Confederated Tribes of Siletz Indians of Oregon, within the federally unrecognized Clatsop-Nehalem Confederated Tribes, the federally unrecognized Chinook Nation, and other tribal communities.

Given the evidence that the Tillamook and Clatsop have shared a common territory, a certain amount of cultural overlap has occurred. Because ethnographic research suggests that cetacean hunting may have occurred within both groups, the ethnographic information of these populations may be addressed together.

Tillamook

The word Tillamook is a Chinook word meaning “Those of Nehalem” (Boas 1965:3; Crawford 1983:4; Edel 1939:2). The Tillamook represent the southern extent of the coastal Salish (Boas 1898:23) and were divided into two main groups: the Nehalem of the north and the Siletz in the south

(Edel 1939:2). The Tillamook language was spoken along the northern Oregon Coast and along all coastal rivers south to Siletz (Edel 1939:2; Jacobs and Seaburg 2003:2).

Dialect variations existed within the Tillamook language, including Nehalem, Tillamook, Nestucca, Salmon River, and Siletz (Crawford 1983:4). However, concerning the Tillamooks, Melville Jacobs stated: "All one has a right to say is that river villages, speaking a number of Tillamook-Siletz provincialisms, occupied or possessed this territory. They were neither one tribe, nor two tribes, nor many tribes" (Jacobs and Seaburg 2003:2). In 1805, Lewis and Clark noted the similarities of the Tillamook (Kil-a-mox) and Clatsop, "The Kil-a-mox in their habits and customs, manner, dress and language differ but little from the Clatsops, Chinooks and others in the neighborhood" (Lewis et al. 1904:vol. 3:326).

Linguistic data suggest that the Tillamook migrated southward from the Strait of Georgia or Puget Sound region. Although anthropologists have provided no specific dates for when that potential migration occurred, the northern region exhibits Salishan-Marpole phase sites similar to the Palmrose site in the Seaside area, suggesting a migration 2400 RYBP and 1500-1000 RYBP (Moss 2011:98). Tribes from the northern region near the Strait of Georgia and Puget Sound conducted whale hunting to some extent; thus an ancient link to whaling witnessed in Oregon could be tied to a migration from the northern region. However, further research is needed to confirm the connection. In addition, linguists have concluded that Tillamook and Chinook languages had converged grammatically, demonstrating the close relationship of these two distinct people (Arbolino et al. 2005:8-9).

Clatsop

The Clatsop are Penutian speakers of the Chinookan tribe living from the south bank of the Columbia River along the Clatsop Plains and

inland (Verne 1975). The Chinook and Clatsop were renowned traders and fishermen who demonstrated superb canoe handling and navigation skills (Lewis et al. 1904:vol. 3 part. 2; Verne 1975). The Chinook facilitated trade north and south along the coast and into the interior (Drucker 1955:12; Braun 1999:30). Items traded included whale meat, blubber, and oil obtained through trade with the Makah, Nuu-chah-nulth and Quinault (Braun 1999: 32). However, according to ethnographic and ethno-historical sources, these resources were also acquired locally (Lewis et al. 1904:vol. 3: 324-325; Ray 1938:114; Deur 2005: 117). During the historical era the Clatsop adopted a variety of languages such as Tillamook and Chehalis (Boas 1894).

The Clatsop have inhabited the Clatsop Plains for many generations. This is supported by tribal oral traditions including a creation story related to the formation of the Clatsop Plains which began around 3,500 years ago (Evans and Hatch 1999: 13). The indigenous knowledge of the geomorphology of the region (see Connolly 1992; Connolly 1995) could provide a time marker for habitation as many native oral histories are based on aboriginal knowledge.

Archaeological Investigations Based on Ethnographic Information

Anthropologists differ on the validity of oral traditions and histories and their use in archaeological research. The issue of validity is compounded when ethnographic information is applied to ancient sites. Oral histories are accounts told by individuals of events that happened during their lifetimes whereas oral traditions are accounts transmitted orally from one generation to another (Lightfoot 2005:16). Prior research investigating ethnographic and ethno-historical data has had varied results. For example, intensive salmon fishing is often linked to the growth of social complexity and sedentism within the region (Workman and McCartney

1998:367). Some researchers, however, have noted that estimates of salmon consumption within Northwest sites have been inflated and other fish often underrepresented (Tveskov and Erlandson 2003; Butler and Campbell 2004:330).

Tveskov and Erlandson (2003) have demonstrated that the archaeology of tidal fish weirs support native oral histories related to the technology, with weirs dating to 2000-3000 years ago. Tidal fish weirs were used during salmon runs but were also part of the day to day life of indigenous peoples catching a variety of fish species.

Research, based on indigenous knowledge and western science, has shed light on geologic forces and the effects that earthquakes and other natural disasters have had on native populations. The Cascadia Subduction Zone is familiar to geologists and anthropologists within the region. McMillan and Hutchinson (2002) demonstrated that Northwest indigenous knowledge related to earthquakes, landslides, and tsunamis had validity when viewed alongside current geologic data. Indigenous knowledge related to geologic events often involved mythological figures that created earthquakes and tsunamis. Although not all events within oral traditions were datable, recent accounts of a Cascadia subduction earthquake and tsunami in AD 1700 were recounted by many indigenous communities demonstrating the accuracy of traditional oral histories during the last hundred years.

Therefore research based on oral traditions previously conducted within the region has demonstrated that native oral histories and traditions can provide valuable insights into geologic and archaeological investigations.

Quantifying Ethnographic Data

An ethnographic and ethno-historical data set was established by the CTGR Tribal Historic Preservation Office, Land and Culture Department. This data set provides the foundation for the ethnographic section of this

project supplemented by ethnographic research conducted by the primary author. Entries in the database documented the reference's description of faunal resources with data recorded for the variable type, common name, Latin names, date, season, month, use, source, and page number. (See Appendix for an extract of the database.)

Analyzing the quantified ethnographic data of fauna that totaled 1,260 entries, I found that 600 entries, 47.6% of all accounts, represented mammals. The two additional fauna with significant percentages were fish (20.6%) and shellfish (11.6%). Accounts of mammals were dominated by elk (18.5%), whale and porpoise (10.3%), deer (9.5%), beaver (7.5%) and bear (6.8%). Additional marine resources such as sea otter (2.6 percent), sea lion (3%), and seal (4.3%) also account for significant percentages of the data. Based on the high frequency of whale and porpoise, seals, sea lions, and sea otters within the ethnographic data, I focused on marine mammals for my research. I was particularly interested in the gap between the ethno-historic significance of cetaceans and archaeological evidence for the hunting of such animals on the Northern Oregon Coast.

Note on Ethnographic Information: Population Loss and Site Antiquity

Three archaeological sites within the Seaside area are well recognized today. In order of antiquity they include the Palmrose site (35CLT47) (800 BC to AD 400), the Par-Tee site (35CLT20) (AD 300 to 1150), and the Avenue Q site (35CLT13) (AD 400 to 1000) (Arbolino et al. 2005:12–16). Because of the antiquity of the sites, the application of ethnographic data in interpreting their archaeological materials may be viewed as speculative. However, I seek to demonstrate that the concepts and practices represented within the ethnographic data could provide a lens into prehistoric customs.

There are pros and cons related to the use of ethnographic data in interpreting ancient sites. Researchers have suggested that archaeologists

should use archaeological evidence to test whether ethnographic models may be seen in antiquity (Moss and Erlandson 1995:29). However, Moss and Erlandson (1995) also cautioned that the combination of disease and land displacement following European contact had major effects on indigenous communities (Underhill 1978:32–33).

On the Northern Oregon Coast Lewis and Clark noted the effects of European diseases on the Clatsop: “This nation (Clatsop) is the remains of a large nation destroyed by the Small pox [sic] or Some other [diseases] which those people were not acquainted with” (Lewis et al. 1904:vol.3: 245). In addition, researchers have noted other illnesses such as sexually transmitted diseases, which were introduced by sailors and traders within the Columbia River region as early as the 1780s (Thornton 1987:83). Lewis and Clark also noted the potential that procreation between natives and Europeans had occurred; the expedition met a member of the Clatsop of whom they stated:

With the party of the Clatsops who visited us last was a man of much lighter Coloured than the natives are generally, he was freckled with long duskey red hair, about 25 years of age, and must certainly be half white at least, this man appeared to understand more of the English language than the others of his party, but did not Speak a word of English, he possessed all the habits of the Indians (Lewis et al. 1904:vol. 3:301).

For more information of early European contact, see *Log of the Columbia 1790-1792* (Massachusetts Historical Society 1920).

Mortality estimates associated with Old World disease epidemics in the Columbia River region vary from 80 to 95 percent population loss dependent upon area and population density (Ramenofsky 1987:7–8; Aikens, Connolly, and Jenkins 2011:411–412). Smallpox outbreaks began as early as 1775 and continued into 1853, right before the reservation era.

Campbell (1990) suggested smallpox may have spread from Mesoamerica to the Pacific Northwest during the 1520s. However, Boyd (1999: 16) states that the hypothesis of a smallpox related population decline must be tested in comparable archaeological regions before the hypothesis of a sixteenth century smallpox epidemic can be accepted. Other diseases affected natives within the region such as venereal disease, measles, malaria, influenza, and dysentery (Aikens, Connolly, and Jenkins 2011:410–415). The combined effects of disease and removal from aboriginal lands must be understood in order to make sense of the ethnographic record. Yet, the ethnographic information may be viewed as a means of deeper interpretation of the archaeological record.

Lewis and Clark provided insight into the lifeways of Northwest tribes half a century before the reservation era began in the late 1850s. During the late nineteenth century, when researchers such as Franz Boas were recording oral histories in Oregon, attempts to assimilate native peoples were already underway. As many native people became wary of Europeans, researchers were limited to a small number of consultants willing to speak with anthropologists. Often, researchers conducted redundant questioning (confirming the accuracy of previous work) with a limited number of subjects. Beginning with Gatschet in 1877 through Crawford in 1977–78, fourteen anthropologists over a century spent a total of fifteen months with the Tillamook (Jacobs and Seaburg 2003:9-29).

Edel (1944) has demonstrated that Tillamook oral histories and narrations exhibit stability through time. Edel collected tales from Clara Pearson and many in Tillamook in 1931. Bess Langdon, three years later, collected talks from Clara Pearson in English. Although the two works were collected under different conditions with a time span between each recital, the texts are nearly identical. Lewis and Clark also noted that natives demonstrated great memory reciting the names of sailors, the months that trade occurred, and the items traded within the region.

Ethnographic Data: Lewis and Clark and the Ethnographic Era

Ethnographic data demonstrate that the Tillamook and Clatsop were knowledgeable in whale processing. It is important to clarify whether that knowledge arose from active whale hunting, opportunistic whaling, whale scavenging, or a combination of the three.

The journals of Lewis and Clark provide the insight into the lives of Clatsop and Tillamook people nearly a century before ethnographers began research within Oregon. Beginning in November 1805 and continuing into 1806, Lewis and Clark had constant contact with the Tillamook and Clatsop in the form of trade, conversations, and observations while living at Fort Clatsop (Lewis et al. 1904:vol 3 part 2; Verne 1975). During that period, the tribes inhabiting the Columbia River were already familiar with Europeans. Lewis and Clark noted that, "The Clatsops, Chinooks, Killamucks [Tillamooks] &c. are very loquacious and inquisitive; they possess good memories and have repeated to us the names capacities of the vessels &c. of many traders and others who have visited the mouth of this river" (Lewis et al. 1904: vol. 3:305-307). A list of 13 traders and vessels who visited the natives for the purpose of trade and hunting were furnished to Lewis and Clark by the natives of the area (Lewis et al. 1904:vol. 3:306).

The contact between the natives and outsiders was noted by explorers who witnessed the natives scavenging sturgeon that were left by the tide and recorded an Indian stating in English, "Sturgeon was very good" (Lewis et al. 1904:vol. 3:276). However, what is most relevant to this project is that Lewis and Clark recorded an instance of whale processing.

On Friday, December 27, 1805, Lewis and Clark sent out two men to make salt. As the men camped near Seaside, Oregon, on December 29, 1805 (Lewis et al. 1904:vol. 3:291), there was a report from the natives that a "whale has floundered" on the coast. The expedition wanted to ac-

quire some “whale oyle” from the natives, but the weather and the party’s inability to navigate the waters delayed the expedition from reaching the whale (Lewis et al. 1904:vol. 3:293-296).

On January 3, 1806, the Clatsops arrived to trade with Lewis and Clark, bringing berries, roots, dogs, and fresh blubber that had been obtained from the Tillamooks. Lewis and Clark stated that the “blubber the Indians eat and esteeme it excellent food” (Lewis et al. 1904:vol. 3). Further reports of the whale continue on January 5 when two members of the expedition returned from salt making 15 miles southwest of Fort Clatsop (Seaside) near the houses of certain Clatsop and Tillamook families. The tribes had been very friendly with the explorers and had provided them with whale blubber. After this report, Clark became determined to acquire more whale blubber and oil. While heading toward the village, Clark viewed a Tillamook canoe burial ground and proceeded to the whale. Clark noted while approaching the whale:

[we] crossed a creek 80 yards near 5 cabins, and proceeded to the place the whale had perished, [we] found only the Skelleton of this monster on the sand between (2 of) the villages of the Kilamox nation; the whale was already pillaged of every valuable part by the Kilamox indians...this skeleton measured 105 feet. I returned to the village of 5 cabins on the creek which I shall call E-co-la or Whale creek, [I] found the nativ[e]s busily engaged boiling the blubber, which they performed in a large squar[e] wooden trough [trough] by means of hot stones; the oil when extracted was secured in bladders and the Guts of the whale; the blubber from which the oil was only partially extracted by this process, was laid by in their cabins in large flickes [fliches] for use; those flickes they usually expose to the fire on a wooden Spit until it is prutty wormed through and then eate it either alone or with roots of the rush or Diped in the oil (Lewis et al. 1904:vol. 3:324-325).

A later report of whale use came from Warren Vaughan who in 1853

witnessed natives near Cannon Beach, Oregon, butchering and processing a “captured” whale (Deur 2005:118). The natives were in the process of extracting the blubber in canoes (as described above). Further evidence of whale processing via this method is given by Tillamook native Louie Fuller in the 1940s to anthropologist John P. Harrington:

My father told me what I never got to see, that the [Indians would] put water in a small canoe and then would put whale meat & hot rocks in just a little while the whale meat would be boiled & ready to eat. Or they boiled a whole quarter of an elk in this same way & when done would take it out & cut it up & eat it as they would (Deur 2005:118).

These passages demonstrate the knowledge of whale processing and the value this species represented to the indigenous populations of the northern Oregon Coast. However, the passage does not provide direct evidence of whaling. Nevertheless, it is known that whale was highly valued and prescribed regulations were observed during the processing of scavenged animals. Oral histories of the Clatsop people recorded by Boas (1894:263) state that when the Clatsop found a whale (beached) they placed holes in the skin and tied straps to it, or kelp if straps were not at hand, for themselves and their relatives (thus delineating their portion of the whale). When the people arrive to cut the whale, they did so in their respective portion. Those who arrived last took the lower portion of the whale. These observations demonstrate that beached whales were scavenged and utilized. But, it is unknown whether whales were actively hunted. However, Clark noted the potential of whale hunting within the project area:

The whale is sometimes pursued, harpooned, and taken by the Indians of this coast; though I believe it is much more frequently killed by running on the rocks of the coast S.S.W. in violent

storms, and thrown on different parts of the coast by the winds and the tide. In either case the Indians preserve and eat the blubber and oil (Ray 1938:114).

The above passage provides insight into the possibility that whaling occurred within the region. Further ethnographic information also supports the possibility of whale hunting. For example, the hunting of whale by Tillamook and Clatsop people is mentioned by Louis Fuller in a 1940s interview with anthropologist John P. Harrington:

when I ask about the California Redwood [kikfLLfx], says that sometimes the ocean brings floating redwoods way up to the Tillamook coast & such a tree is worth a lot to the indian, that is, if he finds one that is not hollow inside, some of them are hollow... The inds. Make a canoe of it for going out to kill whale & seals (Deur 2005: 117).

This supports the possibility that some whale hunting occurred among the Tillamook people and demonstrates that the Tillamook culture was based on both maritime and terrestrial subsistence. Additional evidence of the importance of whale has been found in ethnographic interviews from the Lower Chinook:

This fish (salmon) was of primary importance to the natives, but sturgeon, trout, smelt, herring, and flatfish played each an important economic role. In addition, sea mammals including the seal, porpoise, and whale were extensively utilized (Ray 1938:46).

Hence, ethnographic data supports whale being an important subsistence resource but does not clearly clarify the procurement process. However, large portions of ethnographic data from the region remain in collections unpublished or under investigated. Future research with such collections may reveal further accounts of sea mammal use within the region.

Franz Boas Whale Tales and other Ethnographic Whale Taboos

Franz Boas collected the following Tillamook materials during a field season in 1890 at the Siletz Indian Reservation. The texts are oral histories that demonstrate the extent of whaling and whale scavenging by Tillamook and Clatsop peoples. I have summarized the oral histories discussed below.

In one oral history a man goes to the sea and finds a beached whale. The people of the village came together to butcher the whale. The man who had found the whale cut open the whale stomach and went inside. However, the people who were butchering the whale became angry because the man had cut right into the body of the whale. Someone then wished that the whale would go back out to sea, which it did. After a year at sea the man was finally returned to his people when encountering a canoe (Boas 1965:12–13).

The oral history reveals that whales were to be respected by the people and that particular taboos were followed when processing whale showing that the Tillamook were familiar with whale processing.

Another oral history collected by Boas and later Elizabeth Jacobs (1959) illustrates the cultural and mythological importance of whale and Thunderbird, a prominent figure in Tillamook and Clatsop mythology. The oral history links whales to Thunderbird, believed to be the creator of the Clatsop and Tillamook people, and mentions whaling, the beaching of whales, and the economic importance of whales to the people.

In the narrative a man went out to catch salmon. On his journey he encountered Thunderbird who carried the man to his country (on the other side of the ocean). They entered Thunderbird's home, which was made of whale skin and whose entrance was the mouth of a whale. One evening the man went out and saw people fishing with "torches." Thunderbird advised the man that the people were catching salmon meaning, however, that they were catching

whales. In the morning the man seen that the canoes had many caught whales. After a year Thunderbird returned the man to his people at Nestucka and carried with him two large whales. The people found the man and he sang. The next day he instructed the people to go to the location where they had found him. The people found that two whales had beached at that location. The man instructed them to not carve the whales and instead he went and carved the whales. People from all around came to buy whale oil from the Nestucka people and brought dentalia and other valuable shells (Boas 1965:14–15).

In another account that Boas collected (Boas 1898:23–27), similar events took place at Slab creek. Although there is some variation in that text and the one above, they contain the same basic framework. Various oral histories describe a whale hunter who has the power to sing, thereby bringing whales to the people.

In a further account a man goes into the wilderness to attain “power.” He was gone for a year and when he returned he climbed a rock on the Nestucka River. Later he was found singing with his face painted and with his head covered in feathers. He was brought back to his people and dances were held. One morning he instructed three boys to go to the mountains and to take only their knives and butcher the elk the man had previously killed. The boys did as instructed and found four elks in the mountains slaughtered. Afterwards the man instructed the boys to go the sea and bring back whale meat. In the same manner the boys brought back whale meat. Therefore, whenever the people needed meat the man would sing and he would get elk and whales for the people, and he was paid (Boas 1965:15–16).

The ability to bring whales to the people has also been noted to have existed within the Chinookan worldview.

A Chinook with the proper spirit power would set up a pole on the beach and in that location a whale would drift ashore. Then the

man would sing for five days. On the sixth day a whale would be within that location (Underhill 1978:32–33).

The oral history related to the creation of the Tillamook and Clatsop people also suggests the importance of Thunderbird and whale to the people of the region.

The cultural significance of whale to the Clatsop and Tillamook can also be understood by an oral history connecting a sacred site and the location of a creation myth with whale consumption.

Harrington's consultants recalled stories of Thunderbird dwelling atop Saddle Mountain and eating whales there. The importance of Saddle Mountain to the indigenous peoples of the area can be understood as oral tradition states, "Clatsop oral tradition, and probably those of other area tribes, indicate that the first Clatsops, Chinooks, Nehalem, Tillamooks, and others were created at the top of Saddle Mountain" (Deur 2005:85).

The oral histories and ethno-historical data cited above demonstrate the potential that Tillamook and Clatsop populations may have hunted and utilized whales as long as they have lived along the Oregon Coast. However, for the ethnographic data to be accepted by anthropologists, the data will need to be confirmed archaeologically. The potential for that confirmation exists because archaeological sites on the Oregon Coast (Par-Tee, Palmrose, and Avenue Q) can be attributed to Tillamook and Clatsop communities. Therefore, the ability to test maritime adaptations within the region is a potential research project, which to some extent has been initiated by the primary author (harpoon artifact analysis, radiocarbon dating, and blood residue analysis), but further research is needed to confirm whale use in the region.

Discussion and Conclusion

The ethnographic and ethno-historical data outlined above provides anthropologists the opportunity to further research the potential that cetaceans were extensively utilized on the Oregon Coast prior to the contact period. It is with this potential that I hope future archaeologists will integrate sea mammal studies within their research. Anthropologists have long believed cetacean hunting was confined to regions farther north than Oregon. However, the combined data demonstrate the potential that sea mammal hunting and maritime adaptations were found within areas that constitute modern day Oregon.

Ethnographic research suggests a cultural tradition of the importance of whales for the Tillamook and Clatsop people. However, the ethnographic data lacked information on the methods utilized in potential whale hunting other than the use of canoes and harpoons. Further, ethnographic research of unpublished works (i.e., The Jacobs Collection, University of Washington) could provide further insight into whale use and whaling activities (Deur Pers. Comm. 2013). However, the size of the collection and the limited time to complete this research project made such ethnographic work unfeasible. Future research should utilize such collections and extend the unpublished work available within the Southwest Oregon Research Project (SWORP) Collection at the University of Oregon. Both collections have the potential to contribute ethnographic data related to the use of sea mammals in the region.

Also, future research examining the three Seaside sites (Palmrose, Par-Tee, and Avenue Q) for evidence of whale use (i.e., strike marks, evidence of butchering, tool extraction, and an analysis of cetacean bones in the sites) may identify the extent of large sea mammal use in the Seaside region during the Late Holocene. However, such research will be difficult because of the fragmented nature of the collections housed at the Smith-

sonian Institution, Washington, D.C., the University of Oregon Museum of Natural and Cultural History, and private collections within Oregon, as well as the continued disturbance of the three sites owing to modern day activities.

In summary, anthropological research of cetacean hunting within Oregon has been understudied. The reason may be a long-term belief in the region that such large sea mammals were not utilized while other species (sea otters, seals, etc.) were. In general, Oregon Coast archaeology has been under investigated when compared to states such as California and Washington. Future research in the region should not only identify the extent of sea mammal use within individual archaeological sites but also compare that extent with other early and late sites. Thus, anthropologists may be able to understand long-term species presence and use to provide better interpretations of archaeological materials.

Appendix

Example of Ethnographic Database. Courtesy of The Confederated Tribes of Grand Ronde, Land and Culture Department.

Record	Type	Name_Common	Name_Latin	Date	Season	Month	Myth_times	Historic_times	Modern_times	Hunting_Fishing	Gathering
FAU-0996	Mammals	Whale					y			y	
FAU-1104	Mammals	Whale						y		y	
FAU-1085	Mammals	Whale						y		y	
FAU-1114	Mammals	Whale						y		y	
FAU-1275	Mammals	Whale							y	y	
FAU-1282	Mammals	Whale							y	y	
FAU-1081	Mammals	Whale					y				
FAU-0951	Mammals	Whale					y	y			
FAU-0956	Mammals	Whale					y			y	
FAU-0876	Mammals	Whale					y			y	
FAU-0878	Mammals	Whale					y				
FAU-0880	Mammals	Whale					y				
FAU-0881	Mammals	Whale					y			y	
FAU-0883	Mammals	Whale					y			y	
FAU-0894	Mammals	Whale					y			y	
FAU-0981	Mammals	Whale					y				
FAU-1040	Mammals	Whale					y			y	
FAU-1021	Mammals	Whale					y				
FAU-0310	Mammals	Whale						y		y	
FAU-0346	Mammals	Whale						y		y	
FAU-0440	Mammals	Whale					y				
Record	Type	Name_Common	Name_Latin	Date	Season	Month	Myth_times	Historic_times	Modern_times	Hunting_Fishing	Gathering
FAU-0546	Mammals	Whale						y		y	
FAU-0552	Mammals	Whale					y			y	
FAU-0553	Mammals	Whale					y				
FAU-0584	Mammals	Whale					y				
FAU-0606	Mammals	Whale					y				
FAU-0627	Mammals	Whale					y			y	
FAU-0629	Mammals	Whale					y			y	
FAU-0632	Mammals	Whale					y				
FAU-0768	Mammals	Whale					y			y	
FAU-0770	Mammals	Whale					y			y	
FAU-0772	Mammals	Whale					y			y	
FAU-0815	Mammals	Whale					y			y	
FAU-0832	Mammals	Whale					y			y	
FAU-0837	Mammals	Whale					y			y	
FAU-0838	Mammals	Whale					y			y	
FAU-0865	Mammals	Whale						y		y	
FAU-0871	Mammals	Whale					y			y	
FAU-0874	Mammals	Whale					y			y	
FAU-0798	Mammals	Whale					y			y	
FAU-0580	Mammals	Whale					y				
FAU-0525	Mammals	Whale						y		y	

The University of Oregon McNair Research Journal [119]

Use 1

South Wind finds a whale on the beach near Bay City, but since he had no knife he didn't know what to do about it.

At Cannon Beach in 1853 Warren Vaughan saw a "captured" whale being cut up. Pieces of blubber and meat were cooked in full-sized canoes by adding water and fire-heated rocks--the fat was skimmed off with bones, used for the burial ritual bows, secured in the tops of young trees by the two men in the early 1930s who unearthed then reburied canoe burials at Dicks Point after the Hobsonville Mill incident Smith claims that earlier generations living north of Grays Harbor used to hunt whale, using it as a "portion of their ordinary subsistence".

bones removed from shell midden during 1953 excavation at Rube Wilkens' farm at Idaville

bones removed from shell midden during 1951 (?) excavation by University of Oregon at Netarts Spit

eaten by Thunderbird on the summit of Saddle Mountain

As'ai'yahal convinced two men sitting by the fire together in a house, NctālE'qsen (flint nose) and TaLE'qtEn (copper for making arrow-points), to fight so that he could have a knife to cut up some of the stranded meat, the present given to the Tillamook by Txāxa' after they lost the ball game challenge and their stake of roots and berries caught by Thunderbird like fish

When Thunderbird brought home his catch, the whale would jump and shake the whole mountain. The man staying with Thunderbird was hurt twice trying to watch.

thought by people to be at sea with birds sitting on it, but it was a whale skin covered canoe with people from across the ocean

The men on the other side of the ocean had gone whaling, including the chief, when the last living brother returned to find his wife and son.

meat, in the house of two blind women living on the other side of the lightning door

meat, given in thanks to the canoe men for giving mouths to the mouthless people

pets of Ocean, as were other "ugly animals"

South Wind cut up a whale on the occasion when the old gnarled man visited him, to celebrate and to feed the old man.

The man with the snake belt told a whale that when South Wind packs him, he should pull South Wind out into the ocean. He did, and South Wind was stuck with the whale in the ocean for months, getting cold a

fat, for brighter indoor lighting

grease, drunk in hot soups

beached by Thunderbird, property of man with Thunder power, owner cuts off dorsal fin then sells pieces to others

Use 1

food, measured by number of joints of the backbone

eaten by Ice and his party, sliced by a character called Sharp Nose

two whales breathed into whalers' sweat for ice and his party, filling the house with steam

A woman's invisible husband and his people brought a whole whale to her.

Crow was eating pitch from a log on the beach, and calling it whale.

hunted by the men living in Thunderbird's place

Thunderbird loved to eat the tail of a whale

hunted by Crow's niece's nephew, traded for plants

Crawling One wished for a big fresh whale and one appeared. He cut it up into pieces.

meat, that Split-His-Own-Head's sister asked her brother to go buy with dentalia she gave him

Split-His-Own-Head's sister told him to go along on a trip to buy whale meat, and he sat beneath the people paddling

meat, served to the man with a crooked leg by South Wind, from a whale South Wind brought home with him from Bay City, that had meat taken from it but never died

like fish to Thunderbird. He would catch them for food, and cut them up on a big board

back fin is the best part, the big fat part. It was taken home to burn in the fire of the man who owned the whale.

Human flesh (meat from face and body, stomach, liver, kidneys) from captured people was used by Those People as whale bait.

the most precious food to the Tillamook

bought by Split-His-Own-Head

bought by Split-His-Own-Head

The man with the snake belt told a whale that when South Wind packs him, he should pull South Wind out into the ocean. He did, and South Wind was stuck with the whale in the ocean for months, getting cold ;

Clam Eater stood on a whale until Ice and the people went home, leaving him standing in the rising tide.

eaten by the Tillamook

Deur, Douglas E. and M. Terry Thompson-2008. South Wind's Journeys: A Tillamook Epic Reconstructed from Several Sources. In *Salish Myths and Legends-one people's stories*, ed. by M. Terry Thompson and Steven Deur, Douglas E. (2005). Community, Place, and Persistence: An Introduction to Clatsop-Nehalem History since the Time of Lewis and Clark. Unpublished report. Salem: Oregon Heritage Commission, and Turner, R. Deur, Douglas E. (2005). Community, Place, and Persistence: An Introduction to Clatsop-Nehalem History since the Time of Lewis and Clark. Unpublished report. Salem: Oregon Heritage Commission, and Turner, R. Deur, Silas B. (1901). Primitive Customs and Religious Beliefs of the Indians of the Pacific Northwest Coast. *The Quarterly of the Oregon Historical Society* 2(3):255-265.

Taylor, Herbert C. Jr. [1974 [1953]]. Anthropological Investigation of the Tillamook Indians Relative to Tribal Identity and Aboriginal Possession of Lands. In Oregon Indians I, pp. 25-102. A I E: Indians of the Northwest.

Taylor, Herbert C. Jr. [1974 [1953]]. Anthropological Investigation of the Tillamook Indians Relative to Tribal Identity and Aboriginal Possession of Lands. In Oregon Indians I, pp. 25-102. A I E: Indians of the Northwest.

Deur, Douglas E. (2005). Community, Place, and Persistence: An Introduction to Clatsop-Nehalem History since the Time of Lewis and Clark. Unpublished report. Salem: Oregon Heritage Commission, and Turner, R. Boaz, Franz (editor) (1898). Traditions of the Tillamook Indians. II. *Journal of American Folklore* 11(41):133-150.

Boaz, Franz (editor) (1898). Traditions of the Tillamook Indians, II. *Journal of American Folklore* 11(41):133-150.

Boaz, Franz (editor) (1898). Traditions of the Tillamook Indians. *Journal of American Folklore* 11(40):23-38.

Boaz, Franz (editor) (1898). Traditions of the Tillamook Indians. *Journal of American Folklore* 11(40):23-38.

Boaz, Franz (editor) (1898). Traditions of the Tillamook Indians. *Journal of American Folklore* 11(40):23-38.

Boaz, Franz (editor) (1898). Traditions of the Tillamook Indians. *Journal of American Folklore* 11(40):23-38.

Boaz, Franz (editor) (1898). Traditions of the Tillamook Indians. *Journal of American Folklore* 11(40):23-38.

Boaz, Franz (editor) (1898). Traditions of the Tillamook Indians. *Journal of American Folklore* 11(40):23-38.

Deur, Douglas E. and M. Terry Thompson-2008. South Wind's Journeys: A Tillamook Epic Reconstructed from Several Sources. In *Salish Myths and Legends-one people's stories*, ed. by M. Terry Thompson and Steven Deur, Douglas E. and M. Terry Thompson-2008. South Wind's Journeys: A Tillamook Epic Reconstructed from Several Sources. In *Salish Myths and Legends-one people's stories*, ed. by M. Terry Thompson and Steven Deur, Douglas E. and M. Terry Thompson-2008. South Wind's Journeys: A Tillamook Epic Reconstructed from Several Sources. In *Salish Myths and Legends-one people's stories*, ed. by M. Terry Thompson and Steven Deur, Douglas E. (2005). Community, Place, and Persistence: An Introduction to Clatsop-Nehalem History since the Time of Lewis and Clark. Unpublished report. Salem: Oregon Heritage Commission, and Turner, R. Elizabeth D. Jacobs (2003). The Nehalem Tillamook: An Ethnography, edited by William R. Seaburg. Corvallis: Oregon State University Press.

Elizabeth D. Jacobs (2003). The Nehalem Tillamook: An Ethnography, edited by William R. Seaburg. Corvallis: Oregon State University Press.

Elizabeth D. Jacobs (2003). The Nehalem Tillamook: An Ethnography, edited by William R. Seaburg. Corvallis: Oregon State University Press.

Elizabeth D. Jacobs (2003). The Nehalem Tillamook: An Ethnography, edited by William R. Seaburg. Corvallis: Oregon State University Press.

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References Cited:

- Aikens, C. Melvin, Thomas J. Connolly, and Dennis L. Jenkins
2011 Oregon Archaeology. Corvallis: Oregon State University Press.
- Ames, Kenneth M.
1999 Peoples of the Northwest Coast: Their Archaeology and Prehistory. London: Thames & Hudson.
- Arbolino, Risa Diamond., Stephen D. Ousley, Erica Bubniak-Jones, and National Museum of Natural History (U.S.). Repatriation Office
2005 Reassessment of the Cultural Affiliation of Human Remains and Funerary Objects from Seaside, Oregon at the National Museum of Natural History, Smithsonian Institution. Washington, D.C.: Repatriation Office, National Museum of Natural History.
- Boas, Franz
1894 Chinook Texts. U.S. Government Printing Office.
1898 Traditions of the Tillamook Indians. The Journal of American Folklore 11(40): 23–38.
1965 Notes on the Tillamook. New York: Kraus Reprint.
- Boyd, Robert Thomas
1999 The Coming of the Spirit of Pestilence: Introduced Infectious Diseases and Population Decline Among Northwest Coast Indians, 1774-1874. University of Washington Press.
- Braun, Thorsten
1999 Native American Trade and Exchange in the Pacific Northwest: Ethnographic and Archaeological Evidence.
- Butler, Virginia L., and Sarah K. Campbell
2004 Resource Intensification and Resource Depression in the Pacific Northwest of North America: A Zooarchaeological Review. Journal of World Prehistory 18(4): 327–405.
- Campbell, Sarah K.
1990 PostColumbian Culture History in the Northern Columbia Plateau, AD 1500-1900. Garland Pub.

Connolly, Thomas J.

1992 Human Responses to Change in Coastal Geomorphology and Fauna on the Southern Northwest Coast: Archaeological Investigations at Seaside, Oregon. Eugene: Dept. of Anthropology and Oregon State Museum of Anthropology, University of Oregon.

Connolly, Thomas J.

1995 Archaeological Evidence for a Former Bay at Seaside, Oregon. *Quaternary Research* 43(3): 362–369.

Crawford, Ailsa Elizabeth

1983 Tillamook Indian Basketry: Continuity and Change as Seen in the Adams Collection.

Deur, Douglas E.

2005 Community, Place, and Persistence: An Introduction to Clatsop-Nehalem History since the Time of Lewis and Clark. Unpublished report. Salem: Oregon Heritage Commission.

Drucker, Philip

1955 Indians of the Northwest Coast. New York: Published for the American Museum of Natural History [by] McGraw-Hill.

Edel, May M.

1939 The Tillamook Language. J.J. Augustin.

Erlandson, Jon M., and Todd J. Braje

2011 From Asia to the Americas by Boat? Paleogeography, Paleoecology, and Stemmed Points of the Northwest Pacific. *Quaternary International* 239(1–2): 28–37.

Erlandson, Jon M., Michael H. Graham, Bruce J. Bourque, et al.

2007 The Kelp Highway Hypothesis: Marine Ecology, the Coastal Migration Theory, and the Peopling of the Americas. *The Journal of Island and Coastal Archaeology* 2(2): 161–174.

Erlandson, Jon M., Mark A. Tveskov, and R. Scott Byram

1998 The Development of Maritime Adaptations on the Southern Northwest Coast of North America. *Arctic Anthropology* 35(1): 6–22.

Evans, Gail H. and Michael Hatch.

1999 City of Gearhart Historic Landmarks Commission. "Gearhart, Oregon Historic Context Statement." Gearhart: City of Gearhart Historic Landmarks Commission. Notes, maps, photographs, bibliography. 78 pages.

Jacobs, Elizabeth Derr, and William R. Seaburg

2003 The Nehalem Tillamook: An Ethnography. Corvallis, Or.: Oregon State University Press.

Knowles, Margie Young

1965 Our Siuslaw Natives, the Indians. Salem? Or.

Lewis, Meriwether, American Philosophical Society, Library, and Lewis and Clark Expedition

1904 Original Journals of the Lewis and Clark Expedition, 1804-1806: Printed from the Original Manuscripts in the Library of the American Philosophical Society and by Direction of Its Committee on Historical Documents, Together with Manuscript Material of Lewis and Clark from Other Sources, Including Note-Books, Letters, Maps, Etc., and the Journals of Charles Floyd and Joseph Whitehouse, Now for the First Time Published in Full and Exactly as Written. New York: Dodd, Mead.

Lightfoot, Kent G.

1993 Long-Term Developments in Complex Hunter-Gatherer Societies: Recent Perspectives from the Pacific Coast of North America. *Journal of Archaeological Research* 1(3): 167-201.

2005 Indians, Missionaries, and Merchants: The Legacy of Colonial Encounters on the California Frontiers. Berkeley: University of California Press.

Losey, Robert J., and Dongya Y. Yang

2007 Opportunistic Whale Hunting on the Southern Northwest Coast: Ancient DNA, Artifact, and Ethnographic Evidence. *American Antiquity* 72(4): 657-676.

Massachusetts Historical Society

1920 Log of the Columbia. *Proceedings of the Massachusetts Historical Society*.

McMillan, Alan D., and Ian Hutchinson

2002 When the Mountain Dwarfs Danced: Aboriginal Traditions of Paleoseismic Events along the Cascadia Subduction Zone of Western North America. *Ethnohistory* 49(1): 41-68.

Moss, Madonna L.

2011 Northwest Coast: Archaeology as Deep History. Washington D.C.: Society for American Archaeology.

Moss, Madonna L., and Jon M. Erlandson

1995 Reflections on North American Pacific Coast Prehistory. *Journal of World Prehistory* 9(1): 1–45.

Phebus, George E., and Robert M Drucker

1979 Archeological Investigations at Seaside, Oregon. Seaside, Or.: Seaside Museum and Historical Society.

Ramenofsky, Ann F.

1987 Vectors of Death: The Archaeology of European Contact. Albuquerque: University of New Mexico Press.

Ray, Verne Frederick

1938 Lower Chinook Ethnographic Notes,. Seattle: University of Washington.

Thornton, Russell

1987 American Indian Holocaust and Survival: A Population History since 1492. Norman: University of Oklahoma Press.

Tveskov, Mark A., and Jon M. Erlandson

2003 The Haynes Inlet Weirs: Estuarine Fishing and Archaeological Site Visibility on the Southern Cascadia Coast. *Journal of Archaeological Science* 30(8): 1023–1035.

Underhill, Ruth

1978 Indians of the Pacific Northwest. New York: AMS Press.

Verne, Ray

1975 The Western Shore: Oregon Country Essays Honoring the American Revolution. Thomas Vaughan, ed. Oregon Historical Society.

Workman, William B., and Allen P. McCartney

1998 Coast to Coast: Prehistoric Maritime Cultures in the North Pacific. *Arctic Anthropology* 35(1): 361–370.

Post-Traumatic Sexuality: Reclamation of Sexuality and Eroticism After Colonization

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Introduction

Since much of canonical American history focuses on white men, Native people and other traditionally marginalized groups are continually trying to rediscover and reclaim their history. This reclamation of history is not exclusive to traditionally oppressed racial or ethnic groups. Since American history is often both cisgender and heterosexual, the LGBTQ community also looks back to try to rediscover and reclaim a buried queer history. However, the place where these two issues combine is often ignored, causing the LGBTQ community to unintentionally reinforce whiteness and Native histories to internalize colonial ideas about gender and sexuality. It is important to incorporate gender and sexuality into any examination of Native history for a true reclamation of that history. In doing so, we not only reclaim our history but also disrupt a problematic history that has been written for us.

When rewriting our history, we examine not only our past but also our present. We write (and rewrite) in a way that redefines both temporal

and geographical relationships. This redefinition of temporal and physical space as part of decolonization and reclamation can incorporate queer theory and methods in ways that examine the intersection of indigenous and queer theory. Working with heterosexist portrayals of the land, we can redefine the land in a way that queers both the land and our relationship with it. In so doing, we may also anachronistically queer the relationship between the (often male) colonizers and the Americas. We may question colonized definitions of gender and gender roles, reimagining our history and the feminized land in Native terms both on a tribally specific and indigenous transnational level. By blurring temporal and physical lines, we gain access to a reclaimed and decolonized history that may subvert dominant, colonized ideas of history, a history that is inclusive of Native people who do not identify as cisgender or heterosexual.

The way Cheryl Savageau copes with historical trauma through her poetry suggests a way to decolonize Native lives utilizing literature. In her poetry, she offers a redefinition of temporal and physical space and a rewriting of Native history through creative work. Using this redefinition, her poetry then creates a more empowering future both on an individual level and a more communal, cultural level. Applying the colonial rhetoric of a feminized, colonizable body, I will connect historical and personal bodily trauma and demonstrate the importance of this connection in Savageau's work. Using the same framework, I will show how Savageau queers the relationship between individual and land, particularly relevant in *Mother/Land*, *Dirt Road Home* and her two quilts. Finally, after exploring these frameworks in her poetry, I will then discuss how Savageau works with, within, and in opposition to these traditional colonial frameworks to reclaim both her body and her sexuality as well as to put forth a more empowered Native present through a critical reexamination of the past.

Historical and Modern Colonization

Settler colonialism continues to impact modern Native¹ populations despite having initially occurred hundreds of years ago. Part of settler colonialism's ongoing impact is due to the specific nature of settler colonialism as opposed to traditional colonialism (which typically refers to the colonization of India or Africa). As Weaver writes in *That the People Might Live*, "by contrast [to classic colonialism, in] internal colonialism, the autochthonous [indigenous] population is swamped by a large colonizer group, which, after several generations, no longer has a *métropole* to which to return" (Weaver 10). In other words, Native populations are still suffering the effects of settler colonialism partially because our² land has become nearly inseparable from the colonized land. The distinction between our home and the colonizers' has become so blurred that it is almost nonexistent. Native people live in a homeland that is overlaid with reminders of colonization.

The reality of settler colonialism also contributes to the difficult definition of "home" or "homeland" for Native peoples. Because settler colonists invade an indigenous homeland and make it their own, the Native population finds that a homeland becomes both home and not home. Our homeland exists, but buried beneath markers of colonization and almost exclusively in the past or in the cultural memory of "those few who see beyond the road signs and beneath the concrete" (qtd. in Brooks, *Common* ix). However, geographically, the homeland does not move. Native people then have a strange spatial relationship to the Americas, living in a place

¹ I will be using the terms "Native," "indigenous," "Indian," and "Native American" interchangeably primarily to reflect the variety of terminology used by Native people to describe ourselves.

² I will use both the subjective "our" and the objective "their." As a Native woman, much of this research is personally relevant, and I doubt that integration of the personal diminishes the formality of academic writing.

that is geographically constant, but not recognizably so in many ways. Native people also have a unique temporal relationship with the Americas. Temporally, we still feel the effects of historical events perpetrated against our land and our ancestors while simultaneously remembering a homeland that is essentially no longer recognizable and apparently existing only in the past.

This complex relationship to both land and time can be understood as a form of post-traumatic stress disorder, or as a response to trauma. Although the events that caused this cultural trauma were inflicted upon our ancestors, those events continue to affect contemporary Native people, creating a culture collectively affected by trauma. Hałas, in her essay on time and memory, writes that, “the meaning of ‘trauma’ has become broader ... extended to the collective experience of traumatized communities ... or—as in the concept of cultural trauma—beyond the borders of directly affected participants” (Hałas 315). Understanding and treating Native cultural trauma requires “taking the broad cultural perspective ... viewing trauma and loss across time and place” (B.H. Stamm et al. 93). Similarly, to respond to cultural trauma that transcends time and place, broader ideas of temporality and place must exist. Healing must come from the understanding that one can be traumatized both from personal, recent events and from seemingly distant, indirect events. There must be an understanding that indigenous relationships to land often cross state boundaries, historical and generational time, and modern locations. Therefore, indigenous peoples have a relationship with multiple homelands including pre-contact tribal locations, current reservations, and urban Native sites, all of which impact lives and the healing processes.

For Native people, historical trauma has many forms as do Native responses to those traumatic experiences. In a study of historical trauma among Native communities, B.H. Stamm and associates found that:

the attacks [of continued colonization] may include the prohibition of language, spiritual/healing practices, or access to public spaces. There may be the creation of a “new” history or a “new” enemy. There may be rape or interpersonal violence to destroy families, the elimination of traditional authority figures within a community, or elevation of an authority or outside agency to bypass the traditional systems of authority. (95)

These colonial attacks can be interpreted historically, referring to the colonization that already happened as well as part of the on-going modern colonization of Native people. This can be seen through the elders in Stamm’s psychological study. The study was focused on defining cultural trauma, examining the ways in which a culture is affected when invaded by another, and how to help heal these cultural wounds. For the elders in the study, “loss of land, and language, breakdown in familial relationships, and lack of respect for elders” were cited as examples of grief or bereavement that the respondents experienced (B.H. Stamm et al. 95). The elders with the most attachment to their history, place, and tradition experienced the lowest overall health (B.H. Stamm et al. 96). This study reveals the direct correlation between historical or spatial attachment and Native people’s health, and the physical effects of colonialism. Thus, in addition to the mental impact of colonization, Native people also experience measurable physical effects as a result of colonization.

Native people have also experienced, and continue to experience, trauma in part because of the temporal restriction placed on Native identity. Given that the idea of colonization is often historicized, the Native person affected by that colonization is historicized as well, leading to the idea of the disappearing Indian. Additionally, historicization of colonization erases the effects that both historical and modern colonization continues to have on Native people. Identity becomes complicated in that “the racialization of Native peoples relies on viewing them as ‘living’ only

in dead archival sources and as past victims of progress” (Finley 192). Not only did colonization physically kill Native people in the past, but the rhetoric of colonization and the discursive paradigms of progress and civilization created a definition of Native identity that killed Native people who “progressed” or “modernized.” Simultaneously, the pressures of colonization make it impossible for Native people to continue existing if they did not assimilate. Native people faced either physical death through resistance or metaphorical death by assimilation. Native people face the same issues today because Native cultures are still defined in similar ways. As Craig Womack writes, “Indian cultures are the only cultures where it is assumed that if they change they are no longer a culture” (qtd. in Brooks, *Common* xxxii). Even today, change for Native people often means a metaphorical death. By assimilating to modern culture, Native people seem to lose their identity as Indians in the dominant definition of Indianness and sometimes in their own communities, perpetuating the idea that Native people are slowly disappearing.

Native people do not just face erasure in history books and in misguided definitions of Indianness that require cultural stagnancy. Through blood quantum restrictions and tribal enrollment requirements, Native people are often disappearing on a “numerical” level. Beginning with the Indian Removal Act in 1830 in which Native people were forcibly relocated west of the Mississippi, laws and regulations continued to target indigenous people. These laws ranged from land regulation and redistribution to ideological attacks on Native people. For instance, legal precedent set by the Dawes Act and judicial precedent in cases such as *Cherokee Nation v. Georgia* and *Worcester v. Georgia* led to the idea of federally recognized tribes for which blood quantum was necessary. The Indian Reorganization Act also addressed blood quantum levels, using rather arbitrary blood quantum levels to determine who qualified as Native American and thus,

who was eligible for federal recognition and government benefits. Both blood quantum laws and the Indian Reorganization Act defined Indianness in colonized terms. Additionally, blood quantum laws furthered colonial heteropatriarchy through encouraging heterosexual pairings in order to maintain status as Native people and retain “Native blood.”

The destruction of colonization specifically affected and continues to affect Native women and people who do not fit within heteropatriarchal gender binaries. Before contact, many Native people had a long, much more accepting history that provided more equality for women as well as a variety of other gender and sexuality roles. However, owing to the heteropatriarchal nature of colonialism, and because “patriarchy ... rests on a binary gender system ... it is not a coincidence that colonizers also targeted indigenous peoples who did not fit within this binary model” (Smith, “American” 312). As part of the colonial process and ongoing violence toward the land and its inhabitants, colonialism waged an ideological war against the indigenous populations found in the Americas. Native people were forced into a gender binary to protect and further the patriarchal goals of the colonizers as well as to try to protect themselves. Additionally, “Native people need[ed] to be represented as feminized in order to justify the presence of the white masculine heteropatriarchal nation-state instituting the ‘normalizing’ presence of heteropatriarchy in Native America” (Finley 192). Just as colonization of the land was essential for the establishment of the colonizers’ eventual nation-state, the ideological war against Native cultures was essential for the establishment of the Europeans’ patriarchal, hierarchical, and heterosexist forms of government, power, and control of both the land and Native people.

Violence perpetrated by colonizers against indigenous populations included sexual violence in addition to the environmental, physical, and ideological violence already discussed. Consequently, Native women

experienced unbelievable rates of sexual violence. As Andrea Smith argues, “it is through sexual violence that a colonizing group attempts to render a colonized peoples as inherently rapable, their lands inherently invadable, and their resources inherently extractable” (Smith, “American” 312). Thus, sexual violence against Native women can be linked to colonization’s environmental and ideological impact as well. Furthermore, the colonization of land and women becomes conflated through the rhetoric of colonization itself. In this rhetoric, “images of Native women equate the Native female body with the conquest of land in the European view of the New World. In other words, the conflation of the New World with the Native women’s bodies presents Native women’s heterosexual desire for white male settlers as justifying conquest and the settlement of the land by non-Natives” (Finley 34). In this way, women are particularly targeted not just as victims of colonization, but as subjects whose sexuality is used to justify their own colonization and abuse. Their sexual desire becomes justification for colonial violence, despite the violence perpetrated against them.

Just as environmental and ideological violence of colonization continues to impact modern Native communities, sexual violence perpetrated against Native women continues to impact their experiences and consciousness. For Native women who have experienced sexual assault either directly—“the average rate of rape and sexual assault among American Indians is 3.5 times higher than for all races” (Natl Sexual Violence Resource Center 4)—or indirectly because, given a history of cultural and sexual trauma in particular, embracing one’s sexuality or any kind of eroticism can be a difficult process. Historically, “European iconography of the ‘New World’ imagined the Americas as an exotic, erotic brown-skinned woman, open and yielding to the penetrating thrust of European imperialism. Invasion depended as much upon the subjugation of

indigenous women and their frequent positions of authority as it depended on the erosion of affirming sexual pleasure and diversity of gender roles and identities” (Justice 161). Thus, for Native women who have been perceived as perpetually “open” to justify imperialism and to justify sexual violence perpetrated against them, reclaiming sexuality can be not only difficult but frightening because the reclamation of sexuality may be equated with potentially betraying the community or reinforcing colonial ideals by others within the Native community. Because of both historical sexual assault and modern rates of sexual violence, Native sexuality is often still marked by this trauma. As Lee Maracle writes, for Native American women, “our bodies become vessels for male gratification, not the means by which we experience our own sexual wonderment” (Maracle 24). Native women occupy a societal space then, marked by both cultural and sexual trauma.

Decolonization through Poetry

How then, do Native people reclaim their bodies, histories, and sexualities? Reclamation must empower Native people without repeating colonial ideas and perpetuating the type of intracommunity violence those ideas authorize. It must come with an understanding of the difficulty of reclamation for Native women and those in particular whose life experiences do not neatly fit into the binary models mentioned above. Deborah Miranda addresses the complexity of sexual reclamation and empowerment when writing about Native women’s love poetry, stating that “we accept being made invisible as a kind of novocain rather than endure the constant grinding of historical traumas that directly targeted Native women’s bodies and our ability to express ourselves in language and literacy” (Miranda, “Dildos” 138). For Native people who have experienced both the extreme historical violence perpetrated against them

as well as specific, sexual, gendered violence, it becomes much easier and safer to accept an almost complete lack of sexuality and eroticism as a defense against further violence than to reassert their sexuality and sensuality.

Despite this difficulty, reclaiming Native eroticism and the variety of Native gender and sexuality expressions is key to advancing any decolonizing agenda. Native people may be fully, bodily present despite sexual and historical trauma “whether through erotic expression, through fishing a stream walked by our fathers for generations, participating in tribal deliberation and dance, or picking ripened high bush blueberries in the marsh—these acts, their interpretation and representation, their transformation through thought, and then the written word can be an incredibly powerful political act” (Brooks, “Locating,” 257). Just the act of reclaiming bodily autonomy and empowerment can be an extremely political action, instrumental to the overall goal of decolonization. Doing so on autonomous and Native terms is particularly important, fighting against the hypersexualization of Native women’s bodies. Decolonization efforts that ignore the sexuality of Native bodies or, worse, continue to hypersexualize them, reinforce colonized ideas rather than fight against them.

For some indigenous people this may mean reclamation of the erotic self; for others, the ability to remain celibate or non-sexual. Creating a space in which the full range of human sexual expression is both possible and accepted for Native people is key to moving forward with decolonization. The reclamation of one’s body does not always have to occur physically. Reclamation of bodily autonomy can also happen verbally or through the written word. In fact, literature is an important tool of decolonization for Native people. Writing after colonization, whether in English or in indigenous languages, allows for the autonomous rewriting

of one's history. Lisa Brooks, writing about Abenaki history specifically, argues that

there are multiple ways to think about re-memberment ... the idea of "memory," which can take place in the individual or communal body and is stored in the cavity of the mind. In the Abenaki language, the words for memory, mikwaldamwôgan and mikwaldigan, suggest that, like writing, it can be both an activity and a powerful instrument for finding something stored in one's mind. (Brooks, *Common*, 66)

In Abenaki specifically, language suggests that the process of remembering, like the process of writing, is an active rather than passive activity. Therefore poetry, and the written word of all kinds, is a critical part of the decolonization process. Cheryl Savageau, an Abenaki poet, allows for an examination of these ideas. As a mixed-race, French and Abenaki woman who grew up in the Abenaki homeland in New England, Savageau offers unique insight into the reclamation of the body and of the land. Additionally, as one of the first tribes to interact with settlers, the Abenaki tribe has one of the longest relationships with colonization. When settlers first arrived, Abenaki leaders first attempted to negotiate with the colonizing forces until those Abenaki leaders realized that a peaceful, equal relationship with the land they referred to "as a bowl with a beaver tail from which they all might eat" was impossible (Brooks, *Common* 32). This realization gives Abenaki people a particular relationship with their land and the colonizers that involved both negotiation and revolt, which makes the modern day occupation of Abenaki land all the more painful.

Savageau creates work that first specifically acknowledges the full extent of cultural trauma caused by colonization and its effects on the Abenaki homeland, then responds to that cultural trauma in her

reclamation of sexuality and eroticism. While doing so she often rejects linear temporalities, conflating modern and historical colonization and blurring the easy distinction between these two forms of oppression. Her portrayal of trauma blurs lines between sexuality, gender, and eroticism with a response to the past and her relationship to a traumatized physical land. Although *Dirt Road Home* is predominantly concerned with trauma, history, and the location of a Native homeland, Savageau's integration of erotic poetry into the collection questions the distinction between bodily and geographical colonization. *Mother/Land*, which is more focused on sexuality, gender, and kinship relations, includes poems deeply interested in history and trauma, drawing a connection between reclamation of personal and kinship relations and reclamation of both land and history.

Spatial and Temporal Redefinition

Beginning with the poem "Smallpox" in *Mother/Land*, Savageau directly addresses historical biological attacks on Native people. Through conflating tenses, the poem disrupts conventional narratives that place colonization in the past, confronting modern Native experiences with both past and present colonization. The poem opens with the italicized line "*some of us did not die*" (1) that sets the temporal space for the rest of the poem. By asserting that some Native people "did not die," it simultaneously acknowledges the past and looks toward the present and future. The use of the term "us," which includes the author, creates the idea of the present, because for there to be an us writing the line, people must still exist in the present. These people will continue to exist in the present and continue to create and decolonize the Native future. Weaver, in her book, *That the People Might Live*, also addresses the idea of past, present, and future in her discussion of the Dene Nation. She writes that "George Erasmus... states, 'Our old people, when they talk about how the [traditional] ways should be kept by young people, they are not looking

back, they are looking forward. They are looking as far ahead into the future as they possibly can” (qtd. in Weaver 164).

Savageau’s conflation of past and present can also be seen throughout the rest of the poem. While the subject matter of the poem is predominantly the introduction of diseases into the Americas by settlers, in the second stanza, there is a clarification:

it is not the big pox
syphilis
which they also got from sheep
we don’t have it here. (6-10)

By using the present tense, Savageau retemporalizes colonization not as a historical event that happened in the past but as a continuing process extending into the present. In doing so, she removes it from its usually historical place into the present. For Native people who are often seen as historical objects rather than living beings, the retemporalization of traumatic events is important for the decolonization process. Although the infection of Native people with smallpox happened years ago, it is merely one instance of biological warfare perpetrated against indigenous populations. Thus, by bringing this historical event into the present, Savageau draws attention to the ongoing attacks against Native people, both biological and non-biological.

These lines also address the idea of sexuality and the influence and importance of sexual colonization. Since syphilis is the “big pox” as opposed to smallpox, this places more importance on syphilis, a sexually transmitted disease. This focuses attention more particularly on the sexual colonization and abuse of Native people, a topic often ignored in the canonical narrative of colonization. Drawing attention to the infection of indigenous populations with sexually transmitted diseases also draws attention to the active intent of colonizers. Although the infection of

smallpox may have been accidental, nothing is accidental about the transmission of sexually transmitted infections. This likely contributes to syphilis being described as “big” rather than “small,” larger, more threatening than smallpox despite much higher rates of death from smallpox than from syphilis.

The following stanza further emphasizes the difference between syphilis and smallpox. Despite not being the “big pox,” there is “nothing small about it [smallpox]” and it includes a variety of horrific symptoms in which “the back aches,/the head hurts,/the body burns,/the skin erupts” (11-17). Despite these awful symptoms, syphilis is still worse than smallpox. Perhaps syphilis gains importance because of the sexual nature of the disease. Thus, syphilis is more threatening because, rather than being transmitted through spatial proximity, someone must have engaged in sexual contact with a colonizer for transmission, consensually or not. Thus, syphilis gains importance as an STI that instantly marks the victim more viscerally than smallpox. Unlike smallpox, as an STI, a victim of syphilis may be blamed for the sexual intercourse required to contract the disease regardless of the consent present in the sexual experience. Thus, syphilis draws attention both to the sexual colonization of indigenous people and their potential ostracism from the community for quite literally “sleeping with the enemy,” whether consensually or not. Thus, like Native women whose sexuality has been used to justify violence perpetrated against them, for victims of syphilis and other STIs, their life-threatening infection is used to justify further alienation and oppression.

Continuing with the present tense, Savageau writes that “none of us have mild cases ... we bleed beneath our skin/that sloughs off our living flesh” (48-54). Using the present tense for this particularly horrific description of the effects of colonization, and the infection of smallpox in particular, disrupts canonical Native history in which Native people exist exclusively

in the past. Since Native history is often buried or romanticized, depicting Native people as the passive recipients or victims of colonization, which “turns to the past of the people, and distorts, disfigures, and destroys it,” bringing the history into the present is a tool of empowerment (qtd. in Weaver 19). By retelling Native history in her own words, in her own way, Savageau turns the horrors of colonization and of historical trauma and violence into a way to reclaim Native history and perhaps empower a new Native future.

“Smallpox” reflects the ongoing effects of historical colonization into the present day as well as the ability of community to help cope with those effects. In the ninth stanza of the poem, the speaker says “it is because [she is]/indian [she knows]/though no one/will say so” as an explanation for having the measles (67-70). She has attributed her diseased body to the mere fact she is Indian, demonstrating an internalization of colonial racism. For her, it is because of her ethnicity that she is ill. Furthermore, because of the retemporalization of the historical trauma of smallpox infection described earlier in the poem, the timeline of the speaker becomes complex. Because the rest of the poem is in combination of the present and the past, it becomes unclear whether the speaker is also part of that past or part of the modern-day present. The effect of this confusion is to conflate the two possibilities into one. The temporal confusion allows the speaker to be both historical and modern, creating a connection between modern-day Native people and our historical ancestors. Additionally, although the speaker draws the connection between illness and Indianness, no one else will confirm her suspicions. Stating that “no one/will say so” suggests that others understand the connection between illness or death and Indianness, and it is not a lack of knowledge that prevents them talking about it, but rather an active desire to avoid discussing the connection. The navigation and negotiation with a history that has been written for them, “a history

that shames them, destroys their confidence, and causes them to reject their heritage” are understandably difficult, especially for elders who may be temporally closer to the original trauma (qtd. in Weaver 19). The speaker of the poem seeks to navigate this history by laying claim to the unspeakable past of colonization and how it is affecting her life now, whereas the others around her are trying to negotiate with this history simply by avoiding it. Unlike avoiding the past, the speaker’s acknowledgment of historical trauma allows for a coping/healing process and for her to move forward, despite the initial pain of remembering.

“Smallpox” asserts a connection between the speaker and the past made more explicit when she discusses measles with her mother and clearly shows the importance of queer Indigenous reconceptions of colonizing actions and past struggles. In addition to attributing her illness to her ethnicity, she too fears death as a result of historical infection. While ill with the measles, an easily treatable illness, she asks her mother, “lots of them [Indians]/died will I die” (73-74). Because of the death of ancestors and a known history of colonization, the speaker fears death. She is acutely aware of Native peoples’ history with colonization to the point that it affects her physical health and well-being. While sleeping, she remembers more of Native history:

it is after
they [colonizers] know how
to prevent it
that they give
the blankets
that will cause it. (96-101)

Once again using the present tense, the temporal location of the speaker becomes unclear. However, in this particular passage the speaker is occupying a sort of future space as well. Writing from the apparent present

about the past in the present tense, the speaker also has knowledge of the future. She is able to understand the future actions of colonizers who give smallpox blankets only after they understand how to prevent contracting the disease themselves. Her place in the past, the present, and the future is a way of reimagining Native history. Since “history does not fall from heaven; we make history,” her acknowledgement and creation of a new Native history is important because it introduces Native people as active subjects into history rather than as passive objects to be written about (Smith, *Conquest* 191). Rather than passively accepting a history written for her, the speaker of the poem is creating her own history as well as her present and eventual future.

Additionally, her temporal place between past, present, and future corresponds to definitions of cultural or historical trauma made visible via the trope of disease. Her memory is consistent with the idea of collective trauma that Hałas argues “shows the symbolic, emotional and moral dimensions of memory as a cultural phenomenon, the temporality of which is not limited to the past in the present, but also encompasses the future” (307). Thus, the disease becomes a symbol of collective or cultural trauma, infecting the speaker of the poem. She is able to understand the collective past, feel the effects of it in the present, and by coping with it in the present, look forward into the future. However, in doing so, she feels the physical effects of that connection. Despite these physical effects, the speaker, as with the elders in Stamm’s study who “attribute[d] the strengthened connection to place and their heritage to healing the traumatic stresses of their past,” has an increased connection to the heritage that enables her to begin to heal from the past (Stamm et al. 96). Healing is possible because here and elsewhere in Savageau’s work, rather than ignoring the traumas of a colonized past, acknowledging them, despite their horror, allows for the “rewriting and *rerighting* [of]

our position in history” (qtd. in Brooks, *Common* xxvii). By facing our history and negotiating it rather than allowing it to be buried, forgotten, or ignored, we move forward towards decolonization.

The method of reclamation put forth in “Smallpox” is applicable to other poems in her work, including those more explicitly interested in sexuality, eroticism, and the reclamation of the sexual Native body. “Survival” in *Dirt Road Home* bridges the ideas of colonization and history put forth in “Smallpox” and the need for sexual reclamation and empowerment that is examined elsewhere in Savageau’s poetry. For instance, while detailing historical colonization of Native lands and violence toward them, the poem does so using gendered, kinship-related language that connects that violence to violence perpetrated against Native individuals and their bodies. “Survival,” like “Smallpox,” reflects the blurred temporal lines many Native people inhabit, especially while attempting to decolonize our history and our land.

The poem’s emphasis on the relationship between history and land is captured in Savageau’s use of the setting “on Cape Cod” (71). The poem anachronistically uses the term “Cape Cod” to describe the land despite describing an event that took place before the term “Cape Cod” was established. As in “Smallpox,” this blurs the temporal setting between the historical event she describes and modern day, questioning the distinction between historical and modern colonization and oppression. Throughout the poem, the speaker continues to use the present and future tenses, creating the same simultaneous past, present, and future as in “Smallpox.” However, unlike “Smallpox,” which brings a historical event into the future by using the present tense, “Survival” pulls the present into the past. Anachronistically pulling Cape Cod into the past as the setting for distribution of smallpox-infected blankets blurs temporal lines once again. The specific setting of Cape Cod, an elitist, tourist-based, resort town built

upon Native land whose people were either forcibly removed or denied contemporary presence as a people, implies that original settlers were, in a way, also elitist tourists, emphasizing the connection between modern occupation of Native land and historical settling and colonizing of Native land.

Despite sharing the temporal setting of “Smallpox,” “Survival” portrays a different form of colonization. The colonization in “Smallpox” was deliberate, medical, bodily, yet still mostly passively violent, whereas in “Survival,” the violence is active as evidenced by the speaker’s use of active verbs and adjectives. The body being colonized is not human; rather it is the earthly body, reflecting not only personal colonization but cultural or spatial colonization. On Cape Cod, the colonists “plow the mother’s breast” (4). This line does multiple things. The term plow is simultaneously agricultural and sexual because connotations of the word plow imply sexual conquest, which then makes the agricultural colonization of Native land a sexual relationship that is explicitly exploitative and potentially violent. This relationship also attacks a “mother.” The use of the term “mother” to describe the earth creates a parental or familial relationship between the speaker and Native people and the land. By emphasizing intimacy and kinship, the poem likens colonization of the land to the colonization of family. The importance of this connection is illustrated in Daniel Heath Justice’s essay in *Reasoning Together* in which he writes:

When a family, a community, or a nation is fully removed from the land of its origins, that land doesn’t cease to shape the People’s cosmos, even when they’re building new relationships with a new land; their links to it change, but they rarely vanish, just as separation from a loved one inevitably changes but doesn’t necessarily erase our relationship to that person. (Heath 164)

Thus, despite colonization of the land that makes it almost unrecognizable,

or forced relocation of Native tribes from their homelands, the relationship between Native people and their homelands does not disappear. To push this idea further, while our relationships with our land, our history, our ancestors, or even seemingly lost aspects of ourselves may change or shift with time or because of colonization, they do not disappear. Rather, the relationships change; those individuals, places, and qualities still continue to shape who we are both as individuals and as a collective people, which helps explain both how and why colonization still impacts Native communities. Because colonization of ancestors continues to impact and shape Native lives and identities, the process of decolonization becomes that much more difficult and important.

While increasing the tangibility of the relationship between Native people and the subjugation of the land, gendering the land and colonialist relationships with it often creates a gender binary in which the passive, powerless land becomes feminized and the active, powerful colonizers are masculinized. Especially in colonial rhetoric, the land becomes feminized, awaiting subjugation by the masculinized colonizers. On Cape Cod, rather than the land simply being feminized, the earth itself is a “mother’s breast,” there to be plowed whereas the masculinized forest is more active, standing tall where:

 this sand
 where white pine,
 shrunk from grandfather forests
 to these survivors. (17-20)

While the feminized earth remains plowed, a subject for the actions of the colonizers, the masculinized forests are fathers, standing survivors. Though the distinction between the land and the trees seems to perpetuate a gender binary between men and women, mothers and fathers, it also does something more subversive. In Abenaki tradition, people are made from

the trees, which gives a procreative connotation to the masculine trees. Instead of the feminized, “mother” land giving life, it is the masculinized trees that subvert gender expectations. Additionally, it disrupts the binary created by colonial rhetoric in which all of the land, particularly in the Americas, is feminized and passive. In colonial rhetoric, feminization of the land heterosexualizes the relationship between colonizers and their subjugation of the land. However, the introduction of a male aspect of the land allows for a queering of the relationship between those male colonizers and the land that they are colonizing, an aspect that disrupts heterosexualized history. The colonial relationship is queered in that a traditionally heterosexual relationship, used to reaffirm colonial masculinity, is confronted with a masculinized landscape that changes the sexuality of the colonial narrative. This not only interrupts the portrayal of the land as a female body open to male colonizers, but also reveals a potentially hidden queer colonial history. Queering the relationship between the land and colonizers introduces a potentially non-binary land as well as non-heterosexual colonizers.

The relationship between feminized body and land is also useful for reclaiming the Native body. As with reclamation of a traumatized and diseased past in the poems “Smallpox” and “Survival,” reclamation of the Native body through the land begins with an acknowledgement of past violence perpetrated against Native people, Native land, and the invisibility that can accompany the idea of Native people as part of the land. In the poem “Pemigewasset” from *Mother/Land*, Savageau explores the modern impact of historical collusion of land and Native bodies. Set in a landscape that is now a protected area, the poem describes the experiences of the speaker and another Abenaki woman in the middle of a “wilderness” area. While they are standing by the water, “tourists/rush past” (*Mother/Land* 7-8). Describing the people surrounding them as tourists immediately

gives the speaker and her companion a sense of ownership or belonging in the area that the others around them do not possess. While the two Abenaki women belong, those around them do not, creating an “us versus them” dichotomy. As the only non-tourists in Pemigewasset, the wilderness area becomes home for the Native women in opposition to the others who are intruding upon that space.

As in the past, the tourists, although intruding upon the Native women’s home, do not acknowledge their presence. The speaker’s companion says “I feel like a ghost...they [the tourists] can’t even see/us” (12-15). Tourists typically try to look at everything. That is the point of tourism, to consume as much of another seemingly foreign location or culture as possible. However, for these tourists, it is as if the Native women do not even exist. They are ghosts. The term ghosts, beyond simply implying invisibility, has particular relevance considering the violent and lethal history of colonization Indians have experienced. History has repeated itself. Native women remain standing in their homeland (still named in Abenaki as Pemigewasset), not being recognized as people, while being swarmed with tourists, made to feel not only invisible but dead, simply ghosts.

The speaker of the poem responds to her friend’s understandably grim feelings with a more reclamatory statement, based in a modified understanding of spatial relationships and the land they are standing on. She says that the reason the tourists do not see them is “because/they are in a state park ... and we are at/the center/of the world” (27-32). Her response is to essentially reframe the spatial relationship between the Abenaki women, the tourists, and the land on which they are standing. The reason the tourists are unable to see them is because they are physically in different locations based on their relationship to the earth. For the tourists, unconnected and unfamiliar with the land, they are simply in a state park.

However, for the Native women, traditionally connected to the land either through kinship relationships with an “earth mother” or as physically part of the land itself, their homeland becomes the “center of the world.” This refocuses attention geographically on Native space, similar to the refocusing of history on Native history as Savageau described in “Graduate School First Semester: So Here I Am Writing About Indians Again,” a poem in *Mother/Land* that examines the difficult position Native people have in academia. In both “Survival” and “Graduate School First Semester,” as part of decolonization the speaker focuses the reader’s attention on an often-unnoticed Native space both temporally and geographically. This shifts attention from the tourists who are taking over the land to the Native perception of and relationship to the land.

In *Dirt Road Home*, the conflation of the land and the body expresses sexuality and eroticism in ways that are affirmative, autonomous, and self-directed. In “Night,” a love poem, Savageau uses land-based language to depict a relationship between the wind, smoke, and fire as well as the relationship between the speaker and her lover. The second person narrative used throughout the poem allows for a genderless lover. Although the poem is dedicated “for Bill” (65), the second person subject still addresses the reader in addition to the individual to whom the poem is dedicated, a technique that allows for a queering of the erotic or romantic relationship portrayed in the poem. Unlike the queered relationship between colonizers and the Americas, which looks to a hidden queer past, this queered relationship exists in a constant present. The poem exists in a continual present, creating a relationship with the reader regardless of gender. The gendering of the landscape around them queers not only their relationship but also the relationship between individual and land that is present throughout both colonial rhetoric and Native literature. The speaker and her lover have:

stolen the orange harvest moon
to light our fire
now she glows
chill silver. (2-5)

The term “she” in the fourth line genders the relationship between moon and fire in complicated ways. The location of this pronoun makes its original noun unclear. The reader is unsure whether the term “she” refers to the fire or the moon, an ambiguity that blends them together into a simultaneously feminine and unified relationship. The moon and the fire both become feminized as well as one entity, creating a relationship in which one partner consumes the other. The consumption of another entity mimics the idea of settler colonialism in which the settling force invades and consumes the native population. However, in this instance, the motivation is not absorption/hostile takeover for resources or greed, but rather, a desire to become one out of love. Although this consumptive model of love mimics colonial invasion of the land, through a shift in motivation and subjects, Savageau uses this relationship to subvert damaging colonial relationships. Instead, she mimics the time when “relationships that were formed in Native space between settlers and Abenakis prevented violence, even in the midst of war” (Brooks, *Common* 40). This relationship not only mimics old relationships between colonizers and the Abenaki tribe but also mimics the idea of the reconstruction or “re-memberment” of Native past, present, and future. Brooks defines the idea of “re-memberment” multiple ways throughout her book *The Common Pot*, but the definition most applicable here describes the “process of re-memberment [as] a careful reconstruction of the communal body, a ‘quest for wholeness’ that is essential to the healing of the fragmented political, social, and cultural ‘base’” (Brooks, *Common* 67). Thus, through the relationship between the moon and the fire, the lovers are coming together, re-membering the

communal body via a process of mutual consumption. The consumptive definition of love and relationships in this poem become models not only for human relationships but also for the collective re-memberment of the Native community.

Just as the moon and the fire become unified in their relationship, the relationship between the lovers in the poem becomes merged with the relationship between the earth, fire, and wind. Savageau creates that unity in multiple ways: by using humanistic, sensual language when referring to the earth as well as by using the same language to refer to the relationship between the speaker and the lover. In reference to the earth:

the wind
pulls the smoke into
itself. Flames curl
securely around the logs. (13-16)

The relationship between the wind and the smoke is almost human. The imagery is evocative of people sleeping together, cuddling. Flames are not usually described as curling around logs nor smoke as being pulled into the wind in this very human way. The language makes these natural relationships appear more romantic, more human than they are typically portrayed. Additionally, the wind pulling the smoke “into itself,” creates the same consumptive idea of relationships portrayed by the moon and the fire at the beginning of the poem. Later in the poem, when referring to the relationship between the speaker and her lover, she says, “I want/to curl my warmth/around you” (19-21). Her language when referring to her lover is the same as that used to describe the flames and the log. In this instance, she becomes the flames, curling around her lover, the log. The connection between her lover and the earth, specifically logs, is made more explicit because they sleep with their “heavy length against/the ground” (17-18). Thus, in this love poem, the humans are given elemental properties, the

natural elements are humanized, and both are blurred together. This creates an empowered relationship within Native romantic relationships as well as between Native people and our homeland. The utilization and integration of nature-based language in the process of decolonizing love is crucial because it repurposes a previously oppressive trope that aligned Native people with the earth in a way that justified their subjugation.

The act of writing love poetry for Native women is an empowering action in itself. Discussing the absence of Native women's love or erotic poetry in general academia, Deborah Miranda asserts that "for Indian women to express the erotic is almost as frightening to America as if the skeletal witnesses in anthropology departments and national museums had suddenly risen" because in love poetry "the lover makes herself visible and patriarchal culture suddenly invisible" (Miranda, "Dildos" 143/146). The very act of writing love poetry is empowering for Native women after being either hypersexualized or the victims of sexual violence throughout much of our history. Thus, by writing love poetry or erotic poetry on our own terms, about our own experiences, we are able not only to reclaim our own bodies and relationships but also put forth an image of Indian women that defies the stereotypes of "squaw sluts, Pocahontas, or Indian princesses," instead putting forth the multiplicity of Native women's romantic experiences and of life experiences as a whole (Miranda, "Dildos" 138). Additionally, Savageau integrates language relating to the land and nature in its reclamation of sexuality and sensuality. By doing so, she not only rewrites Native women's sexual relationships but also the relationship with the land, helping to separate both sexual and land-based relationships from colonial frameworks that depict Native people as closer to nature than human or the somehow mystical progeny of the land.

The reclamation of the body and of land from colonization is more explicit in "Like the Trails of Ndaakinnna" in *Dirt Road Home*. This poem is

not explicitly sexual or necessarily even romantic. However, it addresses the negotiation with a colonized past, connections between body and land, and the reclamation of that past to reclaim both body and land. First, Savageau opens the poem by making Native identity a battleground. The speaker's father says "we're French and Indian like the war," (1) attempting to reconcile his history by relaying it to his daughter. While the speaker's father tries to pacify this battle, saying that "they fought together/against the English," the speaker questions this understanding of history and pushes against the myth of allied Indian and French forces (3-4). The speaker responds by saying that "it's still a lie/French and Indian/still fighting in my blood" (7-8). Not only does the speaker retemporalize this battle into the present but also calls into question the dominant history that says that the French and Native Americans fought together. By saying "it's still a lie," she not only questions the unity of the various parts of her heritage but also questions the unity of the French and Indians in the past as well as the accuracy of colonial education.

Speaking to her father, she continues to address the legitimacy of conventional knowledge beyond history, including cultural knowledge and geographical knowledge. She writes to him that he:

Taught [her] to see no borders
To know the northeast as one land
Never heard the word Ndakinna
But translated without knowing it
Our country, Abenaki country (15-19).

Although he did not know the exact word for the concept, her father was able to communicate its exact meaning. In much of Savageau's poetry, her father becomes a mentor and teacher, especially in Native experiences and history. Just as in "Looking for Indians," "Trees," and "Indian Blood," Savageau reveres her father for his knowledge of life,

particularly Indian life, despite a lack of “formal” education. Instead, Savageau’s father and his knowledge are valuable because they transcend the dominant romanticized Native history put forth by dominant, white education. Likewise, in “Trees” her father taught her “the land so well” that she “never saw the highway/the truckstops, lumberyards” (1-4). In Savageau’s poetry, knowledge is useful or revered only when it allows one to move past definitions put forth by a dominant culture of colonization. Specifically, in this poetry, to truly know the land is to redefine spatial borders that define states created by settlers and the divisions between the “United States of America” and “Indian Country.”

The redefinition of spatial relationships that Savageau uses to reclaim the relationship with the homeland also appears in “Like the Trails of Ndinakina” to reclaim the Native body as well. She describes “Grandmothers and grandfathers/[who] are roaming in my blood...chased by blue eyes and white skin ... invisibility their best defense” (20-28). This description collapses the history of colonization and modernity, the distinction between the speaker and her ancestors as well as the difference between her body and the land. Her ancestors, in the present tense, are still running, an observation that brings the historical colonization of Native people into the present. However, rather than running and hiding on physical ground, they are doing so within the body of the speaker. Her body becomes the battleground of settler colonial America. The speaker’s mixed heritage, French and Indian, provides an opportunity to examine internalized racism and colonialism. Though the battle is taking place within the Native speaker, she is also French; hence even within her body, her grandmothers and grandfathers are still being chased by those with blue eyes and white skin. This reflects not only the historical battle between Native and white people but also the internal battle that still exists for many Native people with mixed ancestry who may feel alienated both

from white culture as well as their own Native culture and background.

Finally, despite both current and historical colonization, the speaker is able to use the same framework she used to reclaim the northeast as Abenaki country to reclaim her own body. First, she blurs the line between her white and Native ancestors by once again addressing her grandmothers and grandfathers, telling them that their “blood runs thin in [her]” (29-30). Since the last subjects addressed were the white skinned, blue eyed individuals chasing her ancestors, it is unclear whether the grandfathers and grandmothers she addresses are French or Indian. Further, the line between enemy and friend becomes blurred when she tells them that she catches “sight of you [her grandmothers and grandfathers]/sideways in a mirror” until they “then sink/behind the enemy’s colors” (31-35). Because the ancestors the speaker addresses are unclear, the enemy also becomes unclear. Additionally, since this episode occurs in the face of a mirror, the speaker’s body becomes simultaneously the reflection of both her ancestors and their enemies.

Then, apparently addressing both her grandparents and her father, she writes that:

you are walking the trails
that declare this body
Abenaki land...
speaking my true name
Ndakinna. (36-41)

Despite her struggles with mixed ancestry presented in the beginning of the poem, the speaker proudly states her identity, claiming both her body and the land. The term “declare” makes this line autonomous and demonstrates agency. She declares her true name, the land’s true name, in Abenaki, reclaiming it from modern, English, colonized titles. The way she reclaims her body is important as well. She does so through the idea of

homeland presented in the Abenaki word, Ndakinna, our land. Thus, not only is she reclaiming herself and her body's true name but the land's true name as well. The land is not "Cape Cod" or "New Hampshire" or "New England." It is Ndakinna. It is Abenaki land. Ndakinna translated means approximately "our land," which makes this a collective reclamation as well. She is not claiming private ownership through Ndakinna but rather community ownership in the form of tribal relations to the land and acknowledgement of her ancestors within her own body.

Finally, after setting up a framework of reclamation of land, empowerment of self and body, and negotiation with a colonized past and present, how does this basis affect Native erotic or sexual bodies? The methods for reclamation of eroticism and sexuality are essentially the same renegotiations with history, time, and space, as utilized for the nonsexual body or land. In *Mother/Land*, the last poem of the first section, "Red," explicitly addresses colonization of the land. Although an unnamed poet referred to only as "he" and associated pronouns uses the woods as a metaphor for martyrs, the speaker of the poem argues:

Look at the trees I want to tell him
Listen The trees have their own stories to tell
like the story of fire deep within the heart They too
have been martyrs in the long war against the land. (7-10)

The argument is that rather than a metaphor for martyrs, the trees themselves have experienced suffering. Like the indigenous people who experience colonization, the trees have their own stories to tell, but the unnamed poet ignores them and sees them as nothing more than a metaphor for human suffering, not acknowledging the importance of the land as its own entity.

However, this poem is not simply discussing historical colonization of the land. Rather its point is to highlight the progress that has been made to help rectify some of the damages done by colonization because, "a hundred

years ago these hills were full of trees ... the illusion of ownership” (12-14). In the past, colonial desires for land ownership led to the ransacking of land and the destruction of trees and the natural landscape, a process that Savageau repeatedly addresses in “Survival,” “Poison in the Pond,” “Algonkian Paradise,” and other poems. She also speaks to such relationships in her quilts, “Jazz Autumn” and “The Illusion of Ownership.” “The Illusion of Ownership” (Figure 1) is made of “colors that disappear,” similar to both the disappearing landscape described in the poem as well as the idea of a “disappearing Indian” (*We’re Still Here*). The phrase “illusion of ownership” is also interesting, both in the poem and in the quilt of the same title. The poem implies that settlers perceived ownership as dependent upon the removal of trees; however, that ownership is still not real. It is an illusion. In the quilt, this idea is taken a step further. The disappearing colors portray the disappearing Indian country and a history of Native people forcibly disappearing through death. However, since the quilt actually depicts cabins, a marker of civilization and colonization, it also implies that colonization is slowly disappearing as well.

The joy of survival past colonization is expressed in “Jazz Autumn” and in the poem itself because “now the hills are red with maples” (14). Despite colonial destruction of the landscape, it can be rebuilt. The damage of colonialism does not have to remain permanently unchallenged, and the joy of this possibility is reflected both in “Red” and in this quilt (see fig. 2). In the quilt “Jazz Autumn,” the fervor and excitement of the trees is communicated through the vibrant reds of the quilt. The colors leap out of the quilt, and the triangles seem to shift, forming new patterns as the eye views the quilt. The joy of these new red maples is almost uncontainable within the confines of the quilt.

In the poem, the joy over these trees becomes sexual, almost erotic. When the speaker of the poem sees them, her “heart is leaping out to meet

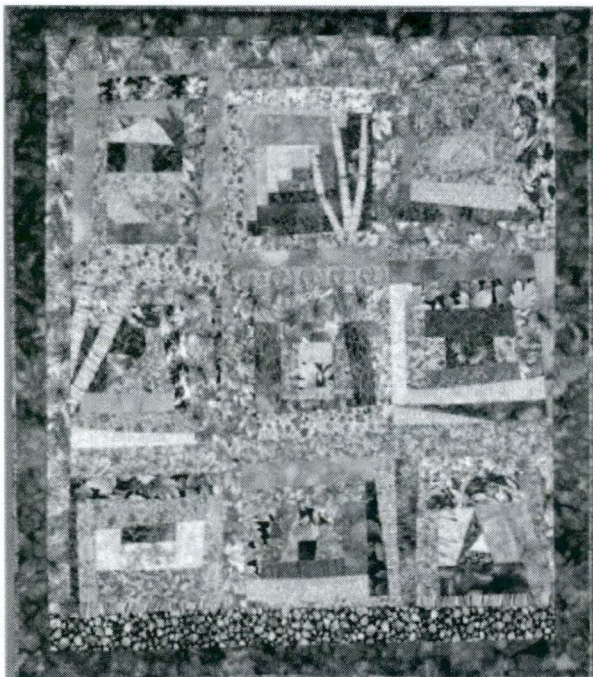


Figure 1. "The Illusion of Ownership". Savageau, Cheryl. Senier, Siobhan. "All This / Is Abenaki Country." *Studies in American Indian Literatures* 22.3 (2010): 1-25. Project MUSE. Web.

them, [her] eyes cannot be full enough" (14-15). Just as in "Night" in which love becomes almost consumptive, overtaking or subsuming the lover, here she uses the same idea, but rather than the speaker consuming her lover, she is being filled with them. Her lover, the trees, cannot fill her eyes quickly enough. There is a sense of overabundance in this scene, an overwhelming, overtaking joy that accompanies the speaker's relationship with the trees. This love becomes particularly important in light of the unique Abenaki relationship with trees. According to Savageau, "In



Figure 2. "Jazz Autumn." Cheryl Savageau. "Center for New England Culture, University of New Hampshire, Contemporary Indigenous New England Artists." *"We're Still Here" Online Exhibit*. Center for New England Culture, n.d. Web. 07 May 2013.

Abenaki creation stories we are told that we were made from the trees, that the trees are quite literally our relatives, and their survival and ours are intimately connected" (*We're Still Here*). Since humans come from the trees, in a way, they become interchangeable; the trees are just waiting to become human. The speaker's love for the trees is a love for other human beings before they are actually human. In so doing, the erotic created is a polyamorous one. The speaker is not simply addressing one tree, one person; rather, she shares this relationship with all of these trees, all of

these potential humans.

Affection for the trees and their eventually human counterparts derives from their ability to survive and persevere. The speaker's initial joy at the trees is because they were completely gone a hundred years ago. Now, she admires their ability to survive because "though acid falls from the clouds/maples have gathered on the hillsides/in every direction" (16-18). Mentioning the modern conditions the trees face as they survive draws attention to the connection between historical and modern harm. The trees survived the forced "civilization" of colonization just as they are now surviving the effects of "civilization" through acid rain. It is their ability to survive, both as trees and as eventual humans, that is attractive to the speaker. In the face of the acid rain, the trees "celebrate ... wearing their brightest dresses," which causes the speaker to join them (18-19). The implication is that it is in the face of pain and struggle that the trees are able to celebrate. By surviving these trials and celebrating that survival, the trees become beautiful, attractive. Survival does not diminish the trees. Instead, it redefines/reimagines their beauty outside of the constraints of colonization.

The personification of the trees, especially based on Abenaki myth and legend, becomes most clear toward the end of the poem. The speaker switches from referring to the maples as trees or objects to addressing them as "sisters," making them human and relations (20). The implied connection between the trees and their human counterparts is made explicit. Because these humans came from the trees, they share the same beauty and attractiveness through struggle. The implication does not exalt Native struggles against colonization, but honors them. We, like the trees, are not damaged because of our struggles, but rather, become more beautiful as a result of our strength. This redefines our beauty and our relationships outside of a colonized context. This is furthered through the way in which

the speaker courts the treewomen. She asks them:

I offer you a song
Let me paint
it red with
passion. (21-24)

Rather than offering material objects as part of the relationship, or as settlers did to make deals with the indigenous people of America, the speaker offers impossible immaterial goods. She offers a song that has been painted, an impossible, intangible object. Moreover, this object is painted red, with passion. Red is the color of passion but also of love, of anger, of eroticism. She offers the treewomen an object made of all of these things, a love wrapped in passion, anger that is both passionate and loving; she offers the treewomen the reality of Native experience.

By offering them this gift that is at once impossible and somehow universal in its description of experience, the speaker extends the universality of the love or sexuality presented in the poem. It ends with a quote from another Native woman poet, telling the treewomen that they “are/all the women/I have ever loved” (25-27). Firstly, this queers the relationship between the speaker and the treewomen. The trees are feminized as is the speaker of the poem, creating a queer relationship between the two. Additionally, within the colonized rhetoric of a feminized American land, any close relationship between a (Native) woman and the feminized land may be interpreted as a queered relationship despite operating within an originally heterosexist, binary rhetorical context. Because Savageau has masculinized aspects of the land, the land incorporates both masculine and feminine elements, which disrupts the original colonial binary, redefining the land in terms more in line with older Abenaki gender and sexuality ideas.

Secondly, the last stanza expands this one moment to all of the speaker’s

relationships. The speaker describes the treewomen as all the women she has ever loved, which implies they were all derived from trees. In addition to creating non-heterosexual relationships between the speaker and other women, this passage posits the Abenaki creation myth as the definitive one, rather than any Anglo-European creation story. The previous integration of both masculine and feminine elements into the land blurs gender lines of the treewomen. They grow from the earth, containing both male and female elements despite being described as women, which broadens the definition of the masculine, and the feminine. Thus, the poem redefines romantic relationships in a regendered space that utilizes decolonized ideas of beauty, gender, and sexuality. These redefined relationships put forth a new creation story in which humans are born from the regendered, non-binary earth rather than the more canonical western creation story.

Conclusion

Whether Native people are trying to decolonize the land, their history, their bodies, or their communities, the decolonization process takes a similar form. It often includes a renegotiation or redefinition of the temporal and spatial relationships they have with these aspects of contemporary Native life. This can mean either rewriting (re-righting) history, redefining land barriers, redefining the boundaries between self and community, or renegotiating the relationship we have with ourselves and our own bodies. The various types of rhetorical navigation and negotiation indigenous people use to try to reclaim our lives after and during colonization can be seen in Cheryl Savageau's creative work, including her poetry and quilts. Through Savageau's work one can see some of the rhetorical and ideological methods Native people are using to attempt to redefine and reclaim our histories and ourselves.

Looking at these poems and this history through a queered context

allows for the re-empowerment of Native sexuality and eroticism, especially in the face of a particularly sexually violent colonial history. Although historical reclamation and rediscovery of gender and sexuality are often considered separate pursuits, the reality is that in order to properly reclaim our history, it must be done with gender and sexuality in mind. Looking at this history in a queered framework allows for the expansion of Native history in ways that a heterosexist, colonized framework would not allow and helps to prevent further heterosexism in decolonization attempts. Poetry and other creative work by Native authors, especially queer Native authors, is integral to moving forward in decolonization. This work involves Native people creatively putting forth their own experiences, working through and reclaiming their bodies and histories in their own words, making it central to the reclamation of Native history and sexuality and moving forward as a unified community.

Bibliography

- Acoose, Janice, Craig S. Womack, Daniel Heath Justice, and Christopher B. Teuton. *Reasoning Together: The Native Critics Collective*. Norman: University of Oklahoma, 2008. Print.
- Anzaldúa, Gloria, and AnaLouise Keating. "Looking for Warrior Woman (Beyond Pocahontas)." *This Bridge We Call Home: Radical Visions for Transformation*. New York: Routledge, 2002. 314-25. Print.
- BigFoot, Dolores Subia, and Susan R. Schmidt. "Honoring Children, Mending the Circle: Cultural Adaptation of Trauma-focused Cognitive-behavioral Therapy for American Indian and Alaska Native Children." *Journal of Clinical Psychology* 66.8 (2010): 847-56. Print.
- Brooks, Lisa Tanya. *The Common Pot: The Recovery of Native Space in the Northeast*. Minneapolis: University of Minnesota, 2008. Print.
- . "Digging at the Roots: Locating an Ethical, Native Criticism." Acoose et al. 234-65.
- Bruchac, Joseph. *The Wind Eagle and Other Abenaki Stories*. Greenfield Center, NY: Bowman, 1985. Print.
- Driskill, Qwo-Li. *Queer Indigenous Studies: Critical Interventions in Theory, Politics, and Literature*. Tucson: University of Arizona, 2011. Print.
- Finley, Chris. "Violence, Genocide, and Captivity: Exploring Cultural Representations of Sacajawea as a Universal Mother of Conquest." *American Indian Culture and Research Journal* 35.4 (2011): 191-208. Print.
- Hałas, Elzbieta. "Time And Memory: A Cultural Perspective." *Trames: Journal of the Humanities and Social Sciences* 14.4 (2010): 307. Print.
- hooks, bell [Gloria Jean Watkins]. "Essentialism and Experience." *American Literary History* 3.1 (1991): 172-83. Print.
- . "Free Spirits: A Legacy of Wildness." *Appalachian Heritage* 36.3 (2008): 37-39. Print.
- . "Remembered Rapture: Dancing with Words." *JAC* 20.1 (2000): 1-8. Print.
- Justice, Daniel Heath. "'Go Away, Water!' Kinship Criticism and the Decolonization Imperative." Acoose et al. 147-69.

- Justice, Daniel Heath, and James H. Cox. "Queering Native Literature, Indigenizing Queer Theory." *Studies in American Indian Literatures*. 2nd ser. 20.1 (2008): xiii-iv. Print.
- Katz, Jonathan. *The Invention of Heterosexuality*. New York: Dutton, 1995. Print.
- Maracle, Lee. *I Am Woman: A Native Perspective on Sociology and Feminism*. Vancouver, B.C.: Press Gang, 1996. Print.
- Miranda, Deborah A. "Dildos, Hummingbirds, and Driving Her Crazy: Searching for American Indian Women's Love Poetry and Erotics." *Frontiers: A Journal of Women Studies* 23.2 (2002): 135-49. Print.
- . "'Like Melody or Witchcraft': Empowerment through Literature." *The American Indian Quarterly* 28.1 (2004): 103-06. Print.
- National Sexual Violence Resource Center. *Sexual Assault In Indian Country, Confronting Sexual Violence*. Atlanta, GA: National Sexual Violence Resource Center, 2000. Print.
- Okubo, Miné. *Citizen 13660*. New York: Columbia UP, 1946. Print.
- Povinelli, Elizabeth A. *The Empire of Love: Toward a Theory of Intimacy, Genealogy, and Carnality*. Durham: Duke UP, 2006. Print.
- Rifkin, Mark. *When Did Indians Become Straight? Kinship, the History of Sexuality, and Native Sovereignty*. New York: Oxford UP, 2011. Print.
- Savageau, Cheryl, and Robert Hynes. *Muskrat Will Be Swimming*. Flagstaff, AZ: Northland Pub., 1996. Print.
- . *Dirt Road Home*. Willimantic, CT: Curbstone, 1995. Print.
- . *Mother/Land*. Cambridge, England: Salt, 2006. Print.
- . "Center for New England Culture, University of New Hampshire, Contemporary Indigenous New England Artists." "We're Still Here" Online Exhibit. Center for New England Culture, n.d. Web. 07 May 2013.
- Senier, Siobhan. "All This / Is Abenaki Country." *Studies in American Indian Literatures* 22.3 (2010): 1-25. Project MUSE. Web.

Smith, Andrea. "American Studies without America: Native Feminisms and the Nation-State." *American Quarterly* 60.2 (2008): 309-15. Print.

---. *Conquest: Sexual Violence and American Indian Genocide*. Cambridge, MA: South End, 2005. Print.

Stamm, B. Hudnall, Henry E. Stamm, Amy C. Hudnall, and Craig Higson-Smith. "Considering A Theory Of Cultural Trauma And Loss." *Journal of Loss and Trauma* 9.1 (2004): 89-111. Print.

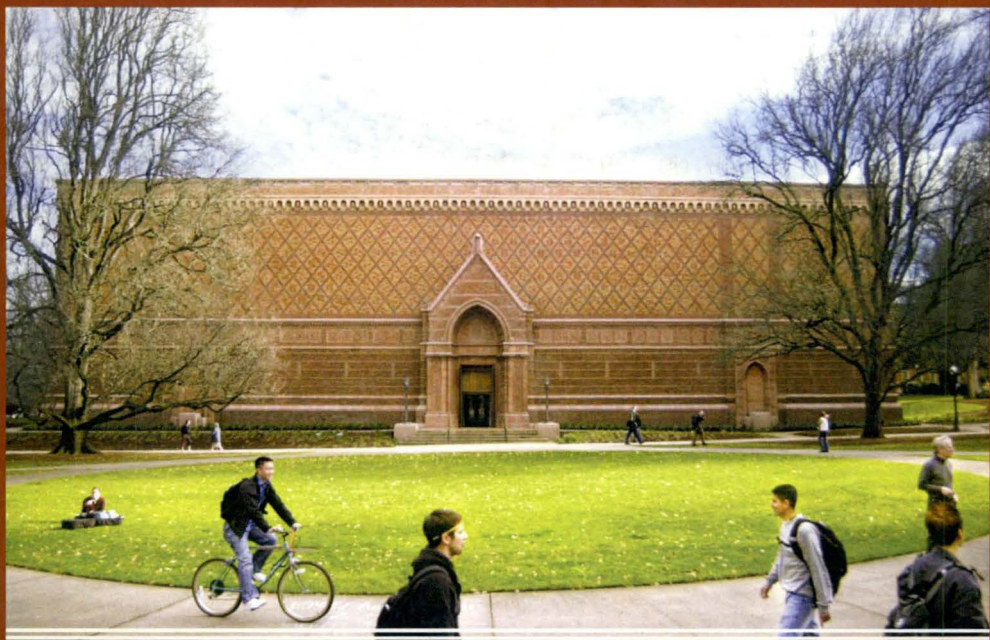
Wallace, Lee. *Sexual Encounters: Pacific Texts, Modern Sexualities*. Ithaca, NY: Cornell UP, 2003. Print.

Weaver, Jace. *That the People Might Live: Native American Literatures and Native American Community*. New York: Oxford UP, 1997. Print.

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