Loss for Words: An Investigation of the English Nature Vocabulary

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“Once upon a time, words began to vanish from the language of children. They disappeared so quietly that at first almost no one noticed—fading away like water on stone. The words were those that children used to name the natural world around them: acorn, adder, bluebell, bramble, conker — gone! Fern, heather, kingfisher, otter, raven, willow, wren... all of them gone! The words were becoming lost: no longer vivid in children’s voices, no longer alive in their stories...”


1. Introduction

This paper explores lexical loss within English as represented by the case of nature vocabulary attrition in a Montana speech community. To investigate widespread but unsubstantiated claims of an intergenerational decline in knowledge of nature lexicon in English (defined in this project as local species, weather, and topography terminology), a new survey instrument was designed and implemented to gather demographic and lexical data from Montanans, resulting in the first qualitative assessment of nature vocabulary in English.

Studies have shown declining nature knowledge amongst English speakers as well as a marked decrease in the usage of nature words in English popular culture throughout the 20th century (Balmford et al. 2002, Kesebir & Kesebir 2017). Though studies across disciplines point to a growing disconnect between humans and their environment, previous research has failed to investigate the role of language in humans’ changing experience of nature. The survey instrument developed in this study gathered demographic information and vocabulary data, aiming to gauge speakers’ depth and diversity of nature terminology as well as attitudes about language and environment. The results of that survey will be explored in depth in this paper, and interpreted as an indicator of lexical attrition or change in a non-endangered language.

The primary research question investigated in this study is the following: (1) Is there an intergenerational decline in nature vocabulary proficiency among Montana English speakers? In other words, do younger speakers have a less-developed nature lexicon than older speakers? This question reflects the principal research aim of evaluating common claims that younger people are less nature-literate and less able to name and identify items in their natural environment than their older counterparts. Establishing a baseline measurement of vocabulary vitality across age groups aids in proving or disproving the purported vocabulary degradation. The second question addressed in this paper is: (2) Can change within a particular semantic domain be compared to, and analyzed similarly to, processes of broader language attrition? I use the case of the English nature vocabulary to demonstrate that modern instruments for measuring degrees of language endangerment may be extended to the lexical domain to provide a framework for conceptualizing factors associated with attrition and assessing degrees of endangerment at the lexical level. Finally, the study implicates a third question relating to human ecology and environmental conservation: (3) What role does language play in our relationship with the natural world? The ability to name and categorize the world around us that is represented in nature vocabulary knowledge may not be independent from our experiences of, relationships with, and attitudes toward nature. Generations with diminishing capabilities for linguistic representation of nature could struggle to conceptualize and differentiate the world around them, decreasing their motivation for environmental engagement. This suggestion, not treated as a primary research question within this paper, is addressed in the implications in Section 6.
Section 2 provides a brief overview of the existing research on nature words in English as well as the recent claims of word loss that have brought the issue into the public eye. Section 3 describes the development of a survey instrument and its implementation, with the results discussed in Section 4. The discussion in Section 5 focuses on the application of factors for assessing language endangerment on the lexical domain, with the implications of word loss for human ecology discussed in Section 6. The paper concludes with a summary of my findings, a discussion of the questions this project raised, and the multiple directions that future research could take in pursuing them.

2. Literature Review

2.1 Word loss in the public eye

On January 12th, 2015, a letter arrived via email to Oxford University Press. The letter began as follows:

“We the undersigned are profoundly alarmed to learn that the Oxford Junior Dictionary has systematically been stripped of many words associated with nature and the countryside. We write to plead that the next edition sees the reinstatement of words cut since 2007.” (Atwood et al. 2015)

A group of renowned British authors, artists, naturalists, poets, and other environmentally minded English speakers (among them famed writers Margaret Atwood and Robert Macfarlane) together wrote the letter after learning of the dictionary’s word removal. Their argument for the reinstatement of the nature words was based in their belief in the important connection between nature and culture, their concern for the future of that connection, and on the value of nature play in childhood. The letter continued:

“We recognise the need to introduce new words and to make room for them and do not intend to comment in detail on the choice of words added. However it is worrying that in contrast to those taken out, many are associated with the interior, solitary childhoods of today. In light of what is known about the benefits of natural play and connection to nature; and the dangers of their lack, we think the choice of words to be omitted shocking and poorly considered. We find the explanations issued recently too narrowly focussed [sic] on a lexicographical viewpoint without consideration for the social context.”

From these words was born a campaign for the “re-wilding” of English. Per the letter-writers, Oxford’s decision to omit the fifty-some nature-related words and names for common British wildlife (including blackberry, acorn, badger, buttercup, otter, and wren) from the children’s dictionary—and to add “indoor” and technology-related terms (such as Blackberry, chatroom, broadband, and cut-and-paste) the same year—was symptomatic of the growing divide between people and the natural world. Children were becoming too disconnected from their environment in the age of indoor play, technological distraction, urban living, and helicopter parenting. Furthermore, the letter-writers argued that the Oxford Dictionary holds a duty as a cultural and educational institution to advocate for natural childhood and to use its authority to encourage the re-wilding of English by reinstating the missing words. Critics asked, Why the great push for reinstating nature in children’s lives? Supporters of the campaign argued that the schism between children and nature will not allow for the appreciation of nature that is necessary to raise a
generation of environmentalists, even more crucial in the face of climate crisis and environmental exploitation (Flood 2015).

2.2 Previous research on English nature lexicon
The words culled from the Oxford Junior Dictionary in 2007 were not chosen randomly, nor selected based on a publisher’s ideologies about children’s language. Oxford University Press releases several children’s dictionaries, comprising a smaller set of words more relevant to the age group for which each dictionary is designed. These dictionaries are carefully tailored to meet the needs of their users, and according to Oxford University Press, its dictionaries have no intent to influence culture or language use, but rather “reflect common and current usage and significant changes in the use of languages” (Oxford Dictionaries, n.d.). Accordingly, the function of the Oxford Junior Dictionary is to provide a descriptive and unbiased catalogue of the words used in children’s language and their definitions. To monitor trends in children’s vocabulary usage, Oxford University Press collaborates with BBC 2’s annual 500 Words children’s writing competition, which collects short stories from hundreds of thousands of British children ages 5-13 (BBC, n.d.). The stories collected add annually to the Oxford Corpus, a massive corpus of children’s writing which, alongside research in schools and analysis of literature written for children, informs Oxford Dictionaries’ decisions of which words to include in their revisions (Oxford Dictionaries, n.d.). Analysis of the corpus in 2017 showed certain nature words at a much lower frequency than other words implying indoor, electronics-centered childhood (Macfarlane 2017). The decision of the Oxford Junior Dictionary to exclude certain nature terms thus represented a shift in children’s language usage.

Five years before the publication of the controversial dictionary edition, a study concerning British children’s comparative naming ability of animals and Pokémon found the children more able to identify various Pokémon “species” than common wildlife species (Balmford et al. 2002). 109 children ages 4-11 were tasked with identifying the species from flashcards, and the study found that by age 8, children could identify 78% of Pokémon “species” and only 53% of the wildlife. The results of the study were attributed to industrialization, urbanization, and a growing disconnect between children and nature; the authors also discussed the implications of their experiment as an early indicator of a generation of dispassionate, disconnected environmental stewards (Balmford et al. 2002). The project’s findings were corroborated by other ecological literacy studies in Britain, which found children and adults alike largely unable to identify common animals and plants in their environment (Macfarlane 2017). Among the most commonly cited causes of this child-nature disconnect are technology and electronic media, urbanization, and increasingly indoor-led childhoods resulting in a decline in nature play—adding up to what has been termed by Louv (2008) “Nature Deficit Disorder” (Kahn 1999, Kellert et al. 2017, Miller 2005, Moss 2012, Pergams & Zaradic 2006.)

Kesebir & Kesebir (2017) conducted a less sensational but equally weighty and more language-centered study on the occurrence of nature words in English popular culture, discovering a significant decrease in the usage of nature words in English text products across the 20th century, most markedly declining from 1950 onward. The researchers compiled a list of 186 different nature words and tracked the frequency of occurrence of these words in English language cultural products (song lyrics, movie scripts, and fiction books) over the 20th century. The word-list selected by the researchers for the study was sorted into four categories: general nature words, names of flowers, names of trees, and names of birds. The words were chosen with a regard to the conception of humans as separate from nature, and thus excluded scientific
terminology, words for natural subjects that serve utilitarian purposes (such as *timber, crop*), words whose referents are not found in the environment of the speech community (such as *giraffe*), and words referring to destructive, harmful, and threatening aspects of nature (Kesebir & Kesebir 2017). Additionally, they also compiled a list of 40 words related to the human-built environment to be contrasted with the nature lexicon. To measure references to nature over time, the researchers used LIWC (Linguistic Inquiry and Word Count) and Google’s Ngram viewer to trace occurrences of the words in the text products. The data showed a marked decrease in the usage of the selected nature lexicon since 1950 in all three literary media genres, with no such trend present among words pertaining to the built environment.

Despite anecdotal claims of decreasing nature vocabulary and feelings of concern tied to the Oxford Dictionary word removal, very little research has attempted to back up these claims with any evidence of lexical shift. To my knowledge, research has yet to investigate the situation from a perspective of language loss and change. The next section will detail the development and employment of a new survey instrument to measure English nature vocabulary usage in the Montana speech community.

3. Methodology
3.1 Survey motivation
As studies until now have not attempted to assess nature vocabulary in terms of actual language use in a speech community, it was necessary to first devise a method of measuring the lexicon in its current usage among Montanans. An online, anonymous survey instrument was developed to gather vocabulary data from participants through a naming task, as well as collect demographic data and additional participant information such as nature experiences and feelings about nature. The survey consisted of 95 multiple-choice, Likert-type, and open-ended question items divided into four sections: 1) Demographic Questions, 2) Identification Questions, 3) Experiences, and 4) Attitudes.¹

Construction of the survey instrument was informed by research and survey work on ecological literacy, environmental education, and scales of nature connectedness (Davidson 2010, Mayer & Frantz 2004, McBeth & Volk 2009, Morrone et al. 2001). Most ecological literacy research has been conducted on young populations, and does not test for item identification ability or naming proficiency. However, many ecological literacy testing instruments are based in research on environmental education, and reflect a framework common to most environmental education literature outlining a pyramid of education and environmental awareness. UNESCO’s 1977 Intergovernmental Conference on Environmental Education outlines five objectives of environmental education known as the AKASA model: Awareness, Knowledge, Attitudes, Skills, and Action (UNESCO 1977). These tenets form the base for the ecological literacy pyramid proposed in the NEETF Report on Environmental Literacy in America (Coyle 2005), shown in Figure 1 below:

¹ See Appendix 1 for complete survey instrument.
Additionally, a fourth level is often added to the bottom of pyramid, underneath the level of environmental knowledge: this is the tier representing general awareness (Davidson 2010). With a strong base of general environmental awareness, a person can begin to build environmental knowledge, develop attitudes based on that knowledge, and advance on the spectrum toward true ecological literacy. Extending this framework to vocabulary literacy, it follows that a sturdy base of general awareness is necessary to begin building lexical knowledge, perhaps develop ideologies surrounding that lexicon, and advance toward linguistic environmental literacy.

The largest portion of the survey, the naming task, elicited word-lists and short responses from textual, visual, and auditory stimuli to collect data on three specific aspects of nature vocabulary proficiency: (1) awareness of referent, (2) diversity of terms, and (3) depth of specialized knowledge. The first of these categories, awareness of referent, draws upon the theory of the ecological literacy pyramid, mirroring that foundation in the vocabulary which I interpret as a base necessary for the development of a complex nature lexicon (Coyle 2005).

The second aspect of vocabulary proficiency identified is diversity of terms, defined as the number of different terms in the participant’s lexicon for a given local species referent: is more than one word in use for a single referent? If so, how many of those terms can the participant supply? Does a greater diversity of names come from a certain age cohort, or are there any other correlations between the number of names provided per referent and performance on other sections of the test? Research on folk taxonomy and classification of natural kinds has shown that greater cultural, economic, or utilitarian value placed on a referent can be reflected by a greater number of names (Harrison 2007).

The third and final type of data collected in this section of the survey is depth of specialized knowledge, which refers to the degree to which participants can differentiate within a given category: does the participant’s vocabulary permit them to distinguish (linguistically) between different species of conifer, or restrict their naming capacity to the general category “pine tree” for both Ponderosa pines and Douglas firs?

3.2 Survey instrument
3.2.1 Demographic Questions
The first section comprised fifteen demographic questions (Q2.1 to Q2.15 in Appendix 1) including factors that have been shown to affect ecological literacy such as age, ethnicity, level of education, and gender (Arcury 1990). This section also included questions regarding
community type (rural, semi-rural, or urban/suburban), history of employment or education in environmentally related sectors, and number of years the participant has lived in Montana. The key demographic factor in this study is age, but because the study was the first of its kind to be conducted in Montana, additional information was collected so it could serve as a baseline study for future research, as well as be correlated with existing research on ecoliteracy.

3.2.2 Identification Questions
The second section of the survey was comprised of a set of questions (Q3.1-Q3.56) designed to record one or more of the three aspects of vocabulary proficiency outlined in Section 3.1. The section consisted of a 56-question naming task designed to elicit responses in the form of word lists and simple one-term or short-answer responses, prompted by three different question types: listing questions (LQ), simple identification questions (SIQ), and two-part complex identification questions (CIQ).

Listing questions prompted the participant to enter a number of terms in the form of a word list. These questions used a text prompt and sought a demonstration of the participant’s ability to differentiate subspecies or specific kinds within a given category, revealing depth of taxonomic specificity, as well as the diversity and number of terms present in the participant’s lexicon. Participants were asked to list as many terms as they could in a text box. Below is an example of a listing question:

(Q3.3) What different kinds of hawks are found in your area?

Simple identification questions presented a simple, definitional prompt eliciting a one-term response which could be correct or incorrect (multi-term responses were also possible if multiple names existed for a single referent, as in the case of larch and tamarack, two commonly used names for the same tree). These questions too were open-response and participants entered their answers in a text box. Below is an example of a simple identification question:

(Q3.12) What kind of tree produces acorns?

The final question type, which accounted for the majority of the questions in the naming task, was the complex identification question (CIQ), formatted in two cooperative parts (CIQA and CIQB). These questions used image or audio prompts to elicit one- or multi-word responses which could be correct or incorrect. In the first part of the question, the participant was prompted with an image or sound bite of the referent (the given plant, animal, bird, etc.) and asked to indicate whether they had seen or heard the referent before by selecting one of three multiple choice answers Yes, No, or Don’t know. If Yes was selected, the second part of the question was displayed, in which the image or audio clip was repeated and the participant asked to enter the name or names they used for the referent in a text box.2 Figure 2 below shows the progression of a complex identification question:

2 Display logic for each question and overall survey flow is visible in Appendix 1.
Figure 2. Sample complex identification question (Q3.20/3.21). If Yes is selected, CIQB is displayed.

Items for identification in the naming task were selected based not only on their commonness in diverse Montana environments but on their salience to Montana English speakers. Plant, tree, animal, bird, insect, and fungus species were chosen to cover the bases of general nature knowledge. Species for identification were selected with input from a biologist with expertise on Montana wildlife to ensure that the species selected were salient and likely to have been seen by rural- and urban-dwelling Montanans alike, and that the species were distributed in habitats across the entire state to counter geographical bias (D. Emlen, personal communication). The questions in the naming task were designed to be answerable to the average Montanan and salient referents were chosen with this in mind.

3.2.3 Experiences and Attitudes Questions
Questions in the Experiences section (Q4.1-Q4.11 in Appendix 1) gathered information about participants’ interactions with nature on a regular basis in their day-to-day lives (such as whether the participant’s home is located in an urban or rural setting, how frequently the participant spends time in nature, and if the participant is satisfied with the amount of time they spend in nature). This section also probed participants’ experiences with nature throughout their lifetime. Questions asked about time spent in nature during childhood, as well as participants’ perceptions of when and from which sources they acquired nature knowledge and words over the course of their lifetime. This section consisted of eleven multiple-choice questions, mostly constructed on Likert-type scales.

The final Attitudes section of the survey (Q5.1-Q5.11) prompted participants to reflect on their attitudes toward the environment and conservation, feelings of nature connectedness, and the personal significance of naming and identification of nature; this section also elicited responses concerning participants’ perceptions of younger and older speakers’ nature vocabulary. These were the only questions on the survey to directly inquire about language
ideologies. The ten items in the Attitudes section were formatted as a statement, and participants indicated the degree to which they agreed with each statement on a five-point Likert scale from “strongly agree” to “strongly disagree”. Data from this section was not analyzed in conjunction with data from the naming task but remains an area for future research.

3.3 Participant Demographics
The survey was conducted anonymously online using Qualtrics and circulated for a period of three weeks. The link was distributed via personal networks and through email lists of selected local organizations. An earlier version of the complete survey was piloted on a test group of ten participants representing different age groups and backgrounds, who were also invited to take the final survey upon its publication. Excluding the pilot survey, 142 responses were recorded in total, though the sample was reduced to 83 participants after the application of several constraints listed below. Participants confirmed their age of 18 or older before beginning the survey. Gender and ethnicity were not equally represented in the participant pool, which was largely female (around 77% of the sample) and White (95%). To be counted in analysis, the participant must have completed the survey in its entirety, and must have met the following criteria:

- a. Birth year indicated
- b. L1 English speaker
- c. Montana resident (at some point in lifetime)

As the participant pool was self-selecting and the survey used non-probability sampling, the population represented in the survey does not represent a random sample and therefore does not reflect the demographics of the larger Montana English speech community. Furthermore, the survey potentially attracted more environmentally inclined participants due to its subject matter, and the sample may have been biased toward a more environmentally literate and naming- competent group because of this appeal. Finally, some demographics may be underrepresented due the electronic format of the survey, which could deter participants less comfortable with computers and phones or those without access to Internet devices.

Though other information was collected for future research, the only demographic factor analyzed in this study was participant age. In my analysis, I located three points of low statistical significance in the sample due to the self-selecting population. Participant birth year ranged from 1939 to 2001, and for the purposes of my analysis, participants were divided into age cohorts by birth decade. With only one participant born in the 1930s, only two participants born in the 2000s, and only three participants each in the 1970s and the 1980s, these three points often appear as outliers in the data. I suspect this pattern may be at least partly explained by the relative dearth of respondents for these age groups. It is unclear why those groups were so underrepresented, but further pursuit of this study could recruit additional participants from those cohorts or from any underrepresented group to rule out the effects of unequal sampling. If more participants were to be recruited in these age groups, I would anticipate those anomalous data points to fall closer to the trend line. Alternatively, the age group interval could be increased from 10-year to 20-year increments, so that the outliers in the 1930s and 2000s would fall into a more populated grouping. However, I chose to mark age cohort by decade to have more points of reference by age, and to better observe the finer details that would be evened out by choosing a larger interval. To determine if the data were being skewed by that consolidation, I created
scatterplots for several questions, where each participant was individually represented. I found the trend line to be nearly the same in the scatterplots as in the line graphs I constructed for each question type.

3.4 Scoring
The survey data was analyzed in Excel, with birth year as an independent variable to evaluate the hypothesis that age positively correlates with nature vocabulary proficiency. Each of the three question types in the naming task outlined above were scored according to a different system. The scores were then plotted by birth decade to observe overall trend lines.

For listing questions, the number of terms listed by each participant was counted and averaged by decade. The resulting average number of terms was recorded and plotted as the LQ score by birth decade. Responses of “Don’t know” or no response were given a score of 0; one value point was deducted for an obviously incorrect answer (for example, a response of maple for Q3.4 “What different kinds of evergreen trees grow in your area?”, intended to elicit a list of evergreens.)

Responses to simple identification questions were analyzed as correct or incorrect. Responses of “Don’t know” or no response were given zero points; a score of one point was assigned for each correct answer provided (again, multiple correct answers were possible for certain questions where multiple names were in standard use.) A score of -1 was given for each incorrect term provided.

Complex identification questions used different scoring methods for each of the two components. For CIQAs, responses of “Yes” were assigned a score of 1, and all non-Yes responses (No, Don’t know, or no response) were given a score of zero. This score is referred to as the awareness score; CIQBs were designed to measure naming ability and are referred to as identification scores. The CIQB was assigned a score based on correctness, specificity, and number of terms. All responses for which CIQA=0 were automatically given a CIQB score of 0. Non-zero CIQB scores were scored according to the following guidelines: a score of 1 was assigned for each correct answer and -1 for each incorrect answer. A score of 0 was assigned for responses of “Don’t know” or no response. When the response was correct but generic (i.e. owl for an image of a great-horned owl), or when the participant listed two terms where one derived from the other (i.e. “balsamroot, arrowleaf balsamroot”), a score of .5 was given for the generic term.

The combination of positive and negative values of 1 in the scoring of several different question types in this section occasionally resulted in scores of zero where the participant had in fact listed two terms. When one term was incorrect and the other correct, the combined score totaled zero, even though the participant had been able to name the referent correctly once. Because of this scoring method, the mathematical average may not always accurately represent the average naming ability of the participant in this respect.

For each question type, the average score was calculated by birth decade and plotted on a line graph with a trend line. Parts A and B of CIQs were graphed separately. A small number of questions were excluded from data analysis. 3 Questions were excluded in cases where (a.) all or nearly all participants correctly identified the referent (for example, the unanimous successful identification of a bighorn sheep), or (b.) responses were so inconsistent as to indicate that the referent was not salient or recognizable to most participants (such as perceiving the difference between a yellow jacket and a wasp).

3 Questions removed from analysis, in CIQA/CIQB pairs: Q3.38/3.39, Q3.42/3.43, Q3.44/3.45, and Q3.46/3.47.
4. Results

Analysis of the data from the naming task showed a consistent positive association between age and naming ability across all three question types, confirming the hypothesis that younger speakers are less proficient at naming and identifying items in their natural environment than older speakers. Nearly all questions exhibited a decrease in lexical proficiency and productivity as well as awareness as age decreased. Most graphs showed an abrupt drop or spike in performance around the birth decade of the 1970s and 1980s, and occasionally in the 1930s and 2000s as well; as discussed in the previous section, I believe this can be at least partially attributed to the relatively small sample size for those groupings.

With the exception of this anomaly, nearly all questions in the naming task showed a consistent downward trend in vocabulary proficiency as age decreased. In the listing questions, the data showed that younger participants were considerably less productive on average than the older participants, able to list fewer names for each given category. Where fewer participants were represented for the 1970s-80s, most graphs showed that vocabulary proficiency either lay close to the trend line or dropped dramatically. In this section, all questions showed a marked downward trend in naming ability as age decreased. One exception, Q3.7, “What kinds of snakes are found in your area?”, showed no significant trend. Below, in Figure 3, is an example of the trend most often observed in the listing questions, representing number of terms provided by birth decade:

![Figure 3. “What different kinds of hawks are found in your area?” (Q3.3)](image)

Analysis of data from the simple identification questions confirmed the trends observed in the listing questions. Correctness and number of correct terms both decreased with later birth decades, this time indicating decreasing awareness among younger participants as well as decreased productivity. On average, older participants were more able to correctly identify the referent described in the definitional prompt than younger participants. The 1970s-1980s anomaly was very pronounced in this dataset, falling significantly below the trend line. The
The complex identification questions were scored and graphed separately for each component, CIQA and CIQB. Analysis of the CIQB data once again showed an overall positive correlation between age and vocabulary proficiency. This section showed the greatest amount of inconsistencies in the trends of any of the question types, with the trend line in certain questions running contrary to the pattern observed throughout the rest of the dataset, indicating a negative correlation. Where the outliers in the 1970s-1980s were significantly distanced from the trend line, they usually fell beneath the rest of the scores. In general, CIQA trends paralleled trends in the identification scores, although in some situations the two trends opposed one another, illustrating an interesting disparity between awareness (perception of having seen/been exposed to the referent) and identification (knowing what the referent was). Generally, CIQA trends indicated a positive correlation between age and awareness of referent.

Identification trends were inverse for great-horned owl and sandhill cranes (although the increasing identification trend for sandhill cranes did not appear significant.) For these two examples, younger participants averaged more correct answers than their older counterparts. Awareness trends were inverse for the following referents: spotted knapweed, morel, mourning cloak, sandhill cranes, coyotes, and elk. For these examples, young participants indicated having seen or heard the referent more than older participants on average. Interestingly, these exceptions to the general trend show that for knapweed, morel, mourning cloak, coyotes, and elk, younger participants reported having been exposed to the referent, but could not name it. Figures 5 and 6 below represent the respective Awareness and Identification trends in responses to an image of bindweed:
Analysis of the combined average scores across all questions in the listing section of the naming task yielded a view of what appears to be a sudden and very dramatic drop in vocabulary proficiency and productivity between the groups of participants born before and after the birth
decade of the 1970s, with scores appearing to decrease by nearly half of what previous generations had demonstrated (Figure 7).

![Number of Correct Terms vs. Decade of Birth](image)

**Figure 7.** Average responses to listing questions by birth decade.

The occurrence of this gap roughly coinciding with the 1970s-1980s anomaly observed throughout the data sets could imply that the decrease is due to sampling error, though this seems unlikely as the scores for succeeding age groups did not return to higher scores closer to the trend line, as usually occurred following the anomalous data point in the graphs.


Analysis of the data gathered in this research substantiates claims of attrition in the semantic domain of nature vocabulary for the Montana English speech community. The data indicates an intergenerational gap or decline in the transmission of the nature lexicon from older speakers to younger speakers. What factors could be responsible for this lexical shift, and what kind of social or linguistic processes might be negatively impacting vocabulary vitality in this domain? According to the UNESCO Ad Hoc Expert Group On Endangered Languages (2003), “a language is in danger when its speakers cease to use it, use it in an increasingly reduced number of communicative domains, and cease to pass it on from one generation to the next.” While the English language is in no danger of becoming extinct in the immediate future, the data revealed in this study indicate that the same may not be true for the nature vocabulary embedded within it. What is the fate of a lexicon whose speakers cease to use it, use it in fewer domains, and cease to pass it on to younger generations? In this section I will discuss how an established language vitality model may be applied to the attrition of a semantic domain to assess lexical vitality.
6.1 Overview of Language Vitality Assessment Models

Multiple methods exist for assessing degrees of language vitality or endangerment. Among these models are the Graded Intergenerational Disruption Scale or GIDS (Fishman 1991), which places the language in question on a scale from 1 (safe) to 8 (endangered) based on intergenerational transmission; the revised EGIDS (Lewis & Simons 2010) which expands the GIDS model to contain thirteen scale degrees with associated labels, also incorporating a scale for factors associated with language revitalization; Krauss’s (2007) model, based heavily on speaker numbers by generation, which assigns languages a grade between Safe, Endangered, and Extinct; and the recent Language Endangerment Index (LEI) focusing on intergenerational transmission, speaker numbers, trends in speaker numbers, and domains of use as four factors associated with language endangerment (Lee & Way 2018). UNESCO’s (2003) framework “9 Factors for Language Vitality” is one of the most comprehensive instruments in terms of individual factors associated with language attrition: the framework identifies nine major factors for evaluation based on intergenerational transmission, speaker numbers and trends, domains of use, language attitudes, and materials for education and documentation. The language in question can be assigned a grade from 0 (extinct) to 5 (stable) for all but Factor 2, which uses real speaker numbers, and the grades are analyzed together to produce a measure of vitality:

Factor 1. Intergenerational Language Transmission
Factor 2. Absolute Number of Speakers
Factor 3. Proportion of Speakers within the Total Population
Factor 4. Trends in Existing Language Domains
Factor 5. Response to New Domains and Media
Factor 6. Materials for Language Education and Literacy
Factor 7. Governmental and Institutional Language Attitudes and Policies, Including Official Status and Use
Factor 8. Community Members’ Attitudes toward Their Own Language
Factor 9. Amount and Quality of Documentation

(UNESCO 2003)

The UNESCO Ad Hoc Expert Group On Endangered Languages (2003) stresses that the above criteria should cooperate to yield the most integrated classification of endangerment status; a language’s degree of vitality cannot be determined based on the analysis of one factor alone (UNESCO 2003). While using this system to assign an exact grade to the vitality of a semantic domain may not be feasible within the scope of this study, I propose that the factors outlined above may prove to be useful in understanding the underlying causes, agents, and indicators of systematic lexical loss within an otherwise non-endangered language. In this section, rather than assigning grades for each factor, I will extend the model from language endangerment to vocabulary loss by discussing the application of appropriate factors to the situation of nature words among Montana English speakers.

6.2 Intergenerational Lexical Transmission

The most critical element among all extant frameworks for measuring degree of language endangerment is intergenerational transmission, present in all new models and now considered both an essential factor for language vitality and crucial indicator of language shift (Lee and Way 2018). UNESCO (2003) scores intergenerational language transmission from 5 (safe; used by all
ages, including children) to 0 (extinct; no speakers.) Using that grading system, the language is scored based on its frequency and domains of use among children, the parental generation, and the grandparental generation.

Parents play a crucial role in teaching children about nature and setting a model for their engagement with nature in the future. As American adults reported that the most influential people on their relationship with nature were their parents, it is evident that parent-to-child transmission of attitudes about nature greatly affects the degree to which succeeding generations engage with and conceptualize nature (Kellert et al. 2017). Pilgrim et al. (2007) found that residents of the UK who reported parents or relatives as the primary source of ecological knowledge were among the most successful in identifying plants and animal species. This evidence for the importance of intergenerational knowledge transmission implies that a generational decline in usage of nature words certainly bears an effect on succeeding generations’ acquisition and knowledge of the nature lexicon. MacFarlane (2017) cites several studies assessing the ecological literacy of adults, finding many adults unable to identify common wildlife and plant species and feeling disconnected from nature. With language as the primary vehicle for knowledge, intergenerational transmission of language and cultural knowledge are necessarily intertwined (Wright 1992, Harrison 2007). The knowledge entailed in language risks being lost when languages die; conversely, as knowledge dies, the language describing it becomes obsolete and risks loss. This relationship applies to the interdependence of knowledge and lexicon as well (Hill 2004).

With younger participants falling considerably behind their older counterparts in naming ability, the data revealed in this study clearly indicate a decline in nature vocabulary proficiency from generation to generation in the Montana speech community that points to decreasing transmission of nature words. While it would be difficult to delineate the filial, parental, grandparental, and great-grandparental generations of participants based on the demographic information gathered in the survey, the consistent correlation between decreasing vocabulary knowledge and decreasing age implies a reduction of the lexicon with each succeeding generation. The abrupt drop in naming ability visualized in Figure 7 above, demonstrating the number of correct names listed on average by each age cohort for the sum category of listing questions and showing an abrupt decrease in number of names produced by participants born after 1970, seems to indicate a sudden gap in transmission between generations.

As the transmission of knowledge and attitudes about nature between generations has been shown to be one of the most important factors determining the acquisition of natural knowledge and ways of engaging with and knowing nature, and as language and nomenclature encodes this knowledge, previous generations’ usage and transmission of nature words to succeeding generations can certainly be identified as a factor of the decreasing trends in connectedness with nature and natural naming proficiency.

6.3 Domains of Usage and Response to New Media

Ecoliteracy or ecological knowledge is “acquired through frequent interaction with the local environment driven by a need to pursue daily subsistence strategies for food and economic provision” (Pilgrim et al. 2008, pp. 1). This definition echoes Gardner’s (1983) concept of naturalist intelligence, or nature knowledge, as the eighth branch in his theory of multiple intelligences; Gardner went so far as to suggest that humans’ innate capacity for awareness of our natural surroundings (necessary knowledge of dangerous parts of the environment, such as poisonous snakes, and of beneficial parts, such as edible plants) has led to the replacement of
nature knowledge with knowledge of the built world (Louv 2008). With over half of the global population living in cities and a projected increase in urbanization in years to come, it is no surprise that nature knowledge plays a less prominent role in many English speakers’ lives (United Nations 2014). The 2017 Nature of Americans Report found the most popular outdoor activities among American children to be swimming, visiting zoos, exploring the outdoors, biking, and playing sports; among the least popular activities were hunting and fishing, growing indoor plants, and helping with yard work (Kellert et al. 2017). These statistics suggest that children may conceptualize nature as recreation rather than subsistence. Naming of natural species develops much more elaborately when people rely on those species for survival (Harrison 2007). With fewer people depending directly on the earth and natural systems for subsistence (i.e. subsistence farming, hunting, and other land-based livelihoods), it follows that the lexicon of those domains should become nonessential.

Another domain which seems to be undergoing lexical shift is the domain of child play. Children are leading increasingly indoor childhoods, and list TV and video games among the reasons they do not play outside (Moss 2012). While the present study did not assess the vocabulary of participants under the age of eighteen, some inferences may be drawn based on existing research on natural childhood and ecological literacy among children. A study found that British children spend more time in front of a screen as they grow older, with a 40% increase in electronics usage per decade; examined alongside a recent 2-year study which finding that children ages 13-15 reported significantly lower engagement with nature than children ages 5-13, this relationship may support the oft-suggested correlation between technology usage and decline of nature play (Moss 2012, Hunt et al. 2016). Balmford et al. (2002) showed in their Pokémon identification task that gaming words and names are more prevalent than nature names amongst children; subsequently, the Oxford Corpus summary of recent children’s writing found that themes of social media and internet fame have risen, reflected by the constant addition of new technology and gaming words (Oxford University Press). These data suggest that nature vocabulary, once stable in the domain of child play, may be falling out of use as a response to the influence of new, dominant lexicon for technology, gaming, and other indoor play.

6.4 Institutional Attitudes and Materials for Literacy
The UNESCO framework, unlike other vitality assessment models, takes into account existing materials for education and literacy as a factor associated with language survival, with the most endangered languages having “no orthography available to the community” and, in the safest languages, an “established orthography, literacy tradition with grammars, dictionaries, texts, literature, and everyday media”, with writing used in administration and education (UNESCO 2003). There are certainly many resources available for nature name-learning: dictionaries and encyclopedias, identification manuals, and educational children’s books, to name a few. However, I have observed that children’s early picture books frequently feature tigers, elephants, zebras, or other exotic, non-local animals iconized in children’s taxonomic imagination from a young age in place of local flora and fauna that the child will observe and interact with near home as their naming skills develop. Similarly, much early species-education literature for children features cows, pigs, horses, chickens, and other typical farm animals with which many children may never interact. Because of the unequal ratio of place-based educational materials to place non-specific education materials for children, young speakers learn to name iconic animals such as lions and tigers before more unassuming local species like the wren. It is worth noting one educational resource directly addressing the loss of nature words represented by the Oxford
Junior Dictionary word removal mentioned earlier in this paper. Robert Macfarlane’s *The Lost Words* (2018) is an illustrated children’s book weaving a “spell” for many of the animal and plant names removed from the dictionary, intending to bring local, place-based wild words back into children’s vocabulary. There is no dearth of written materials containing nature words in English, and the removal of nature words from the dictionary does not mean those words do not appear in centuries’ worth of other text materials. However, the removal of those words from the children’s dictionary may indicate the beginning of a trend toward fewer easily accessible educational materials.

6.5 Lexical ideologies

As Hill (2004) observes in the introduction to her analysis of the lexicon of biosystematics in Tohono O’odham (an indigenous language of the Sonoran Desert spoken by people of the same name):

In indigenous communities… community members often seem to think of their language exclusively as an inventory of words—especially, the “old words” that are seen to capture in a special way the privileged essence of local tradition. A good speaker is “a person who knows a lot of old words.” Language loss is characterized as “nobody knows those old words anymore.” […] The idea that certain “old words” are important to local heritage deserves respect; such words can have an important function in the humanistic life of a local language community (Hill 2004).

Hill speaks to the value of vocabulary in constructing identity in indigenous speech communities, especially in the face of language extinction. Are similar sentiments towards special words felt in a community whose language is in no danger of becoming lost? It seems that, at least for the community members behind the letter to Oxford University Press, the answer to this question is “yes” (Flood 2015). In my interaction with Montanans over the course of my research, certain reactions appeared consistently both in my survey comments and in person-to-person conversation with friends, relatives, and acquaintances about my research and survey. When describing that the majority of the survey questions asked participants to identify local species, I was very often met with a response of “Oh, I would fail that test!”, especially from younger, college-aged participants. I usually detected what seemed like a sense of uncomfortableness or shame on the part of those people who professed to have no knowledge of nature names, as though admitting to some lexical inadequacy before I could notice it in their survey performance (though survey responses, as stated earlier, were anonymous). When speaking to people who had taken the survey or were planning to take it soon, this sense of embarrassment was nearly always communicated: “I hope you can’t tell which responses are mine!”; “I did such a bad job”; “I didn’t know any of the answers”; and often simply “I’m embarrassed”. These speakers seemed to feel that their underdeveloped natural lexicon reflected poorly on them in some way. While anecdotal, this overwhelming reaction of embarrassment for lack of naming proficiency indicates that there is value placed on these words in the speech community.

A small selection of questions was included in the survey to record participants’ ideologies surrounding the nature lexicon. The first of these questions asked the participant to rate their agreement with the following statement on a five-point Likert-type scale ranging from Strongly Agree to Strongly Disagree: “The ability to identify and name things in nature is important to me.” Analysis of the responses to this item by age group showed that on average, the older the participant, the stronger the agreement with the statement: older participants
considered the ability to name and identify things in nature more important than younger participants. In a subsequent question probing participants’ thoughts about generational differences in vocabulary, a corroborating trend was observed: younger participants indicated that they believed older speakers to be more proficient at naming and identification than people of their own generation. These trends and the anecdotal evidence I described above indicate that the value Montanans place on nature words is greater among older speakers, and that this value placement is reflected in their speech; not only this, but younger speakers seem to be aware of their relatively smaller nature vocabulary and may experience shame surrounding it.

7. Implications beyond linguistics: naming, cognition, and human ecology

Countless vast systems of knowledge are encoded in the world’s linguistic diversity (Nettle & Romaine 2000). As language is the main agent in cultural transmission, immense bodies of knowledge are lost when a language disappears (Evans 2009, Harrison 2007). In the case of many endangered indigenous languages, this means the extinction of entire, unique ways of knowing. Research on ethnobotany, folk taxonomies, and other forms of traditional knowledge in indigenous communities has found that irreplaceable value is embedded in specialized domains such as plant and animal taxonomies, and that this same value is lost when languages cease to be passed on from one generation to the next (Berlin et al. 1968, Harrison 2007, Zarger and Stepp 2004). Many indigenous languages whose communities rely heavily on certain species or environments for subsistence have developed incredibly complex systems for categorizing them and highly specialized vocabularies that reflect their importance. According to Harrison (2007), “as societies become larger and inhabit a greater range of environments, and as people become urbanized and detached from nature, languages and people shed specialized knowledge pertaining to the environment” (p. 29). As discussed in Section 2 in this paper, the decreasing lexicon for the natural world in English is likely a symptom of our growing disconnection from it. If words for nature are systematically disappearing from the English vocabulary, what will happen to the knowledge they encode? What implications might this vocabulary loss have on the way English speakers conceive of and act toward their natural environment?

The question is perhaps more eloquently and provocatively phrased in an oft-cited quote from Robert Michael Pyle: “What is the extinction of a condor to a child who has never seen a wren?” (Pyle, 1993.) The wren—one of the species whose names were removed from the Oxford Junior Dictionary—fares well in the United Kingdom today; its habitats are diverse and children are not likely to lose the opportunity to see a wren anytime soon. However, in the light of the vocabulary trends observed in this study, we must ask a slightly different question: What is the extinction of a condor to a child who has never heard of a wren?

Language, according to Nettle and Romaine (2000), is “part of a complex ecology that must be supported if biodiversity is to be maintained.” Childhood connection to nature and outdoor play has been shown to correlate with attitudes toward environmental stewardship (Andrejewski 2011, Bixler et al. 2002, Pilgrim et al. 2007). Considering this correlation, will generations with a depleted lexicon for nature form different attitudes toward the land and its management? According to Pretty et al. (2009), “Being able to recognise and name something (e.g. a tree or bird species) is a prerequisite to forming a bond with it and, thus, caring about it.” As studies have shown that this knowledge is best transmitted orally, the intergenerational transmission of vocabulary for nature may be crucial to the future of conservation: people are more likely to be aware of and care about those species with which they are more familiar (Pretty...
et al. 2009, Selby 2017). What are the consequences of a diminished lexicon for nature on future generations of conservationists and environmental stewards?

It is important to note that the attrition of nature vocabulary in English, a large and influential language in no danger of extinction, does not compare to the massive and irreversible loss that the extinction of the world’s linguistic diversity poses to collective knowledge and indigenous cultural identity. Nature vocabulary is well documented and preserved, as discussed in Section 6.4 above, unlike words in many undocumented endangered languages.

8. Areas for future research

8.1 Adaptability of survey instrument and use as a baseline study
The design of the survey instrument developed in this study may be easily modified for use outside the Montana speech community. Species selected for the naming task could be substituted by a comparable list of species salient to inhabitants of any other state, region, or country to obtain a vocabulary assessment for a different speech community. Additionally, to answer questions about age-specific or generation-specific use of language and assess the influence of age-grading on the data, the survey could be repeated in the same community a number of years later and compared to the original study to determine if trends are static over time (Cheshire 2006).

8.2 Additional data collected in survey
Additional data was collected from the survey that was not analyzed in this study. This paper focused on correlating naming ability with age, but supplementary data was collected for use in future research to determine trends with other participant factors and correlations with existing research in related fields. Certain question items in the survey (particularly demographic, lifestyle, and ideology questions) were included with the potential of future comparison between studies, since research has not attempted to associate ecological literacy with naming ability. Ecoliteracy surveys do not generally measure identification ability but more general awareness of systems and environmental interaction. Research in this field has shown positive correlations between environmental knowledge and participant factors such as age, level of education, gender, and ethnicity (Arcury 1990, Davidson 2010). Research has correlated ecological knowledge and ideological trends with factors such as time spent in nature per week, outdoor activities during childhood, and community type as well (i.e. rural, farm, suburban, urban, etc.) (O’Brien 2007). Many of the questions in the Experiences and Attitudes sections of this survey drew on this literature. Though not analyzed within the scope of this project, the data from these questions could be used in further research to assess conclusions drawn from ecological literacy work, and to investigate the relationship between nature vocabulary and ecological literacy. Are people proficient in naming also knowledgeable in other domains, such as biology, global systems, and current issues in ecology? Does the Montana population assessed in this study support conclusions reached in ecological literacy studies elsewhere? Do broader environmental systems knowledge and naming ability come from the same sources, and are they influenced by the same factors?

Data from these sections of the survey, particularly the Experiences and Attitudes sections, could also be compared with vocabulary trends to establish whether naming ability is tied to factors for ecoliteracy, such as amount of time spent in nature, access to nature, feelings of nature connectedness, or childhood experiences with nature. Future research could also assess the sources people reported for learning nature words, and determine if certain sources seem to
be linked to a higher or lower naming ability. Data on attitudes toward nature should be examined in correlation with naming ability as well, to perhaps shed light on the implications for human ecology discussed in the previous section.

8.3 Tiers of taxonomic specificity
Another interesting implication to pursue in further study of English nature-naming is the question of semantic loss in taxonomic depth and complexity in the lexicon of biosystematics. Considerable linguistic and ethnographic research has been conducted on folk taxonomies, covert categories, and hierarchies of natural kinds in indigenous speech communities, particularly in areas of high biological and linguistic diversity (Begossi et al. 2008, Berlin et al. 1968, Zarger & Stepp 2004). Examining the systems and criteria that different cultures and language communities use to classify biological diversity in their environment indicates that cultural or economic value placed on a given species can be associated with number of names in use and degree of taxonomic differentiation (Harrison 2007). This is true of semantic specificity in other domains as well, and differential ability is often lost when languages become endangered. For an example unrelated to folk taxonomy, consider the four different words in Dyirbal, an Aboriginal language of Australia, corresponding to the English word for “uncle”: a study of language change within Dyirbal showed that young people tended to simplify lexical differentiation by using one word to refer to all specific referents (Nettle & Romaine, 2000).

In this study, for certain questions in the naming task, responses were given a lower score when the participant provided a hypernym in place of a hyponym, or the name of a generic category rather than a specific name; for example, if, when prompted with an image of a Douglas fir, the participant responded pine, the term was given a score of .5 rather than 1 to document the broader level of taxonomic specificity (other examples of specific-generic pairs might include bird or owl in response to an image of a great horned owl; butterfly for a mourning cloak butterfly, and so on.) These varying degrees of specificity in responses made scoring certain questions difficult. A reinterpretation of the data could delineate different levels of taxonomic depth and score accordingly, resulting in a more detailed analysis of semantic category differentiation. Semantic specificity could be analyzed to assess if taxonomic complexity in simple and complex identification questions correlates with productivity in listing questions. Furthermore, taxonomic complexity could be analyzed by participant age group to determine if degree of differentiation ability is associated with age.

9. Conclusions
This study confirmed claims of a loss of nature lexicon among younger speakers in a Montana English speech community. A new survey instrument was developed to measure vitality within the semantic domain of nature vocabulary, and data was collected on participant demographics, naming ability, and personal experience with and attitudes toward nature. The resulting data proved that vocabulary proficiency positively correlated with age, with younger participants generally able to correctly identify fewer salient Montana species than their older counterparts and able to list fewer terms for a given category when prompted. Moreover, the data suggest that older speakers place more value on this lexicon than younger speakers, and that younger speakers are aware of this disparity and may be insecure about their performance. The results of the survey were interpreted using a framework for assessing degrees of language vitality in an experimental application of language loss measurement on lexical attrition. The intergenerational transmission of nature vocabulary among Montanans, shown in this study to be in decline, is
crucial to its vitality, and may have implications for studies of language change. With generations becoming increasingly more distanced from the environment and natural ways of life due to a variety of factors including urbanization, industrialization, use of technology, and “de-natured” childhood, younger speakers may change the way they conceptualize, categorize, and interact with the natural world, with potential implications for future environmental conservation.

Acknowledgements
I offer my sincerest thanks to the Anna Davis and Gordon S. Watkins Scholarship for generously funding this project. Thank you to the University of Montana Davidson Honors College, for supporting and encouraging my learning; to audience members at the University of Montana Linguistics Club Research Presentations for their constructive feedback on my presentation; to survey participants for their time and cooperation; to Sam Niederman for his help with data visualizations; to Dr. Doug Emlen for his expertise on Montana; and to Dr. Leora Bar-el, my faculty advisor, for her enthusiasm and guidance throughout the research process.
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