Summer 8-2016

Being with Bees: An Anthropological Study on Human-Animal Relations in Southern Beekeeping

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BEING WITH BEES: AN ANTHROPOLOGICAL STUDY OF HUMAN-ANIMAL RELATIONS IN SOUTHERN BEEKEEPING

by

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A Thesis
Submitted to the Graduate School
and the Department of Anthropology and Sociology
at The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Master of Arts

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August 2016

Published by the Graduate School

THE UNIVERSITY OF SOUTHERN MISSISSIPPI®

ABSTRACT

BEING WITH BEES: AN ANTHROPOLOGICAL STUDY OF HUMAN-ANIMAL RELATIONS IN SOUTHERN BEEKEEPING

by Kori Nadine Armstrong

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This thesis investigates the complex and dynamic communicative relationship between beekeepers and their managed honey bee colonies, providing insight into the relationship between bees, their stewards, and the interface between nature and culture. It also helps unravel the ways in which this interspecies relationship changes a beekeepers' perception of what it means to be human. Data collection features extensive participant observation with 21 semi-structured interviews with Southern beekeepers.

The interrelationship between communication and interaction, as well as diverse ways in which messages and cues manifest in the bee yard are explored through olfactory, optical, touch, and mechanical modalities. Variables, including attire, smoke, movement, veils, and gloves. This magnifies the ways that these factors may impact the delivery of messages central to the delivery of successful interspecies communication. Literature that helps elucidate the communication and interactions between beekeepers and honey bees is currently limited; however the importance of probing into these issues cannot be denied. If beekeepers can successfully learn to understand the messages of honey bee "language," they can improve the management and the overall well-being of their beehives.

The results of this thesis confirm that whether it is conscious or subconscious, beekeepers do communicate with their honey bee colonies. Furthermore, the research

underlines that this communicative interrelationship can profoundly alter the worldview and ecological perceptions of an individual beekeeper and may even inspire greater environmental awareness. Conclusions emphasize socio-ecological perceptions of beekeepers and illuminate the role of honey bees in transforming human perceptions of nature and the environment.

ACKNOWLEDGMENTS

I would like to express my deepest gratitude to my advisor, Dr. Bridget Hayden, for the continuous support of my thesis study, for her patience, motivation, and immense knowledge. I would also like to thank the rest of my thesis committee, Dr. Kaufmann and Dr. Cochran, for their insightful comments and encouragement.

DEDICATION

I dedicate this thesis to the beekeepers of the South. Without you, this thesis would not exist.

I would like to thank my friends who helped me keep my sanity during graduate school and those who critiqued my writing. Without you, graduate school would have been much more difficult. I also want to thank my Crescent City Grill family who supported me through graduate school.

Finally, I would like to thank my parents and fiancé for supporting me and encouraging me throughout graduate school and my life in general.

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CHAPTER I - INTRODUCTION

Before beginning my research in the field, I was told by my thesis committee that I had to decide on a research question and that research question was to be typed out and hung on the wall in front of my desk. The reason for this display was for me to keep in mind my research question throughout my research and writing. Initially, my research question focused on whether the scale of beekeeping had an effect on the human-animal relationships between honey bees and Southeastern beekeepers. To answer this question, I planned to look at communication through time, movement, and the varying methods that took place in the bee yard to determine if there was a substantial difference in the way large-scale versus small-scale beekeepers worked with their honey bees. Yet, as I began to talk with various beekeepers, what I found more interesting was the question of whether there was real communication between beekeepers and their honeybees. If communication between Southern beekeepers and their bees exists, how does it happen, and what effect does this have on both bees and their keepers? Does this communication change what it means to be human for the beekeeper and alter how they are viewed in the world? But before delving too deep into this complex set of questions, I believe it is important to introduce myself to the readers and share my own background and the backgrounds of the other characters of this thesis.

Myself

I have always maintained a close relationship to nature and animals. My father works in the cattle industry, so I spent my childhood on a farm surrounded by pastures and forest land. Here I interacted with the farm animals and entertained myself by exploring the woods and pastures surrounding my house. We owned cows, horses, and

chickens that we raised for eggs, and I adopted them all as pets. My father hunted raccoons and trained dogs to herd cattle, so we always had puppies for me to play with with. Before I began attending school, my father sufficed as a babysitter, so I spent my days feeding cows and riding horses. This relationship continued until I began kindergarten. At this time, my mom began working for the local veterinarian, where I spent most of my time after school playing with the animals. I believe all of this time spent with animals helped me become closer with nature, making me more aware of the world around me and the non-human species with whom I shared the world.

Although surrounded by animals growing up, I did not become acquainted with the honey bee until I was a teenager. My father became interested in beekeeping when I was an undergraduate student and started working under a man named Bud Watt to learn how to keep bees. Bud's a large man with white hair on the sides of his head as well as the rest of his body. He is usually underdressed, wearing either shorts or overalls without a shirt and Crocs© when "fooling" with his bees. Bud has a country accent (though I have little room to talk) and is always smiling. I first met Bud when I was around 18 years old when my dad dragged me with him to film Bud and him catching a swarm and moving boxes of bees. At the time, I was slightly interested in bees, but as a typical teenager, I took little interest in my father's hobbies.

Figure 1. Bud Watt holding bees during an interview.

I stayed busy with school, pursuing a bachelor's degree in history at the University of West Alabama. While there, I wrote about past cultures and would sometimes go with my dad to check his hives. In the fall of 2013, I began graduate school at The University of Southern Mississippi where I originally pursued a dual Master's Degree in history and anthropology. However, I dropped the history component and focused on cultural anthropology. Subsequently, I enrolled in a southern ethnology class under Dr. Bridget Hayden where I was assigned to read Laura Ogden's *Swamplife.* Ogden's book focused on the connections between humans, animals, and the world both share.

During the spring of 2014, Dr. Jeffrey Kaufmann, my advisor at the time, sat me down to discuss thesis topics. After reading Ogden, I knew I wanted my thesis to be on human-animal relations and began researching potential topics. That weekend, I stayed home and watched documentaries on Netflix while researching potential topics on the internet. After watching *Vanishing of the Bees* and *More Than Honey*, two documentaries on honey bees and Colony Collapse Disorder, I decided that human-animal relationships in beekeeping as a topic was both interesting and relevant. I was not as close to bees then. I had a respect and wonder for them but knew very little about them. I only knew I wanted to study a topic in environmental anthropology and bees seemed an intellectually intriguing choice ripe for further investigation.

The Landscape

I chose the rural South because the existing literature on the relationship between bees and beekeepers is mostly limited to small-scale beekeeping in urban areas. While this is important, rural beekeeping offers a wider variety of beekeepers, ranging from small to large-scale operations. Furthermore, the Southeastern United States plays a vital role in American beekeeping. As of 1980, "an estimated 1,483,000 colonies [were] located permanently in the Southeast," and "an estimated 300,000 kg (660,000 lbs.) of live bees, and many thousands of queens [were] shipped from the Southeast annually" (Nye 1980:11). More specifically, Mississippi, the main setting for this thesis, plays a vital role in beekeeping.

Founded in 1873, the Mississippi Beekeepers Association was the first agricultural association in the state. Stover Apiaries, opened in Lowndes County in 1909, was the largest beekeeping operation in the world for most of the 20th century.

Woodville, Mississippi is currently where Richard Adee, the owner of the world's largest beekeeping operation, brings his hives to in the winter (Upholt 2013:1). Many northern beekeepers bring bees to Mississippi during the winter to "fatten 'em up," according to Jeff Harris, a research apiculturist with Mississippi State University (ibid.). Thus my research provides a rural counterpoint to the urban focus of existing studies, while also further extending existing knowledge on the subject.

Because some plants start blooming in January, hive growth in Mississippi contributes significantly to the beekeeping industry. At one point, the state lead the nation in honey yield per hive, averaging about a hundred pounds annually (ibid.). Mississippi beekeepers split hives, which typically triples them in size and reinforces the commercial colony populations. Beekeepers will split their hives, pulling out combs that contain fresh eggs or larvae along with special nurse bees that will tend to the broods to create a new hive.

Having been born in Louisiana, raised in Alabama, and now living in Mississippi, I found it fitting to study the culture of Southern beekeeping and the relationship beekeepers in these three states have with their bees. Though some informants lived outside the tristate area, they all had connections to the region.

The Honey Bee

The honey bee has been around for millions of years (Crane 1999:35). It is a remarkably resilient generalist pollinator and will likely continue to survive without man. Most honey bees in the United States are domesticated European honey bees (*Apis mellifera*) and are the focal bee species addressed in this study (ibid., 12). The beekeepers in this thesis can therefore be considered as my lantern into the bee world, helping

illuminate and translate the "words" of the bees and deciphering the nuanced meanings of sound, smell, and movement given off by their honey bees.

Overall 52 out of the 115 predominant staple food commodities are at least somewhat dependent upon honey bees for pollination, with bees pollinating about one-third of the food we eat (vanEngelsdorp 2010:7; Ghazoul 2005; Lecocq 2015:1). Due to this dependency, the value of insect pollination alone has been estimated at US $212 billion, which represents nearly 10% of total agricultural production for all sectors (Kluser 2010; Ghazoul 2005). These figures do not include the notable economic value of honey; the global value of honey production was approximately 1.25 billion USD in 2007 (FAO, 2009). Demand for honey on global commodity markets has also continued to gain momentum: between 1961 and 2007 honey production increased by 58% (FAO 2009; Ghazoul 2005; vanEngelsdorp 2010).

Disappearance rates of European honey bees have been unprecedented and alarming in North America where up to 50% of managed colonies have died out in recent years (Ghazoul 2005). Honey bees have come into the spotlight due to largely inexplicable disappearances of honey globally, which has focused international attention on the irreplaceable value of pollinating insects. The widespread disappearance of honey bee colonies is also known as "Colony Collapse Disorder." While the causes of this disorder have been widely debated, some of the major threats include parasites (namely *Varroa* mites), other pathogens, habitat degradation, stress, intensive beekeeping, agri-chemicals (e.g. neonicotinoids), monocultures, agri-insecticides, climate change, and genetically modified crops. Most likely, the problem is a combination of these factors (Henry et al. 2012; Johnson 2007; van Engelsdorp et al. 2010).

The natural habitats of insect pollinators are threatened through emerging environmental challenges such as habitat fragmentation, climate change, deforestation, decreasing dietary diversity, and the challenges of less wildflower availability. Inside of managed beekeeping operations, the health of controlled hives has also been declining. The Varroa destructor mite originally spread through Russia and have been detrimental to bees for the past 30 years. It is now wreaking havoc on colonies worldwide (Solignac 2005: 419). The Varroa mite weakens the colony's health, making hives more susceptible to pests and other diseases (Rosenkranz 2010:S98).

The large disappearance of honey bees in the United States as well as other places in the world are causing humans to pay more attention to the honey bee with burgeoning realization of just how precious these insects are. Because of the colossal anthropocentric value of honey bees in contemporary society, the plight of the honey bee has generated more widespread awareness regarding environmental issues, acting as a canary in a coal mine. Observing the attention bees have received from humans demonstrates that we are paying closer attention to what is happening to our planet.

The portrayal of pollination services in decline have incited a powerful motivation amongst policy makers and the scientific community regarding the potentially severe ramifications of widespread honey bee extinctions on global food security, the economy, and the environment. Not only are scientists and policy makers reacting to the disappearance of honey bees, but many people are gaining interest in helping bees. There has been a growing interest in backyard beekeeping with workshops and clubs popping up not only nationally but also globally (Eilperin 2015:1).

The Beekeeper

Because of my anthropological focus, the beekeeper plays the most important role in this thesis which is a study of human-animal relations in apiary practices. The honey bee and the beekeeper have an ancient bond largely forged through mankind's sweet tooth (vanEngelsdorp 2010:S80). The Maya considered honey the second most important food after maize; the Egyptians depicted bees on their sarcophagi; and the ancient Greeks minted honey bees on their coins. In fact, numerous early societies considered bees as messengers of gods, creating links between the heavens, sun, and Earth (Kellert 1993:304). The practices of beekeeping can be traced back to ancient Egypt around 2600 BCE, and later spread to the Greeks, who in turn passed the art over to the Romans (FAO 2009).

The focus of this study is the complex relationship between beekeepers and bees. Beekeepers have tremendous responsibility as hive stewards: the total number of managed honey bee colonies worldwide was estimated at 72.6 million in 2007 (vanEngelsdorp 2010:S80). Despite their large number, there are different types of beekeepers, and people define varieties of beekeepers differently. With the assistance of my informants and the literature on beekeeping, I will describe the various types of beekeepers using the knowledge I have gained over the past few months.

The first type, *hobbyist*s tends to be small-scale beekeepers with only a few hives. They may also be defined by their purpose for keeping bees. Often small-scale beekeepers who keep hives as a hobby are referred to as backyard beekeepers or recreational beekeepers. They often obtain hives for reasons other than economic viability such as therapy, recreation, or even environmental purposes. These hobbyists

give honey and by-products away as gifts, trade, or sell from their homes for minimal, if any, profit.

Figure 2. Sideline beekeepers inspect a frame of bees.

Semi-Commercial beekeepers, commonly referred to as sideline beekeepers, are the second type of beekeeper. These beekeepers have a full-time job for their primary source of income, but also run a profitable beekeeping business on the side. They make significant profit off of their bee-products whether it be honey, hive by-products, such as wax or propolis, or the actual bees themselves. Some sideline beekeepers expand their bee business and eventually become commercial beekeepers while others have no intentions of scaling up their operation.

Commercial beekeepers are the third and final type of beekeepers. These beekeepers are commercial giants because their hives are their primary source of income.

It takes a high number of bees to make a viable profit, so commercial beekeepers tend to be affiliated with large-scale beekeeping.

For this thesis, five hobbyists, twelve sideliners, and four commercial beekeepers were interviewed. Though not all informants are included in this thesis, the information they gave was beneficial to my research and helped me find and support my thesis question. Now that I have covered the characters involved in this research, in the next chapter, we will discuss current knowledge on interspecies relationships and api-ethnographies. Here, I will survey books, scholarly articles, and other resources that strengthen my argument that there is a communicative relationship between bees and their keepers.

CHAPTER II – LITERATURE REVIEW

Anthropologists are coming to share a new perspective on the relationship humans have with their surroundings rather than focusing on just humans. When I tell people what I am earning my degree in, many commonly ask, "So what is anthropology again?" They are often left more confused when I explain that anthropology is the study of humans, and that my specialty is cultural anthropology, the study of human culture. The next question I will usually be asked is "What do bees have to do with human culture?" To answer this question, I would like to discuss a body of relevant literature and explain how it helped me build my research topic.

Human-Animal Relationships

Kirksey and Helmreich define multispecies ethnography as "anthropological research that seeks to bring species linked to human social worlds closer into focus as the co-constitutive subjects (Kirksey and Helmreich, 2010:545)." Multispecies ethnography has received many contributions from scholars and anthropologists over the years. Curiosity and the need to understand more about human-animal relationships has encouraged most multispecies ethnographers to further their studies in human-animal relations.

Kirksey and Helmreich have studied "contact zones" highlighting lines that separate nature from culture that have been broken down. Therefore, through their works, they demonstrate how the lives of a multitude of organisms shape and are shaped by economic, cultural, and political forces (Kirksey 2010:546). Some earlier contributions to this subject came from Evans-Pritchard, who carried out a study on the Sudanese 'Nuers Bovine Idiom' (1940) and Rappaport's (1968) studies on "Tsembaga Maring Pig Love."

These studies set a significant milestone into realms of multispecies ethnography. Anthropologists have familiarized themselves with cultural practices and systems of classification as well. In her book, "Humans and Other Animals," Samantha Hurn (2012) was able to assert two important points regarding a human-animal relationship. First, there is a strong emotional notion or undercurrent especially regarding how human beings perceive animals. Secondly, if these perceptions are subject to critical scrutiny by anthropologists, then it exposes largely unexplored and highly sensitive aspects regarding understanding our humanity and our relation to the other species.

Select ethnographers have studied significant elements in the multispecies discipline that touch on human-animal interactions. It is crucial to understand that non-human species are considered capable of creating a significant culture through interactions with other species (Sanders, 2003). Most sociologists term this interspecies interaction as one way by which intersubjectivity can be achieved with humans. Considering this notion, Arnold Arluke (2006) explains through the "interactionist perspective" that humans construct animals socially and in the process they can build their own sense of self. Arluke's work looks specifically at dogs and their human caretakers and the connection between the two. More importantly, he reveals the mindful, self-possessing, and purposeful nature characterized by dogs.

Janet Alger (1999) explores the potential for human-animal intersubjectivity through the application of ethnographic methods to the cat/cat and human/cat relations in a confined shelter. The study concludes that the social structure created inside the shelter was crucial to all relationships in the shelter and acted as a product of interaction between cats as well as cats and humans. The observed structure achieved when cats are confined

is an actual representation of the choices that are made by the cats and how they will interact with humans. Essentially, within a community of cats in a shelter, a unique shelter culture emerges that represents cats' adaptations to specific conditions provided by shelter life. The shelter allows the development of high order needs as well as goals to animals that stress friendships, affection, and social cohesion among the cats rather than instilling conflict and territoriality of the cats as perceived in ordinary wild instincts. The social structure of cat/cat colonies in shelters influences their interaction with humans and vice versa. This idea not only applies to cats, but has also been observed in other domesticated animals such house rabbits.

There is a significant commensal relationship between humans and the house rabbit. The rabbit's ability to be incorporated into the human household is an important element that shapes its interaction with us. Rabbits have the potential to execute some concrete actions, which in one way or another, show their understanding of some relationship with human beings. DeMello and Davis (2003) provide an example of this with a house rabbit named Hattie. In *Stories Rabbits Tell,* DeMello explains an incident where she accidently drops Hattie's water bowl off the ramp. After cleaning the mess, DeMello replaces the water bowl. The rabbit then climbs on the ramp and pushes the bowl off again. The authors interpret this behavior as the result of Hattie seeing their actions as a performance directed towards herself and responding to it. Therefore, it is quite evident that rabbits can replicate the acts of humans as well as behave towards them. This is an indication of a cross-species relationship displayed by a rabbit and a human being when in close approximation with one another. When interacting with one another day-to-day, relationships are formed and recognized by both parties. While this is

common with house pets, other animals who interact closely with humans can develop bonds as well.

Interaction between humans and animals is evident in the human sports and leisure sector. Interspecies ethnographers emphasize that these relationships are often interactions based on development of a more attentive connection between non-human animals and human beings. According to Dashper (2015), amateur riders in the U.K. often develop attentive relations with their horse partners throughout time that are beneficial to both parties. Dashper notes that humans pay close attention to their horses, treating them as partners and sentient beings. This relationship can be termed as mutual with more rewarding aspects in the sporting context.

Sanders (2003) exemplifies an important aspect of interspecies relationships using the same non-human versus human context as Dashper (2015). Sanders focused on how, through relationships, humans and non-humans build each other emotionally, psychologically, and/or even physically, and that this is strengthened with time. Maurstad et al.'s (2013) study, which involved 60 open-ended interviews with riders from Norway as well as the Midwestern United States also contributes to this idea. The authors identify important aspects of co-being through the relationship between riders and their horses and how time helped build these connections. Their study ascertains that a strong connection is built when horses and their riders relate for a substantial period, therefore entering into co-being, which may change the human perception of the animal in the long run.

From these studies, we learn that relationships are evident between different species and can be strengthened through time. Communication is found in any relationship, even among different species.

Interspecies Communication

Communication has necessitated a change in thinking for anthropologists doing interspecies ethnography. Recent studies conducted in the field of microbiology show that interspecies communication can occur even with bacteria. Communication within a species is a common phenomenon between most high-level animals, but it seems primitive to simpler organisms like bacteria as asserted by Federle and Bassler (2003). Communication occurs through diffusion where signal molecules transfer information between cells. Ryan and Dow (2008) detect that some bacteria have the potential to sense and respond to specific signal molecules that do not originate from a member of their own species. These bacteria synthesize and respond to other species' signals. This means that there is a possibility that bacteria might be able to listen in on other organism's communications with their environments.

Leinonen et al. (1991) argue that if communication can break through the species barrier at the molecular level, as portrayed with bacteria, it is entirely possible for communication to occur among higher-level animals. This is proven by Bateson (1972) who offers a cybernetic approach to understanding human-dolphin communication. Using the concept of "play and fantasy," Bateson focuses on the essentialities of non-verbal communication between non-humans and humans. He points out that the body movements and whistle sounds made by dolphins play a crucial aspect in communication. The fact that communication has been characterized as an aspect of humanness through

language has barred the consideration of other non-human communication abilities and competitiveness (Kramsch and Whiteside 2008:667)

Anthropologists have prioritized the use of language as one of the principal forms of communication. This follows the widespread belief that language expresses and embodies an important component of cultural reality (Kramsch and Whiteside 2008:666-668). While humans use language for the vital function of conveying information, other animals may use different communication techniques. For example, Outtara et al. (2009) are able to show Campbell's monkeys (*Cercopithecus campbelli)* have the ability for affixation, which allows them modify their sounds and broaden the ordinary meaning of significant alarm calls. Diana monkeys (*Cercopithecus diana*) also respond to the Campbell monkeys' warnings and use the semantic information to predict the presence of predators (Zuberbuhler 2000:713). These findings prove that animals can communicate through synthesizing other species' vocalizations. Therefore, it is important to remember that there are other modes of communication besides language. Humans can tap into the communication techniques of animals, resulting in stronger relationships.

Hart's (2005) study of the elephant-mahout relationship in India and Nepal show the significant relationship between humans and elephants through communication. Sociability is an essential feature that leads to the development of crucial communicative abilities as well as cooperative strategies in elephants. For instance, elephants are trained to work with humans especially in transporting tourists as well as carrying logs while being directed by human (Hart 2005:173-174). Through this interaction, people communicate with elephants through *mahouts* – the elephant trainer, keeper, and rider. Conversely, mahouts understand how elephants communicate through speech, body

language, and physical interaction and can read and respond to these messages (Schliesinger 2015:15; Hart 2005). Hart also strengthens the argument that time plays an important role in the relationship between humans and elephants. She explains that mahouts are often not interchangeable for elephants. Instead, they respond preferentially to "their" particular mahout whom they have grown a bond with. Social scientists can better understand the relationship and co-being between the elephants and humans by studying ways in which they communicate.

Many indigenous communities, especially in East and South Africa, share habitats with wildlife. For example, the Borana of Kenya and Ndebele of South Africa show a mutualistic coexistence with some wild species, specifically the greater honeyguide (Isack and Reyer 1989). The greater honeyguide is a bird with the ability communicate with humans and other animals. Since these greater honeyguide birds are unable to obtain food from the beehives themselves, they seek the assistance of either human beings or other animals such as the honey badger. The honeyguide guides flies for short distances while calling and circling the location of the hive and then returning to the location of the honey seeker. Once honey is collected by the human or animals, the greater honeyguide flies in for the substantial amount of food left behind. These actions are quite demonstrative of not only interspecies interaction but also the potential of interspecies communication. Dean et al. (1990) argues the relationship of these birds and man has grown stronger with time and in different circumstances. In the modern world, greater honeyguide birds can be seen following humans in motor vehicles and even boats. Furthermore, they are still attracted to any sound of chopping wood, which is quintessentially a human activity.

Communication has also been observed between mushers and their sled dogs and effect on their winning and success streak in the races. Kuhl's (2011) study on human-sled dog relations demonstrates an important aspect of communication as observed among the sled dogs and the mushers. Kuhl acknowledges the mushers' ability to read the body language of their sled dogs as well as the dogs' capabilities to respond to their mushers' non-verbal messages (Kuhl 2011:29). The ability of these canine friends to communicate with humans was henceforth termed by Kuhl's informants to be *quasi-psychic,* meaning the ability of the sled dogs to "read" the mushers' minds.

Before moving into the next section, it is important to let the reader know how the environment which humans and animals share can affect interspecies communication. Mäekivi (2013) demonstrates that spaces shared by humans and animals known as hybrid environments (e.g. zoos, bee yards, etc.) create complex communication situations. Her study looks at environments where animals and humans are able to interact and critically assesses the intersection between anthropological and ethological zoo-semiotics. Mäekivi debates different aspects of how communication between human and other species are impacted by attitudes and existing perceptions, especially cultural. Mäekivi asserts that hybrid environments are shaped by people to offer an important environment for the animals. However, she explains that for the animals to feel secure and satisfied, it is the human mandate to meet the standards of the captive animals. More importantly, the difference in various species, as well as the extent to which their communicative abilities are exemplified, tends to either overlap or not overlap with human beings. These are the major aspects that form a foundation for creation of a hybrid environment that can improve human and animal's relations. Hybrid environments have the ability to influence

or shape the communicative abilities of captive species with humans either negatively or positively. They can either disable or enable communication between the human and nonhuman.

Human-Bee Relationships

Eduardo Kohn's (2007) "anthropology of life" is an essential concept in the study of bees and their interactions with humans. Donna Haraway's (2008) works describe these connections as "contact zones," which correspond to the ability of human beings to entangle with non-human species. An interaction between bees and humans can be traced to Kosek, who discusses the usage of honeybees in wars ranging from the early Roman frontlines to lab-altered cyborgs more popular in the United States military. Kosek characterizes bees as little creatures with significant powers and discusses its ability to elicit a powerful and essential response when approached that can be termed as both threatening and exotic at the same time (Kosek 2010: 652).

Honey bees have become an important part of human culture and captured our imagination over time (Derrida and Willis 2002). The complexity of their social organization has been cited to fascinate most anthropologists and human beings in general (Moore and Kosut 2013). Honey bees are not the only insects with social organization. Ants and termites also have complex societies and live in well-organized structures. However, Green and Ginn (2014) argue that honey bees have the potential to stimulate something extra in us, including a profound love or even reverence. According to Moore and Kosut (2013), bees are not just like other ordinary insects. Human beings, especially beekeepers, realize this and are essentially entangled in what bees do. These

people find themselves in a situation where they can elicit vulnerability in that they feel the urge to contain the bees while also wanting to repel them.

Even though one might argue that bees are certainly frightening due to their sting, for many people, the case is different. Mary Kosut does not believe bees are as dangerous as many people assume. According to Kosut, bees are friendly creatures if one understands them (Moore and Kosut 2013:73). Honey bees display certain behaviors especially when they relate to humans. Their responses to humans involves gestures that may not necessarily be termed fixed or reciprocal since these gestures are emergent and always in motion (Moore and Kosut 2013:37). Understanding these signals can lessen fear some have of bees.

Just as bees are social creatures, human beings also share the social aspect since we cannot easily survive solitarily. Therefore, on a psychological and emotional level, we demand a certain aspect of physical and intimate connections, especially with others to satisfy our feelings. Non-human species offer the comforting feeling we want, and we may reach out to these species for connection, whether it be a pet dog or a purring cat. Urban beekeepers, however, exemplify an important notion of how human beings can connect with insects such as honey bees through different modalities of communication.

Human-Bee Communication

There are many factors that can affect the relationships and communication between bees and their keepers. For instance, how one approaches the beehive and how he or she expresses rapid eye movement, breath exhalation, and increased sweat can cause various reactions from honey bees. These acts may make the bees go for the pulse points especially when they want to sting (Derrida and Willis 2002). Honey bees also

find certain instinctive human movements to be quite upsetting. The speed of a beekeeper in the bee yard and the fluidity of their movements can have an effect on the interaction between them and honey bees.

Green and Ginn discuss how behavior in the bee yard is affected by attire. There is a difference in how beekeepers behave when tending to their beehives based on their attire. Natural beekeepers often may not use full protections when tending to their bees. Green and Ginn note this as essential, especially with regard to the crucial connection between the bees and human keepers (Green and Ginn 2014:162).When not in protective suits, beekeepers tend to move in a more precise manner and have a different way of thinking. According to Green and Ginn (2014), a beekeeper's whole inner attitude changes enormously when not in protective gear. These actions are the ones that build strong connections and intimate relationships between bees and their keepers. The absence of protection is not only about exposing oneself to stings but also an effort to facilitate a stronger physical connection.

When one is protecting herself or himself against bees, it is quite obvious that the bees' guarding instincts will be elicited automatically. However, the most important thing that cultivates our relationship with bees is how we approach them and how we intentionally engage with them. It encompasses consciousness, body, intention as well as our energy (Green and Ginn 2014).

> Not using bee suits is about more than bodily exposure to the potential poison. It expresses a profound longing for connection - to expose oneself and not be stung; to acknowledge the bees and want the bees to look back, to

return the acknowledgment with friendship and not hostility (Green and Ginn 2014:15).

It is pertinent that as humans seek to address the bees, they are hopeful the bees will address them back in a pleasant manner, considering that these insects are social creatures. However, to find love from these dangerous insects, one needs to have a deeper connection and be vulnerable, not only in body, but in mind (Kosek 2010). There are many questions beekeepers or anyone who comes in contact with bees asks themselves. The first is, "Can I get hurt while addressing them?" or "Will the bees sting me?" However, the most important question that one asks is whether the bees will ignore them or recognize their friendly approach. These are crucial questions which are part of human-bee interactions.

Building a relationship with bees does not only involve learning how to handle them, but it stretches down deep to taking in their smell, their sound, and even their tastes at times. To learn and build an intimate relationship with bees, one has to make contact with the bees through their body (Moore and Kosut 2013). Mary Kosut explains this aspect effectively when explaining that the beehive scent ultimately blends into a seductive sense which can draw humans even closer and is termed by most beekeepers as comforting.

Interactions in the bee yard are also said to be meditative in some way, which is an important aspect and benefit to humans if they can create a strong connection with the insect (Moore and Kosut 2013). Human beings are always looking for companionship and considering that bees are social creatures, they complement each other. However, the only lacking aspect which tends to affect most of the human-bee interaction is decoding

the language of bees since it's the most important connection feature for human-bee interactions (Frisch 1974).

Honey bees can communicate with each other. Not only do they produce sound, dance, and fly, but they have a unique ability regarding how they interact with their environment and objects that surround them. A study by Dyer, et al. (2005) shows impressive abilities of honey bees to discriminate between images of human faces. The honey bees Dyer studied were still able to show recognition even with enhanced disruption in each experiment undertaken. Bees can also recognize different colors, this clearly shown through an experiment by Frisch (1974) confirming the most implied aspect that bees are not color blind.

Frisch (1974) considers the use of scent as an effective and efficient method of communication in which bees use to locate nectar as well as locate their fellow bees. Frisch asserts that bees are very communicative creatures with an ability to lure or call other bees to rich source of food (i.e. nectar). "Recruitment pheromones" can be released by worker bees to attract other bees to the nectar (Gould and Gould 1988:55). The Nasinov gland, found near the tip of honey bees' abdomens, also releases pheromones to help guide other bees during disturbances such as heavy winds or rain (ibid.).

Movement also plays a role in hive communication. Honey bees perform an act of round dances and tail wagging. When performing these dances together, honey bees can communicate with one another in a way that humans still do not completely understand. For instance, based on the experiments done by Frisch, each specific dance performed by a honey bee has meaning to other honey bees. Returning bees from a far location dance in

a figure eight circle, while those from a close location dance in a busy circular dance while tail-wagging (Frisch 1950:70).

Since bees do not have ears, movement and vibrations are strongly linked together. Honey bees are able to "hear" air vibrations elicited by a dancing bee around them through their antennae. Lindauer (1971) asserts that all species of bees can engage in an element of communication. In his subsequent works, he explains how bees are able to move freely and explore different locations when looking for nectar as well as when relocating to other areas. The previously supposed idea of magnetic fields as factors in bee spatial orientation was rejected and replaced by the idea of communication, proving the socialness of bees (Lindauer 1971). Such advances in scholarship signify how bees can communicate with each other and interact with humans in various ways.

Karl von Frisch is notable for his discovery of the waggle dance (Frisch 1950). He and others made leaps and bounds to better understand the various ways honey bees communicate. In this thesis, I move outside of the colony, looking at the communications between bees and their keepers. This is not to suggest a humans can converse with bees as they do with other humans. Bees, of course, cannot talk. Instead I focus on the ability of humans to pick up and translate some of the bee "language." The result is that humans may use this language to work with and/or manipulate their bees. Applying knowledge of bee language can be beneficial for beekeepers, helping them work more harmoniously with their bees. Cohesiveness is great for any relationship, but it is especially advantageous when working with thousands of insects than can sting you.

By picking up on bee language, beekeepers are able to improve their hives, produce more honey, and pollinate more crops. For example, training bees using floral

scents can improve pollination of crops and increase honey production. The practice known as “guidance of scent” was first used by Karl von Frisch’s advisor Guido Bamberger in 1920. Knowledgeable about the waggle dance as well as floral scent in communication, Bamberger was a proficient migrant beekeeper (Frisch 1967:257). Applying his knowledge, he moved his hives to a neighborhood with better harvesting conditions (Frisch 1967:257). Bamberger laid “cut flowers, sprinkled with honey and sugar water of those food plants that had occasioned the journey,” before the newly constructed hive (Frisch 1967:257). The flowers were soon found by a few bees who then alerted their hive mates and led them to the “proper” flowers (Frisch 1967:257). As a result of training his bees using “guidance by scent,” Bamberger had a better crop of honey than other beekeepers in the area (Frisch 1967:257).

In his book *Bees: Their Vision, Chemical Sense, and Language,* Karl von Frisch discusses how Russian scientists performed the “guidance of scent” method to improve red clover crops. Beehives were transported to red clover fields where they were fed a sugar tincture scented with red clover flowers that had sat for several hours until the odor of the flower was in the sugar-water solution. In the evening, the honeybees were fed the tincture. The following morning, many of the bees flew to red clover plants (Frisch 1950:63). From this, Frisch realized that if bees discover a good feeding place, they will communicate its location to the rest of the hive. The hive will “not only learn that there is food available, but they are also informed in which flowers it is to be found (Frisch 1950:63).” If beekeepers would do as Bamberger and the Russian scientists did, they could benefit from tapping into the bee language.

Though there is not the same type of communication between bees and humans as there is among honeybees, knowingly or unknowingly, willingly or unwillingly, beekeepers do communicate with their bees. If beekeepers better understand the relationship they have with their bees, they may improve their hives and bee-products. As a cultural anthropologist, I hope to help others improve the relationship and function between two societies that speak different languages. Instead of teaching the reader to be less ethnocentric, I am teaching them to be less anthropocentric or humancentric.

CHAPTER III - METHODOLOGY

The methods I used to acquire the data for this thesis consist of interviews and participation observation. I conducted 21 interviews to gain a better understanding of who the beekeepers were and why they kept honey bees. I then followed these beekeepers to record their interactions with their honey bees – a necessity for this thesis. But before discussing the methods of how I obtained the data for this thesis, let us first look at my approach to using pseudonyms for this research.

Initially, pseudonyms were going to be used and consent forms were handed out and signed, but after talking to my informants, I realized that most of them did not care to keep their identities concealed and actually wanted their names used to promote their businesses. Because of this, I contacted my informants during the writing process, giving them the option to either a) have their first and last name included in the thesis, b) use only their first name, or c) continue to remain anonymous and have their names replaced with pseudonyms. Informants chose either options A or B. I informed the IRB of the change and used the names of my informants in this thesis. Now that I have explained how participants are represented in this thesis, I can discuss how they were recruited.

Recruiting Participants

As a cultural insider in the world of beekeeping in the southeastern United States, I had the advantage of tapping a number of channels to recruit informants. Family, close friends, and a co-worker were immensely helpful in helping me gain informants. Beekeeping clubs and organizations were also available and helpful in establishing contacts early on in my research. Here, I was able to meet multiple beekeepers at one time and gather information quickly.

As I tapped my social network, a friend at work gave me the number of an urban beekeeper named Justin from New Orleans. Beekeeping is illegal in New Orleans so it can be difficult to find informants from the area in comparison to areas where beekeeping was legal. Because the beekeeper was a friend of a friend, there was a sense of mutual trust between us from the beginning. Had I found him through the internet, establishing a working relationship with him might have been more of a challenge. Instead, he readily invited me to his home and was receptive to my research interests.

My father still has beehives and I was able to obtain informants from him and his mentor, Bud Watt. Bud hosts a beekeeping gathering at his home each April when beehives are ready to be split or have already swarmed to find a larger space. Each year, 25 to 35 beekeepers from in and out of state drive to Cooksville, Mississippi to get together for a weekend to split Bud's hives and gather swarms from the surrounding area. Attendees consist of new and old beekeepers working together and talking about bees and beekeeping practices. Beekeeping knowledge is shared among of the beekeepers. Having already attended one of these gatherings, my dad helped me search for informants, leading me in the direction of beekeepers he thought would be beneficial to my research.

I also recruited informants at the Mississippi Beekeepers Association meeting in October of 2014. Here beekeepers from around the state gathered to learn about issues in the beekeeping business. I gained not only multiple phone numbers to contact potential informants but learned about important topics discussed in the beekeeping world. I met Johnny Thompson, a sideline beekeeper from Mississippi along with Jeff Harris, Mississippi State University's entomologist, and other beekeepers ranging from small-scale hobbyists to large-scale commercial beekeepers like Richard Adee. Mr. Adee is in

fact the world's largest commercial beekeeper and brings his bees to Woodville, Mississippi every winter. Meetings like that of the Mississippi Beekeepers Association were beneficial to gaining contacts, but other sources such as the internet also helped.

Figure 3. Empty hives at the Adee warehouse ready to be filled.

Through the internet, I was able to make contact with actor and Mississippi beekeeper Morgan Freeman. I learned though social media that Mr. Freeman had hives on his Mississippi ranch and knew that I wanted an interview. After months of research, I was able to interview Mr. Freeman at the Mauldins' home near Clarksdale, Mississippi. Before going any further, I should introduce the Mauldin twins. Draper and Doug Mauldin are actually responsible for Morgan Freeman gaining interest in and obtaining bees so I contacted them through their Facebook page. After explaining my thesis and my desire to interview them, they agreed to sit down with me. The Mauldin twins live in Nashville, Tennessee where they keep bees, but they also have an apiary at their parents'

home in central Mississippi. Because of the driving distance, we decided that we could meet there to conduct the interviews.

One summer afternoon, I drove to the Mauldins' parents' home. When I arrived, their mother answered the door and invited me in. She informed me that one son was in the shower and would be out shortly, while the other was finishing up mowing the yard. She told me I could have a seat and she would let her son Doug know that I had arrived. She also informed me that Morgan Freeman would be joining them for dinner and that I could join them if I would like. Of course I said yes, but very coolly. Later that evening after interviewing the Mauldin brothers, I interviewed Mr. Freeman about his relationship with honeybees.

I found other beekeepers through the internet, googling local organizations where beekeepers met with other beekeepers. Searching the web, I was also able to find a list of Mississippi beekeepers certified to sell and ship products including nucs (small honey bee colonies), packaged queens, workers, and drone bees (Mississippi Department of Agriculture and Commerce). I began going through the list, calling thirteen of the twenty-five beekeepers on the list. Eight beekeepers answered and seven were interviewed. Most of the beekeepers on this list were sideline or commercial apiarists who were in the beekeeping business for economic reasons. Once I found a beekeeper, it was pretty easy to find more. Often I established rapport with a beekeeper during an interview and they often shared the name, and in some cases the number, of another beekeeper they knew. I was highly appreciative for Southern hospitality in this manner.

Interviewing Participants

As a multi-species ethnographic study, this thesis seeks to address and unravel the complex relationship between beekeepers and their managed honey bee colonies. In order to collect data pertaining to this complex communicative relationship, interviews were conducted with regional beekeepers regarding their perceptions of communication, apiculture management methods, and to catalogue general interactions with their hives through various modalities of perception.

I intended to be very casual and laid back with my informants when conducting interviews. While this manner comes natural to me, it was also key to establishing a professional rapport between myself and informants during my fieldwork. By doing so, I could gain a more organic understanding of the relationship between my informants and their bees while also building trust.

When meeting my informants, I first provided a consent form for them to sign while also giving them a rundown about my thesis topic. By doing so, my informants better understood that I was less interested in the biological aspect of beekeeping and more interested in the actual relationship between them and their bees. After having my informants sign consent forms, semi-structured interviews were conducted.

Initial interviews were conducted for the purpose of gathering a basic profile of informant beekeepers. The questions I asked focused on how many hives the beekeepers had, how much time they spent weekly with their bees, and what their perceptions were of the bees and nature. Their responses helped me understand why my informants got into beekeeping, who they learned from, who the beekeeper was personally, their

background in beekeeping, and generally what the most important questions of my thesis would be.

Follow-up interviews took place during or after watching the beekeeper and often generated new questions that built upon the results of my first interviews. This included, for example, why a certain beekeeper had performed a technique in a certain way. By second interviews, I had a comparative analysis to work from initial interviews and observations among the informants. Follow-up interviews included more elevated probes developed from existing subject matter in order to further define the trends I observed in my comparative analysis.

When beginning my research I intended to first interview my informants before following or working with them in their apiaries. I began interviews in December when little work was being done and beekeepers were more readily available to talk about beekeeping. However, migratory beekeepers are only in the South during the spring months and during this time they are very engaged. By the time I was going back to meet with the migratory beekeepers, they were getting ready to ship their bees north or to California. As a result, I was able to only follow two migratory beekeepers. In addition to the initial interviews I was able to schedule, I improvised for gathering insight from the rest of my informants by watching documentaries and films online of migratory beekeepers. From these films and visuals, I gained an understanding of the physical relationship between the migratory beekeeper and their bees. This helped me understand aspects such as movement and methods.

For some, interviews were given in apiaries or after I had worked with my informants. During Bud Watt's second beekeeping gathering in April, I first watched

many beekeepers during their work and later pulled them aside when they were available. Due to the improvisational nature of this process, it occurred to me to ask new questions I had not considered while watching the beekeepers work with their bees. Beekeeping was also fresh on their mind, which helped them to provide me with invaluable insights about the process. Excited from working with other beekeepers, informants were happy to share their thoughts on beekeeping methods and the relationships they had with honey bees. Ideas were openly discussed among the group of beekeepers, while one-on-one they might have been more reserved. Based on my personal knowledge of social culture in that context, having multiple beekeepers present to fill gaps of silence seemed to ease tension among the beekeepers.

I recorded all of my interviews so my memory could be refreshed as I wrote my thesis, but I took notes as well. I did this in part for myself so I could make note of what I thought was interesting and important, but I also think it helped with the awkward pauses that can occur when interviewing a stranger. I found taking notes in my notebook also gave people more time to think about their responses, and often they would go into more detail about the topic being discussed. There were often natural pauses in my informants' interviews where I think the participants' narrations would have otherwise been rushed or forced. However, while I was jotting down notes in my notebook, they had more time to think about what they wanted to say. I also do better to write notes even if the interviews were being recorded. I will admit that jotting notes also helped with conducting a fluid interview.

Questions also popped up in my head while interviews were taking place. I was able to jot down the improvised questions while my informants continued their extensive

interview. I marked these questions and then go back to them later in the interview at the appropriate time. Another benefit of note-taking during interviews was describing what could not be seen while the interview was being recorded. I jotted down details that I might have not remembered later while writing. With notes written in my field notebook, details like dates, number of hives, and names were easily accessible for later use.

Shortly after conducting my interviews, I reviewed my field notebook, listened to the recordings, filled in gaps, and wrote descriptions that I had earlier been unable to document. I went back and listened to the recordings when school let out for the spring. Though I had initially intended to transcribe all twenty-one interviews, I soon discovered that this was a vast undertaking and chose a different route. Instead, on a notepad I wrote the title of the recording, which consisted of the name and number of the interview starting at zero. As I listened to the recording, I wrote down important concepts and quotes I heard in the recordings while writing the time in the left hand margin. This way I could go back and listen to the specific topic if necessary.

Because I had an idea of the topics I was writing about in my thesis, it was easy to pick out the important parts of my recordings. When an important concept was heard in the recording, I would write the concept (ex: movement) in the left hand margin above the time of the recording. This allowed me to go through my notes, and match up the key concepts later on. As I performed this method, I kept my field notebook on my desk and followed the recordings.

The reason for using the notepad is because I feel keyboarding is more cumbersome, and I can get my ideas down quicker on paper versus a laptop. After going through the recordings to organize the concepts and subject matter from my interviews, I

was then able to begin writing the actual chapters of my book, followed by typing these handwritten chapters.

Beekeepers in the Southeastern United States communicate openly with both insiders and outsiders to the beekeeping community. They were eager to share their knowledge and did not hold back, exuding Southern hospitality. Beekeeping organizations are abundant and have a high number of attendees. Often during interviews, I would turn on my recorder, begin the basic questionnaire, and before I knew it I was no longer part of the interview session. I was merely a one-person audience being told everything there is to know about bees. These informants generated a wealth of data-points as dialog flowed freely between us. However, this was not always the case. There were many interviews that required more guidance on my behalf. Some informants were simply more reserved than others, answering with a simple yes or no, sometimes going into detail about a few topics. Overall, I gathered the information I needed and felt satisfied with the data collected.

Following Participants

After attending Bud Watt's beekeeping gathering in April, I began conducting interviews during or immediately after participant observation with my informant beekeepers. This was essential because during this time beekeepers are in full work mode with less time to stop for interviews. There were multiple benefits from conducting interviews in the field. I found beekeepers were often excited or "buzzed" from being around their bees and shared more about their relationship with the insects. At this time, I was also able to simultaneously observe the methods and movements of my informants as they discussed the physical relationship they had with their bees.

I found Bud's beekeeping events insightful as both an insider to Southeastern culture, while still somewhat of an outsider to the beekeeping community. Not only was I making contact with informants, but I was also able to observe beekeepers working together and listen in on discussions between them. New beekeepers at these gatherings were a good source to glean motivations for beekeeping as well as how they thought I should move and what I should do when beekeeping. Often I noticed these methods were considered common sense and would be omitted by some informants during interviews. I also participated and observed hive inspections, splits, and cut-outs. This allowed me to learn more about the practice of beekeeping, the different ways people keep bees, and how they interact with the insects.

While in the field, I kept my notepad with me, but at times, I felt it was disruptive and rude to only write. Interpreting my own knowledge of social etiquette in this context, I would often turn on my smartphone recorder. As a result, I was able to take notes while listening to conversations that had occurred while working at the hives. While writing, I felt that this process was missing important visual aspects so, at times, I would video record the beekeeper's movements with my phone in hand. Other times, I would prop the camera somewhere so I could record both the beekeeper and myself working in the hive.

When I worked with the bees, I allowed my informants to teach me as they saw fit. My informants would explain something that they may have not thought to mention while I observed them in the bee yard or during the interviews. My beekeepers were inadvertently demonstrating the nature of their relationship with the bees as they walked me through their methods. They were subtly molding me to share the relationship they had with their bees so I often stood back a little and closely observed their behavior. In

doing so I could pay closer attention to their movements and interactions with their bees in addition to my own. Given that my research pertained to how my informants interacted with the bees, it was important that I be able to distinguish the emic and etic positionality of myself in the context of my fieldwork. Another reason for observing instead of participating at times was out of respect for the beekeepers. Many of my beekeepers were hard at work during the interviews and I did not want to be an obstruction.

While following beekeepers was highly beneficial to better understand their relationship with their bees, the acquisition of my own hive allowed me to understand the experiences that my informants spoke about. An informant gave me a hive as a gift midway through my research so that I could have my own experiences keeping bees. From this I was able to compare my own experience to what I had been told by my informants. There is an evolution that comes from working with bees in terms of comfort that develops over time. It was at this point that I was no longer an outsider to Southeastern beekeeping culture. One-on-one interaction with my bees helped me understand the various ways humans read and communicate with honeybees while working in the bee yard.

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CHAPTER IV – COMMUNICATION IN THE APIARY

Analysis of communication is an essential aspect of understanding human-bee relations. Informants gave mixed responses when asked about their perceptions of communication between themselves and their honey bees. Some believed communication exists and that it is highly beneficial to tune into what the bees are conveying. These beekeepers jumped at the opportunity to express their experiences of communicating with their bees in various ways, as well as their perception and interpretation of the beekeeper-bee relationship. Others I interviewed believed there was no communication in any form. Due to these experiences and the responses I received, I was able to determine that my research would be based around communication between bees and beekeepers based on senses.

Argument for Communication

I met many beekeepers at Bud Watt's beekeeping gathering in April of 2015, who believed that there was communication between themselves and their bees. This event included over two dozen beekeepers from the South who come together annually at Bud's property to split hives and catch swarms. Here I had the opportunity to meet a wide variety of beekeepers and conduct interviews with some of my best informants. During their interviews at Bud's beekeepers like Mike, JP, and Alan pointed out the importance of knowing how to interpret and communicate with bees.

Mike, a beekeeper from Beaumont, Texas, believed that communication occurs between beekeepers and their bees. I first met Mike at Bud's in 2014 and again in 2015. After hearing Mike talk to new beekeepers about how to handle bees, I asked if I could pick his brain about whether or not there is a relationship between bees and beekeepers.

Mike kindly agreed and began to tell me his story. He first became engaged in beekeeping because he had an uncle who kept bees. Mike explained, "I wanted to get started, but kept dragging my feet until [my uncle] got bone cancer and died. So I just made up my mind and ordered stuff and started keeping bees." Mike was open to discussing communication of bees and the different ways humans can interpret it. "So a lot of people say 'Oh they're just bugs but they're one of the most intricately designed and fashioned creatures that exist in nature. The ways they communicate through sound, smell, vibrations, visually… I mean none of us understands it all the way. I don't know that anybody really does," Mike detailed as we sat on the tailgate of a truck in Bud's front yard.

Another beekeeper I was introduced to while at Bud's gathering shared the perception that communication exists between bees and humans. JP "The Beeman," an exterminator from Louisiana, initially entered the beekeeping business due to his occupation. "My background is in pest control. I had worked for another guy for about five years and then eventually started my own business. We weren't always saving them back then and I thought there had to be a different way to approach what we were doing at the other company. So I learned more about them and started keeping bees. Back then there wasn't any sort of YouTube so I just kind of jumped right in and made a lot of mistakes, but I tried to learn from them." JP had a very interesting outlook on bees despite his occupation. He described the myriad of cues given off by bees and gave insight regarding how to interpret them. "They're giving off visual cues, chemical cues, of course they communicate audibly too. You just need to be aware of what they're telling you. They will tell you a lot if you listen. It's all about respect. You need to get in

there. You need to be aware of what they're telling you." JP's experiences with bees exemplify an essential aspect of communication with bees through their social acts, which they display towards beekeepers.

Figure 4. JP carefully pulling honey comb out of a spool on Bud's property.

Alan Buckley, a beekeeper from North Alabama and attendee of Bud's beekeeping event, firmly believed that there was a relationship between beekeepers and honey bees. Alan is 59 years old and ordered his first setup colony from a Sears and Roebucks catalog at the age of 11. In the interview, he recounted that his grandfather and father, as well as older family friends, all maintained beehives. Over time, Alan became fascinated with the insects as well. After adopting his first colony, he received his next 30 to 40 colonies from his uncle and his love for bees continued to gather momentum. Alan is also an emergency medical technician (EMT) with extensive apiculture experience: he

has been in the commercial beekeeping business, sold packaged bees, shipped bees to California to almond growers, shipped queens around the US, and at one time maintained approximately 800 beehives. Due to family considerations and other dilemmas in the past two years, Alan has downsized to between 60 and 70 hives. “What I’ve been doing lately is basically I left my bees in survival mode. That's another thing with bees. People have been pushing them so hard. So every so often, I'll leave them alone for a season or two and just build back from what has survived real well and those that died, well they just died. I take the ones that survived real well and then expand from those like crazy. I can take 50 to 60 colonies of bees and have 200 to 300 really easy in one year. No problem.” Alan explained that he had not visited his hives or gone inside one in the past two years, but planned on getting back into expanding his hives during the upcoming fall of 2015. “This fall I’ll be getting things cleaned up and getting ready to rock and roll in the spring.” He also explained how he had developed a relationship with his bees, “I had bees that were so used to me being out there with them that I could hold up a frame from the hive, and I would have them fly back from the field and land on the frame I had in my hand.” “They really do get used to you?” I asked Alan. “Oh yeah” he responded.

When talking to new beekeepers at Bud’s, Alan always reiterated the importance of working with, not against, bees and picking up on cues given off by the bees. “The biggest thing about your bees is trying to get in tune with them just like you would with your dog or cat or anything else. They learn to recognize you,” said Alan. “How so?” I asked. “Well you know they have the ability to map the human face? So they can recognize your face, and if one bee recognizes it, then that means the whole hive recognizes your face. That's because they transfer the various information between the

bees in the hive. It'd be like you taking your finger to reach out and touch me on the knee or touch me on the shoulder. It's a certain number of cells doing that, but our entire body recognizes it. So compare our cells to the individual bees. The colony has the three separate components of the queen, drones, and the workers, and that is the actual organism. The organism is what reproduces in some manner, not the individual bees reproducing. People commonly refer to the individual bee as an organism, but it really isn't. They're part of the greater organism." I nodded my head, "It's like a super organism?" Alan nodded, "Yeah."

Alan continued, "You can take the idea I just told you a step further with bees in a bee yard. Bees in a bee yard to a certain degree operate as a super colony and having this perspective can benefit one as a beekeeper. It gives you a more complete understanding of what occurs in the hive. If you know how the queens, the drones, and the workers function, it's like having a better understanding of how your entire vehicle functions instead of just knowing how the brakes or the clutch work. It's a more complete understanding of a functioning machine. Bees are a biological machine. I've noticed in a lot of academic writing, and in scientific articles that scientists and the general public are looking at bees as individual organisms, but with the beekeeper, we see the whole hive as an organism. The organism is the colony."

Figure 5. Alan Buckley capturing a swarm from a tree in his bee yard.

Argument against Communication

Although a good amount of evidence suggests communication exists between bees and their keepers, some may ignore or not pick up on this like others do. While many of the beekeepers I talked to, including Mike, JP, and Alan believed there was communication between themselves and their honey bees, others simply laughed or answered no when asked the question. A potential reason for this could be experience. As Green and Ginn (2014) explained, it takes time to know bees and build a bond when you

start realizing that they respect and recognize you. This could have been the case with some of the beekeepers who said that they did realize communication between themselves and the bees. Another reason could simply be the perception of the individual beekeeper.

Johnny Thompson, a Mississippi sideline beekeeper and queen breeder, seemed confused about whether or not there was communication between himself and his bees. I met Johnny at the Mississippi Beekeeper's Association in October of 2014 and conducted an interview with him late in the spring of 2015. I drove up one morning to Broken-T Honey farm near Philadelphia, Mississippi to work alongside him, his father, and his son Caleb. The moment I arrived to conduct my interviews, all three Thompsons were suited up and ready to begin. Already wearing long linen pants and a long sleeve t-shirt, I tucked my pants into my canvas sneakers, put on my gloves, and walked with the three beekeepers to the first row of hives less than 50 yards from Johnny's parents' home.

During our interview, Johnny Thompson debated with himself whether or not he communicated with his bees, often making contradictory statements. Initially, when asked if there was a relationship between himself and his bees, Johnny had thought about the question for a second, and then shook his head no. "There's not a lot of communication. It's not like cows where you can go out and herd 'em or move them from one pasture to another with a four-wheeler. You don't really train bees to do anything or learn to read them." Yet in the next breath, Johnny Thompson stated, "You know when you open up the box, and they're calm and everything seems okay and you got a queen, you know it's good. But when you open it up, and they are mean soundin', they are buzzing loud, and flying around, you can probably guess 'Okay, they're probably

queenless.' You can read their movements and stuff, but there's not a lot of communication back and forth. Not like with the dog that you can train to do tricks. They're not like cats and dogs and horses. You can kind of communicate with a dog saying no, yes or let's go. You can't say, 'Hey, let's go over yonder' and [the bees] will all follow you."

Johnny Thompson believed there was lack of communication from his side and clearly there is no verbal communication. Of course beekeepers cannot verbally command bees to sit, stay, or rollover. But while working with Johnny Thomspon, I saw him communicate through other modes of communication, especially touch. For example, while searching for the queen, Johnny would gently move his hands over the bees crawling on the frame and when needed would ask, or if you want to say it, force, the bees out of the way by lightly brushing them out of the way.

As we continued searching for queens, the topic of communication was brought up again. "Yeah you were talking about communication. Bees will sting you when they're angry," Johnny Thompson said, laughing. He had apparently just been stung on the hand. Later on while opening a hive, Johnny stated "If you go into a hive beating and knocking, communicating to them that you're upset, they'll get upset back. That's a type of communication. That's like with most animals. They can tell if you're nervous or confident, and bees are like that."

Mr. Thompson commented on communication again when we had returned from our lunch break. As we began opening hives, I realized that the bees seemed more agitated. Bees often become more aggressive in the afternoon heat in comparison to cooler morning temperatures. More bees flew violently in the air, buzzing loudly and

Johnny noted this, stating: “When they get mad, they'll sting you, and tell you. Now bees communicate between themselves, but between the beekeeper and the bees, there's not much communication.” While Johnny Thompson was talking, he told me there was little or no communication between him and his bees, before describing how he observed the movements of bees and interpreted their sounds. Some beekeepers did not believe there was communication between themselves and their bees because of their perception of the insects. An example of this can be seen with Ralph, who described bees as being machine-like.

After analyzing the mixed reactions and responses of beekeepers when asked about communication, it became apparent that the diverse ways in which communication can manifest might have caused some confusion during the interview processes. Some beekeepers may think of verbal language as being the only mode of communication, not considering the other forms. Whether beekeepers realize it or not, there is communication between themselves and the insects they work so closely with. It is also important to remember that senses play a significant role in the communication between the two. And that communication with bees goes beyond verbal language. It involves senses including touch, smell, sound, and sight.

Communication through Senses

Although famous entomologist Karl von Frisch and many of his predecessors attempted to investigate the physiology of sensory organisms through which information is transferred, the details and meanings of the honey bee language are still not completely understood (Lindauer 1971:3). Yet it is evident that extensive collaboration occurs between honey bees. No single organism can build comb, raise brood, collect, and store

food without some type of collaboration. As social insects, honey bees work harmoniously together. This might be one of the reasons that many informants in this study became fascinated by the sophisticated social ecology of honey bee colonies.

The study of animal communication has led to significant progress in our general understanding of motor and sensory systems, evolution, and speciation (Searcy and Nowicki 2005:7-9). Because animals are inherently social beings to some degree, communication therefore takes place amongst both humans and non-humans (Lindauer 1971:1). Like with humans, communication can involve multiple senses at one time. Through my fieldwork, I observed the chemical, mechanical, and optical means of communication which Martin Lindauer describes as the, "means of communication at the disposal of animals (Lindauer 1971:2)." Lindauer explains that there are chemical, optical, and mechanical means of communication used by animals; chemical being the most primitive (Lindauer 1971:1). The term "chemical" pertains to scents and pheromones, "optical" refers to communication through sight, while "mechanical" refers to communication through sound waves or vibrations. "Chemical" communication in this context relates to the sense of smell. Though Lindauer does not include touch in his list of "sensory mechanisms through which information is transferred" among bees, it has been included as a section in this research while optical communication takes a back-seat (Lindauer 1971:3). I believe touch is a very important concept beekeepers shared throughout my research and can play a pivotal role in interspecies communication in the apiary. Therefore, this study explores manifestations of communication between beekeepers and honey bees through analysis of these fundamental modalities.

Scents and pheromones play an important role in the hive, particularly in how bees recognize odors of their food sources, flowers (Frisch 1971:35). Karl von Frisch trained his bees using odors, discovering their preferences for citrus essential oils in the process (Frisch 1971:36). From his experiments, Frisch discovered that bees distinguish odors just as well as a person with a well-developed sense of smell. Furthermore, "odors which are similar for the human nose are also similar for bees" (Frisch 1971:38). Therefore, humans are not so different from bees when it comes to the perception of scents. In fact, although their olfactory organs are physiologically different than ours, the olfactory reactions of humans and bees are very similar. Located outside of the body, their sense of smell can be superior to that of humans (ibid.). Because humans and bees have similar olfactory responses, there is an ongoing exchange of communicative information that should be noted.

Beekeepers are able to take cues from their bees, using their sense of smell to read signals given off by honey bees. One important and widely known cue given off by honey bees is the "alarm pheromone." The alarm pheromone is an important scent given off by a single bee when they have been harmed or threatened, alarming the other bees that the enemy is near. During my field interviews as we discussed different ways beekeepers interpret bees, JP remarked "Sometimes if you just push on a single bee and she doesn't like that, she's going to send out an alarm pheromone and they're going to start popping you." To illustrate this interspecies communication, one event also illuminated this correlation. During my fieldwork at Bud's gathering, Mike was stung and reacted nearly imperceptibly. Another beekeeper immediately inquired, "Did you get that banana smell?" in reference to the strong-smelling odor of alarm pheromones that

smelled very similar to ripe bananas. Therefore, scents can play a critical role in helping the beekeeper understand what the colony intends to express or communicate (Moore and Kosut 2013:94).

During my interview with Mike, he explained to me how beekeepers take the alarm pheromone as a warning from the bees. “Sometimes when you get into a hot hive, you open it up and will smell that banana pheromone, and that lets you know they are not happy. It’s kind of like popping smoke. You know in the military where they'll say, ‘Hey I want you to drop bombs over there, pop smoke over there.’ That's kind of how I see it because the bees zero in on their target. If you get stung, there's a good chance you're going to get stung in the same vicinity a couple of more times,” explained Mike. Morgan Freeman touched on the subject of alarm pheromones. “When you squish or wound a bee, that lets out a banana pheromone. I don't squish any because if you squish one bee, you're going to get stung so watch squishing bees.” These interactions imply a strong understanding of communication between the beekeeper and the hive whereby honey bees successfully and clearly are able to signal clear warning and distress across species. If beekeepers can realize smells emitted by honey bees, they can be able to read the language of the bees which is a form of communication.

Another scent given off by honeybees is a scent similar to lemongrass. Lemongrass oil can be used to simulate the attractant pheromone of bees. Lemongrass oil contains high amount of the chemical citral, a component also found in worker bee pheromones. This pheromone is multipurpose and is used by worker bees to direct bees to hive entrances or flowers during foraging (Beesource Forum). Because of this, beekeepers can lure in swarms using the lemongrass scent. I first smelled lemongrass at

Bud's beekeeping gathering while a swarm was gathered. As everyone gathered around, Bud and Alan prodded people to come up and observe the bees. Bud pointed out that the scent of lemongrass was in the air.

I asked Mike if any other smells or scents that occur in the bee yard are indicators of the bees' actions or what is occurring within the hive. "No, not that I know of. Those two are most frequently produced in enough of a quantity that we can smell them," said Mike. "We caught that big swarm yesterday, and it was probably 8 to 10 pounds and it was a lot of bees and when they got on the box and we were sitting around the box you could smell it - the lemongrass scent. They're just producing that much of it. And then of course when you get stung, that [banana] smell is an intense smell, but I can't think of any others. I mean propolis has a smell if you get close to it, but that's not any way the bees are communicating with us."

We can infer that if humans can smell scents given off by honeybees, then they can also smell us. I asked my informants what effect this had on their beekeeping methods and practices. "I'll tell you this: I don't wear scented deodorant, I don't wear cologne. I don't use shampoo and conditioners that put out heavy scents because they may like the way you smell or they may hate the way you smell." JP answered, emphasizing the "like," and "hate" in his sentence in order to emphasize the distinction. "That's very important right there. I had a guy last year, and I sold him some bees. He came to me and said 'Man, I cannot get near my bees. Can you come over here and give me a hand and tell me what's going on?' So I went over there and went through his bees. They paid no mind to me, but they were stinging him. I asked him if he was wearing any

deodorant or cologne and he said yeah. So we had to kind of talk about that and he had to change his approach on that. He's doing a lot better with them now," JP recounted.

Holley Bishop highlighted a similar experience in her book, *Robbing the Bees: A Biography of Honey, The Sweet Liquid Gold That Seduced the World.* Bishop described going to her hive after taking a shower and getting ready to go on a date. She knew the repercussions of being hasty in the apiary, but thought that since she only needed to be in the hive for a minute, it would not matter. However, this caused discord with her relationship with the bees: she was repeatedly stung in a short amount of time. Holley states that the scents from her bath wash, shampoo, and perfume had been partly to blame, the other being her hastiness (Bishop 2005:195-197).

While some scents such as perfumes and deodorant can deter or even anger honey bees, some can be useful to beekeepers. Beekeepers may use scents to their advantage as Guido Bamberger did with the "guidance by scent" method (Frisch 1967:257). As briefly discussed earlier, they can take advantage of lemongrass or peppermint oil to attract their bees like Karl Frisch did to train his bees (Frisch 1971:39). While some oil scents can attract honeybees, others, such as catnip essential oil, can repel them.

Some beekeepers, such as Mike, believed more than chemical output changes how bees react to humans. On this topic, Mike explained, "People call it a wives tale. I don't think it's a wives tale, but if you are nervous, the bees will be nervous. It's kind of like if you're comfortable around dogs, they can sense that. The bee's sense of smell is so off the chart, it's not far off for me to believe that if I'm stressed, I put off a certain scent. I also believe this can include vibrations as energy - maybe bees can sense that. We've seen it before where people show up real nervous around the bees. They tend to be the

ones that get stung the most." Not only are scent and pheromones a modality of communication between bees and beekeepers, but sound is also a way that the two can converse.

While there is controversy about whether or not bees have the ability to hear, it is known that mechanical communication (sound waves and vibrations) plays an important role in the communication in the hive (Lindauer 1971: 3-5) Sound also plays an important role in the communication of humans. The sound of bees affects humans and the sound waves and vibrations of humans affect the bees. Therefore, it is important to note this exchange and the effect it has on both parties. It is also beneficial to look at how beekeepers tap into the language of honey bees and the benefits of doing so.

The buzzing motion of a bee can have a powerful impact and can quickly induce a wide variety of emotions in a person. A person's heart rate or adrenaline can increase when a bee buzzes near them. Although it may not be the intention of the bee or the hive to warn an intruder, the sound given off by the wings of a bee can send a strong warning signal. This has been mentioned by Derrida and Willis (2002) in their works on certain instinctive features which characterize bees and which we need to understand.

Agitation can be also heard amongst bees as their wing pulse increases to become louder and faster. The pitch of buzzing becomes gradually higher as bees become increasingly agitated, and can therefore roughly indicate the current temperament of a hive or individual insect to a beekeeper. During our interview, Mike explained how beekeepers and mankind in general interpret the attitude of bees based on the sound given off of the single bee or hive. Hovering his finger about a foot away bouncing around, he made the sound of a weed eater almost, saying "If they get irritated with you then it's

kind of like ‘yeng yeng yeng yeng yeng’. And it's constant, they are not getting closer or further away from you. They are right there and they kind of do this around you.”

Beekeepers interpret sounds that their bees make and the most frequent is that of an agitated bee. My dad pointed out the sound one day while we checked his bees while I was still an undergraduate. It was overcast that day, and my dad had not wanted to go out because he knew the bees were going to be testy. Yet he insisted we needed to go. As we checked the bees, we could tell they were more frantic than usual. Their sounds were louder and higher pitched with a quicker pace. “They are antsy. Let's just get in and get out,” said my dad. I heard similar observations during my fieldwork. Many beekeepers responded to the bees’ agitated sounds, including Alan Buckley. “Let's just back off and give them their space. When they’re agitated like that, I'll just step off and give them some time," said Alan calmly walking away from the hive.

I experienced an agitated bee during my fieldwork at Bud Watt's. Half of the group had gone to a trailer of the boxes while others had gone to perform a cut out. My fiancé and I had stayed at the cut out and were late getting to the hives. When we pulled up, some beekeepers were in suits while others only had on blue jeans and T-shirts. The bees we had experienced at the cut out had been docile and we thought it would not be necessary to wear protective gear. Because only a small portion of the beekeepers were wearing their suits, we opted to go without. I walked up and talked to a few beekeepers. I busily took notes reflecting what I witnessed. My fiancé, Tyler, was new to beekeeping and had been standoffish, so we backed away under some trees for shade to watch the beekeepers work. Then a bee flew into my hair. Inside, I started to panic a little. Hair is the worst place for a bee, since she can easily get trapped in it. I tried to untangle the bee

from my hair without getting stung as I heard the insect becoming frantic and wings began to make a higher pitched sound. Surrounded by beekeepers, I tried to keep calm. I whispered to Tyler, asking him to get the bee out of my hair, but he wasn't much help. I let down my bun, flipped over my hair, and tried to shake the bee out lightly, but was unsuccessful. Right behind my ear, the pitch continued to get higher. I had heard the sound before when I was working with my dad and a bee got trapped in my hair. This time, I was not so lucky to remove the bee. I felt a sharp pain into my skull, and it was over. I had been stung, and the bee had died.

Figure 6. Draper Mauldin, Morgan Freeman, and Doug Mauldin.

There are other sounds interpreted by beekeepers that indicate what is going on in the hive. During my interview with the Mauldin brothers, Draper described the different

sounds that bees make, specifically when there are two queens in a hive. Their mentor, Ibrahim, had taught the Mauldin brothers how to tell when two queens were in a single hive without opening it. “Ibrahim asked if he could come over to one of our bearding hives and get a queen cell. We went out to a hive that was bearding out really big, which means that at the bottom seal, there will be a queen cell on there. So we went through there, and before we went through it, Ibrahim opened up the hive, and before we even spotted one queen, he said ‘Oh, there's a new queen in here. Listen to her whine. Listen to her whine, my brother. Isn't her voice beautiful?’ And it sounded like a little pig. It was in these increments,” explained Draper. He began making the sound of a weed eater, raising and lowering the pitch as he similarly gesticulated the volume of sound waves with his hand. “She would go to each frame until each bee knew that she was a new queen. So before Ibrahim ever found the new queen that was whining, he said, ‘So my brother, let's look on the front of the hive. That's where your old queen is going to be. I’ll take her. She's a good worker.” Based on these observations, it becomes clearer that beekeepers can and do interpret the language between bees as a directly applicable working tool as they maintain their hives.

The aforementioned sounds described by the Mauldins are known as quacking or piping. These sounds are typically heard when there is more than one queen in a hive, “piping is a signal that a virgin is ready to fight for the honor of being the one-and-only (Noah’s Bee Products).” It is the sound, “made by a virgin queen while she is still in her cell, or the sound she makes once she is freely roaming about the colony (Honey Bee Suite Blog).”

In addition to sounds emitted by bees, a variety of sounds may be heard from the beekeepers themselves. Intentionally or unintentionally, humans often emit sound in the presence of their bees, opening up the possibility of a new channel of communication. Talking or singing in the bee yard can affect and reveal more about the relationship between beekeepers and their bees. Regardless of whether or not bees actually hear sounds or just feel vibration, the results of this study seem to indicate that bees may be affected by human sound waves.

From the very first day I obtained bees of my own, I talked to them. After opening my nuc box and checking the frames, I would commonly use phrases like, "Hey girls. It's okay. I'm just looking around. Move out of the way. I don't want to squish you." I had not done this in front of other beekeepers during my fieldwork, and had not planned to do this with mine, but as I had always talked to chickens, cows, or horses, I also began talking to my bees. While I don't believe they understand what I say, as a result of my own self-awareness I considered there could be various reasons for the verbal output (e.g. my own nerves).

It can be a little intense when first going into a hive on your own. Though I had gone into hives before, I had felt more confident because there had always been someone there. With my adrenaline pumping, alone in my backyard with my bees for the first time, I was nervous. I felt like I was one-on-one with my bees. If they felt threatened, I would be their target. Because of this, I guess it was instinctive to try to calm them using my voice the way I would a domesticated animal. I was very soft spoken trying to convey to the bees on some level that I had good intentions and was not a threat. As I became more

comfortable with my bees I still spoke to them. Though I may have raised my voice, it was only a little and I continued to use a comforting tone when working with my bees.

During interviews some beekeepers admitted to talking to their bees. Like me, some beekeepers said they talked to their bees only when they were alone in the apiary. I posted a question on the Beemaster International Forum as well as its Facebook page, inquiring if any other beekeepers talked or put off any intentional sound like music when working in the beeyard. Some beekeepers responded immediately, saying they spoke only in response to stings. “I say a few choice words when she stings me,” responded a North Carolina beekeeper, “but otherwise, I stay sorta quiet.” Kathy, a beekeeper I met in the spring of 2015 at Bud’s bee gathering wrote, “I have a string of 4 letter words.”

JP and I discussed talking to bees during our interview at Bud’s. “Yeah, I talk to them, and some people probably think I'm crazy for talking to them. I say ‘Come on girls,’ you know, like Alan Buckley. You'll hear him say ‘Come on girls!’ or ‘Y’all stop, girls’, ‘Don't be doing that now.’ Sometimes we may be a little too engrossed in it,” laughed JP.

Some beekeepers vocalized for the same reasons I did. “I do occasionally say soft things like explaining that I am going to open the hive, etc. so they know I am not there to harm them. Hunose [who knows] if they understand, but I think on some level, it prepares me mentally and maybe prepares them. However I am not the bee whisperer.” wrote “flyboy”, a Canadian beekeeper and member of Beemaster International Forum. “Mostly what they hear from me is, ‘Where did I set that dang hive tool?, Crap!,You better move out the way, girl!, Ohh, you just got squashed, easy, easy,… I’m almost

done!...," replied a beekeeper from Bowling Green, Kentucky.[1] I agreed with other beekeepers on this last statement. I often lost my hive tool, and am always telling "my girls" to move out of the way, nervous I am going to squish them. This kind of sound establishes a link between the bees and the beekeepers both emotionally and psychologically.

Some beekeepers in this study reported that it can be important to not be loud while around bees. During our interview, JP explained, "We had this one guy named Larry, and he doesn't come anymore, but we kind of gave him a hard time. I think Mike may have told you about this, but I mean his hands were moving all over the place when he talked. I mean everywhere. He kind of talked loud, and we said 'Larry, you know when you get around those bees you got to tone it down.' And we were in the hive, and he kind of yelled 'Ohhh,' and a couple of bees jumped off and a couple of people got stung. Bud had to grab him and say, 'You just need to stand over here'."

During my interview with the Doug and Draper Mauldin, I brought up the topic of talking with bees while working with them. "Do any of y'all talk to your bees or does Morgan talk to his bees?" I asked the Mauldin brothers. Doug began, "You know actually I found out –and this is the craziest thing – my buddy googled it: classical music." Draper countered, "Are you sure that's not for plants?" "You weren't there," responded Doug rolling his eyes, "but my friend was there, and he said 'Hey man, I heard that if you play classical music for them [the bees], they'll chill out.' So sure enough, he pulled out his cell phone, and put it up to the hive and played classical music and the bees just chilled out (Beemaster's International Beekeeping Forum)."

One of my informants in New Orleans, Justin Irby, also played music while in the beeyard. I met Justin's bees the second trip to New Orleans. I had conducted an initial interview with Justin in December, and followed up with him in the spring in order to delve deeper into my research while observing his behavior and beekeeping methods in the apiary. After picking Justin up from his home, we drove to his friend's home a few blocks away to check on his hives. Initially, Justin's two hives were in his backyard, but because his mother was his duplex neighbor and highly allergic to honey bee stings, Justin relocated his hives to Fairchild's backyard. When we arrived at Fairchild's home, Justin and I first suited up, followed by him putting on what sounded like electronic house music. I cannot say if or how Justin's bees reacted to the music because I had only interacted with them while music was playing. All in all, the bees seemed unbothered by the beat.

Figure 7. Justin and Fairchild checking hives.

I told the Mauldin brothers about Justin playing electronic music while checking his hives in order to record their reactions. “With his honey bees? Are you serious?” asked Draper. “Yes.” I replied, nodding. “Is it documented that it works?" asked Draper. “I don't think he really does it for the bees, I think he does it because he likes to listen to his music while working,” I responded. Afterwords I realized that I had not asked Justin the reason for playing his music, and I merely assumed that he played the music solely for his own enjoyment. Like talking, the actual music may not have an effect on the bees,

but it may in fact have a soothing or calming effect on the beekeeper which can subsequently impact the bees as well.

Karl von Frisch (1974) looked at touch as an essential feature for communication between honey bees which I was able to confirm through my study. Scientists have also argued that touch may be an important tool in interpreting the waggle dance since the ritual is usually performed inside the dark hive. In dim close-quarters, vibrations allow bees to communicate throughout the hive as Alan described during our initial interview. Honey bees can communicate with outsiders as well using touch and not just when a stinger targets a threat.

Alan Buckley believed physical contact between beekeepers and their bees is highly beneficial to their relationship, stating, “If they want to crawl on me, I'll let them check me out like they check the hive.” When I first met Alan in 2014 at Bud Watt’s beekeeping gathering, the first thing we did as a group that morning was catch a swarm of bees on the edge of the woods a few miles from Bud’s property. Swarming occurs when a hive becomes too crowded and over half of the workers leave with the old queen to find a new home. Though swarms may be found high up in trees, this particular swarm was less than 3 feet off the ground in a young pine tree. Before the swarm was actually placed in a hive box, the beekeepers gathered around while Alan and Bud shared some information about swarms and the process of capturing one. Afterward, Alan and Bud wanted everyone to “get their hands dirty.” Here, I found how important Alan thought it was to have physical contact with bees. He showed everyone how to scoop the bees carefully from the swarm into our hands, and let them crawl on us while everyone

crowded around. For those who were too scared to grab the bees, Alan would offer to scoop them out of the swarm, and place them on their hands and arms.

Figure 8. Beekeepers at Bud's scooping up honeybees from a swarm.

In the early summer of 2015, I traveled to North Alabama to meet with Alan along with his friend and fellow-beekeeper, Jerry. I met Alan and Jerry at a gas station where we gathered snacks for the day. After this, I followed behind Jerry's truck to one of his bee yards located on a tree line in the back of a wheat field. Immediately after arriving at Jerry's bee yard, Alan opened a hive and began scooping bees into my hands, and on my arms. "Is that the first time you've had them on you?" asked Jerry. Alan and I

responded at the same time. “No, I’ve had them on me a couple times,” I laughed shyly. “See that's one of the primary things I do in Macon is try to get people used to bees” said Alan. “That's the first thing I want them to do – is get acquainted with the bees.” By become physically acquainted with honey bees, beekeepers more easily pick up on cues in the bee yard.

Head-butting is great example of touch used as a communication tool between bees and humans: “head-butting” refers to the phenomena when a bee flies head-first toward a target and bounces off. While I watched Mike perform a cut-out at Bud’s, he explained and interpreted this behavior. “Sometimes bees do what we call head-butting. It’s kind of its’ warning, because they really don't want to sting you. That’s one of the most effective, and clears ways that bees communicate with us. The vast majority of the rest of it is you just learning to interpret," stated Mike.

Biting, nibbling, or chewing were also mentioned by beekeepers in this study. Beekeepers indicated that there are different interpretations of biting or chewing. While at Bud Watt’s, one beekeeper stepped back away from his hive, stating coolly “They're biting me. It's not stinging.” The beekeeper slowly stepped back and moved away from the hive for a few minutes watching other beekeepers contently. Two or three bees slowly crawled around his bare arms. One bee flew back to the hive voluntarily while the beekeeper lightly brushed the other two from his arms. A few seconds later, the beekeeper stepped towards the hive and began working again. In this way, he let the bees calm down and realize that he did not pose a threat, attempting to communicate that he had good intentions towards the hive. Based upon his reaction and behavior, I inferred

that he perceived that the bee biting and/or nibbling is a warning that the beekeeper should back off and give the bees some space.

Because the significance of this form of interaction between beekeepers and their hives is not well-reported in current literature, I posted a question about the matter on Beemaster's International Beekeeping Forum, in order to gain more substantial perceptions regarding the meaning behind biting and nibbling. "[They're] checking you out and licking minerals on skin.... Head butting and banana smell pheromone is a warning in my humble opinion," responded a South Carolina beekeeper. Another beekeeper from Jacksonville, Florida agreed and expounded upon this notion, "They usually will head-butt, and harass you to try to get you to get away and if you slowly turn and walk away they will usually leave after a certain distance. Nibbling is collecting salts as was mentioned, not a warning." More beekeepers joined in on the discussion, "Pulling hair is one of their warnings. They may land on your arm, and pull the hair there or get into the hair on your head. My guess is that is what you are experiencing, but they can also bite somewhat (not much) and that is also a warning." Although I had never previously heard mention hair pulling by bees, I thought that it was an interesting perspective.

On the human side of the communicative relationship with touch, beekeepers use their hands to move bees out of their way. It is important to reflect upon the role of touch in the communication between beekeepers and honey bees. On the one hand, beekeepers have large hands that can easily squish the small insects yet use these as modes of communication, while for most of the human population, physical contact with a bee is an unpleasant occurrence. Touching bees or brushing them with their hand is not always

wise or safe, but it is a common practice used amongst beekeepers, with or without gloves. Physical contact occurs usually while beekeepers look for something specific in a hive such as a queen or brood cells that are covered by bees such.

While visiting Mr. Thompson and catching queens alongside him, his son, and father, I was able to see how beekeepers use physical contact to communicate with their bees. As discussed earlier in this thesis, Mr. Thompson and his family breed queens to sell across the United States for other beekeepers to buy and cultivate. The day I arrived at the Thompson's in order to conduct my field research, they were locating and capturing queens from each of their nucs. Queens can be difficult to spot if one is not accustomed to the sport of queen finding. She can be distinguished by having a longer and smoother abdomen compared to the workers and drones. Often queens will be hidden by other bees who will be completely covering her. To search for her, the Thompsons would lightly brush their fingers over the bees who respond by moving to reveal what was beneath them. Moving bees was a common activity with every beekeeper during my fieldwork, seeming be an integral part of beekeeping.

The use of touch was also witnessed in New Orleans with Justin Irby, an owner of two hives. Oftentimes, Justin would blow or breathe on his bees, explaining that they didn't like CO2 and would retreat from the gas. When CO2 did not seem like it was enough to move them, Justin would use his hands to move the bees out of his way, making sure not to squish them against the hive box. When removing a frame by hand instead of with a tool that looked like a metal claw, Justin would slowly wiggle a gloved finger to the side of a frame lip where bees would often be crawling between frames. Wiggling allowed the bees time to move out of Justin's way. As the bees crawled away

from his fingers and out from between the frames, Justin would grip and lift the frame ledge to remove it. This finger-wiggling method was common among beekeepers.

In my research, the use of touch as a communicative modality seemed to be nearly universal. Moving bees was a common practice with every beekeeper in my case study, and I witnessed that although touching bees or brushing them aside may not always be safe, it is very commonly utilized by beekeepers with or without gloves. One beekeeper in this study explained that this practice is most commonly adopted when beekeepers are searching for something specific within their hive such as brood cells or a queen. Methods of touch can vary broadly and the temperament and manner with which a beekeeper approaches a colony can be very telling. In this study, beekeepers reported that if a person approaches a hive too quickly, it can easily threaten the bees as I will discuss later when analyzing the movement of beekeepers. Until then, I will briefly discuss optical communication in the apiary and how this acts as a mode of communication between bees and their keepers.

Although optical communication was not largely reported by beekeepers in this case study, during participant observation I observed that optical communication and interaction may play some role in interspecies communication. While observing beekeepers during their work, many seemed to integrate optical clues regarding the hive's state into the apiculture management practices. Visual cues regarding movement may be perceived by the beekeeper and may give insight into other forms of communication. For example, during my observations, I noticed that distressed hives may begin to swarm, causing a form of optical communication that the beekeeper may perceive by viewing the large-scale movement of the colony.

Enhancements and Inhibitors

During my fieldwork I witnessed that the previously discussed communicative cues may sometimes be expressed through multiple sensory modalities at the same time. For instance, a distressed buzzing bee may simultaneously exhibit mechanical communication through vibrations (through sound), stings (through the modality of touch), release alarm pheromones (through olfactory communication), by swarming (visual), and/or nibbling/biting the beekeeper. While the combination of so many sensory cues may pose a strong case for interspecies communication, attire such as veils and full-body beekeeping costumes may inhibit or diminish the success of interspecies communication optically. The methodological practice of smoking may also obscure a beekeeper's vision, thereby altering the potential delivery of message delivery between bee colony and their human stewards.

Because perceptions of the communicative modalities highlighted in this thesis can be juxtaposed with the impacts associated with different beekeeping methods in the apiary, these correlations will also be explored. The impacts of beekeeping methods on human-honey bee communication will therefore be magnified as they occurred in each modality, including aspects such as: attire, smoke, movement, veils, and gloves. This will help increase understanding of the ways in which these factors may interfere or impede each modality of perception.

Factors such as attire can impede touch and communication, notably the use of gloves, which can obscure the direct sense of touch between human hands and individual bees. The use of veils and beekeeping costumes can also play a role in altering potential communication between the species. In the event that beekeepers are fully cloaked, they

may not pay close attention to the messages from the hive especially if they do not need to be aware of potentially being stung due to extra protective layers (Moore and Kosut 2013:98-101).

While listening to beekeepers discuss communication through the medium of touch with honeybees, it became clear that communication is easily affected, even muted, by what a beekeeper wears in the field. According to Derrida and Willis (2002), there is clearly a direct relationship between the level of communication achieved between bees, the beekeeper, and preferred attire. This was seen when analyzing beekeepers who tended to their bees wearing full attire and those who never saw the need to go on with the suits. Many beekeepers did not wear gloves or veils while working bees. Some wore attire similar to mine consisting of long loose pants and a long sleeve shirt. Beekeepers such as Bud Watt wear as little as just cut-off khaki pants and sandals when in the bee yard. Others actually have professional full-body beekeeping suits, which can obscure and minimize interspecies interaction. In my fieldwork, I gathered information on attire preferences and if my informants thought it could affect the relationship between bees and their keepers. By doing so, I hoped to better understand the role of attire in regards bee-beekeeper communication.

There are cannons of debate on proper attire in the apiary. Some beekeepers believe that certain clothing items, especially gloves, get in the way of good beekeeping. Many beekeepers believe gloves interfere with dexterity and touch. Some reported that they were clumsier and more bees are killed in the process while wearing bulky gloves. However, it is important that safety come first, and though it may be uncomfortable, beekeepers who suffer from bee sting allergies need or have to wear protection.

Beekeepers like Justin Irby have to be fully suited up in the bee yard for safety reasons. "There are people who will suit up when no one else is. Part of that is because they might be reactive or allergic and we might give them a little ribbing, but if you need a jacket or veil, by all means, put it on." said Mike. Some think this constrains and impedes communication between beekeepers and bees, but with extra attention, beekeepers may tune into certain modes of communication such as sound.

During my fieldwork, I also gathered that choice in attire is related to comfort and experience, both of which are also impacted by variables such as who a beekeeper learns from and the manner in which they were trained. Who you learn from and the beekeepers with whom you are affiliated with can have an effect on the variety of comfort. I realized this after following Michael Marengo, an owner of three hives inside the Hattiesburg city limits. I met the Marengo family through my advisor Dr. Kaufmann and followed them in their bee yard just after visiting Alan in Fort Payne, Alabama. In his backyard near his hives, Michael explained his hand attire in the bee yard. "When I do wear gloves, I use surgical gloves so you'll still have feeling. I wear two pairs. They'll sting you through one, but not through two. I put two pairs, but it's still thin."

I had not worn gloves or a veil when working with Alan and Jerry. My beekeeping attire at the time consisted of loose linen pants that I tucked into my Keds© shoes, an oversized t-shirt that I could easily tuck into my pants, and a baseball cap. In light of the run-in I had with the bee getting caught in my hair, the baseball cap is the most important, essential piece of attire for me. Michael wore a full beekeeping suit and thin latex gloves so I thought it was more polite to dress in the "appropriate attire."

Additionally, I felt nervous and wanted to take extra precautions about Michael's bees, which I had never been around. Perhaps they were aggressive, and I would look like the fool who watched everyone put on bee suits and then would have been stung multiple times. I had worn a long shirt to the Marengo's home and brought my backpack with a veil and gloves. I wore this outfit out to the apiary, but after a few minutes, it was too hot for me. The humidity from the recent rain and the heat made wearing a suit miserable. I had to remove my gloves and veil.

Michael Marengo's son joined us at the hives fully dressed in beekeeping attire. I could tell that he was excited about going into the bee yard, but was nervous when his father opened up the first hive. You could tell that even though he was in full gear, he was still scared, jerking when a bee came near his face. From this, I realized that experience and attire both play a large role in beekeepers growing comfortable with their honeybees. I thought back to when I first started interacting with bees and how my comfort with bees had changed. As this comfort grew, I began wearing less when around my bees. Yet maybe it was the other way around, and I grew comfortable with my bees after wearing less in the bee yard.

Figure 9. The Marengos preparing to inspect hive.

When I first went out to my father's hive, I had been told to wear loose pants that could be tucked into boots and a long button-up shirt. When we arrived to the bee yard, my dad would pull out a veil and work gloves for me to wear. My dad was always dressed in his work attire: wranglers, a light cotton button-down, cowboy boots, and either a cowboy hat or baseball cap. Work gloves were always in his truck, but most of the time they stayed there while he worked in the bee yard. When my dad first began caring for bees, he would come home with his fingers swollen from being stung by bees with the occasional face stings as well. As a nurse who is highly allergic to bees, my mom purchased an epi-pen as

a preventive measure in case my dad ever began having allergic reactions to the stings. As time passed, my dad hardly wore a veil or gloves while working and after a while, the stings lessened. Therefore, experience, comfort, and attire all have intertwining effects on one another.

While interviewing Schwanee, a beekeeper I met at Bud's who learned from JP, I asked if he had been nervous when first dealing with bees; also if and how his comfort levels had increased. "Oh yeah. I didn't know what to expect so I was suited head to toe, you know, but they weren't bad. I put 'em in a box, and everything worked out fine. I still had fear of 'em until getting with JP. JP was like a mentor to me. He was showing me a lot of things. Once you get in that comfort zone, the gloves will come off, and then the jacket will come off. It just depends on how you feel. Now I hate putting something on." I asked Schwanee if he thought he could communicate and better understand the bees if he was not suited up or wearing gloves. "I believe so," he replied. "Because you can feel things that you would not wearing gloves. See I feel when I am like picking up a frame. If you got gloves on, you don't know if you're killing bees. And what I do is I never grab, I slide, and if I gotta move it down, and if the bees there, I just push them outta the way, and she'll usually go around the other way or she'll just jump across."

Moore and Kosut observed that without protection, beekeepers tend to be more careful due to the fact that they aren't protected from attire, and can easily be stung (Moore 2013:98). Not wearing clothing may slow down the beekeeper, but the tradeoff is that they are more cautious in their attempts to not squish a bee that will release the alarm pheromone. Recall that the alarm pheromone is an attack signal released by injured bees so that other bees attack the intruder, thus protecting the hive. Moore and Kosut go onto

explain that not suiting up heightens the exchange (Moore 2013:99). JP agreed with this when attire preference was discussed at Bud's. "I hate suiting up. You lose some of your visuals, and you lose some of your dexterity," said JP. "I rarely wear protection, and a lot of us don't. The way to get away with that is you do have to take everything in. You do have to pay attention to your movements, and you have to acknowledge the bees and what they're doing. So if the beekeepers you see go in with these big heavy gloves don't have dexterity… even if you push against a single bee and she doesn't like that, she'll put out that alarm pheromone and they are going to start [stinging] you," said JP.

Neither Johnny Thompson or his son or father wore gloves while collecting queens from their nucs, although Johnny did wear a veil and bee jacket. His son, Caleb, donned the same attire as his father consisting of a veil and suit but no gloves. Johnny's father, on the other hand, wore a button-down mechanic's shirt with the sleeves cut off and blue jeans. He wore no gloves and no veil. All three Thompson shared JP's idea that wearing gloved inhibited dexterity, especially when trying to capture them.

Figure 10. The Thompsons catching queens one summer morning.

Doug Mauldin also explained his reasons for not suiting up. “I don't even wear protection when I work with my bees. You don't when you keep your bees happy. You give them a good and happy home, enough room to spread, they will not be angry. So literally nine out of ten times when I'm going to work bees, I do not have a suit on.” “So no suit and no gloves?” I asked Doug. “No gloves,” replied Doug as he shook his head no. “I like to feel the frames because I don't like to squish any bees. Because when

you go into the hive with gloves on and you squish bees, that'll piss them off." When I asked if he wore a veil, Doug responded with, "Nope." Draper laughed, and shook his head in agreement when I admitted I can't suit up because I'm lazy and I sweat. "Immediately when you get out there it's… ugh," he responded looking exhausted. "When I got out there in a bee suit for the first time, I immediately wanted to take it off. It's just sooo hot. And I sweated so much that I never wanted to put it back on." After sharing that Justin Irby listened to house music while in the apiary, I told the Mauldins how Justin suited up because of his bee allergies to which Doug responded, "Well that's a time when you should of course, and probably the only time to be suited up."

Overall, what a beekeeper wears can tell a lot about their perception of and relationship with their honeybees. This can be analyzed even further when realizing that beekeepers may not choose the same attire each time they tend to their hives. While some may only wear shorts and a loose-shirt some days (such as I do when the weather is nice and my bees seem happy), other days beekeepers may feel that their bees are more temperamental and a little extra protection is needed. As stated earlier, experience also has an effect on what a beekeeper wears and whether it is comfort that leads to less attire or vice versa, the two become more evident as experience levels rise.

Philosophy, Methods, and Movement

The philosophy, methods, and movements of a beekeeper can either enhance or inhibit the communication between bees and their keepers. A beekeeper's philosophy on beekeeping can say a lot about their perception of bees as well as how they communicate with honeybees. One of the most popular philosophies discussed among my informants was the idea of "being with bees". The concept of "being with bees" refers to the

methodical aspect of beekeeping. Most of the beekeepers at Bud Watt's thought this idea was useful when working with their bees. Many expressed this idea using phrases like, "be with the bees," "think like the bee," etc. I heard another iteration of this wisdom the morning before I interviewed JP, Mike, and Alan. A beekeeper named Ralph was helping with a cut-out at Bud's. With his face fairly close to the hive, Ralph explained to a few spectators watching closely, "When you have your face in the hive, squint. Remember… bee space." Ralph's eyes were almost closed as he helped pull out honeycomb and place it in empty frames. As he worked, it was evident that Ralph was highly attuned to the ecology and state of the bee colony: he was thinking of the bee and being with the bee.

Many of the beekeepers at Bud's shared this frame of reference to work with bees rather than against them. From this, I inferred an important concept beekeepers shared throughout my research, though I was introduced to "being with bees" through the work of Moore and Kosut. In their book *Buzz: Urban Beekeeping*: *The Power of the Bee*, Moore and Kosut actually have an entire chapter titled "Being with Bees." Here, Moore and Kosut explain the effect that bees have on humans unlike other insects. Together they elucidate "the intimate common worlds of humans and bees and what happens when we come in close contact with each other" (Moore 2013:88). They discuss the experience that beekeepers have while in the bee yard and the different emotions brought out by the insects.

Figure 11. Ralph holding a frame at Bud's gathering.

Mike openly described his philosophy toward working with rather than against the colony. "My overall philosophy is to let the bees be. I mean you got to do a certain amount of manipulation in order to achieve any of the results that you kind of desire…. I tell the guys, and ladies in our [beekeeping] club 'Look, bees know how to be bees better than you do so don't try to reinvent the wheel. Be harmonious.' I mean I'm not trying to be a flower child or anything, but I'm smart enough to figure out they are better at that than I am. What I can do is get some honey, some pollen, some propolis, be able to keep, enjoy, and experience the bees without interfering too much. That's where the harmonious thing for me comes in," said Mike proudly. However, he also related a frustration, saying that, "… one of the mistakes that a lot of new beekeepers make is attempt to get the bees to do what they want them to do instead of understanding what the

bees want to do. We can work in harmony with them. Does that make sense?" Mike asked me. "That makes perfect sense to me," I replied.

Like Mike and JP, many beekeepers explained the importance of "letting the bees be," alluding to the resilience of the insects: many beekeepers believe that that they have been around for thousands of years, and know what they are doing. I asked all the beekeepers I interviewed after attending Bud's workshop "If you had to summarize how your methods were or how your attitude was when working with the bees, what would that be?" "Be deliberate, and be slow, and fluid," answered JP who had been listening in on my interview with Mike. At this moment, Alan Buckley walked by and leaned in. "Be the bee," he said grinning and Mike shook his head in agreement. "Have you ever been around horses much?" asked Mike. I nodded my head, yes. My dad worked his cattle farm on horseback, so I had been around horses all my life. "Well if you stand next to that horse, and jerk really quick that horse is going to flinch or react to that stimulus. Bees are not that much different so if you have a hive open, you can just put your hand over it real slow and most of the time, they don't even pay attention to you. But if I was moving faster and I threw my hand over that hive they're going to react to that." JP added, "There's really so much going on that you've got to step into their world so to speak, and almost become one with them. If you don't, that's one of the troubles…There's a saying amongst most of us that is you want to keep your bees as feral as possible. Let them be the creatures that they were intended to be. Go in [the hive] here and there, but you don't want to disrupt it. There is a whole bunch going on inside of a colony that we don't even know about- delicate balances, pH, good bacteria, bad bacteria, moisture." Mike chimed in, adding "Humidity," as an additional component.

When stepping into the space or another organism, human or non-human, patience and slow movements were deemed critical by a large number of interviewees. In *Buzz: Urban Beekeeping and the Power of the Bee*, Moore and Kosut compare the movement of beekeepers to a dance or tai chi (Moore and Kosut 2013:92). As an important role in the relationship between bees and beekeepers, there is a sort of choreography to the movements of a beekeeper. Movement involves improvisation as beekeepers synchronize their activity with those of bees. Learning from other beekeepers and obtaining my own hive, I found the basic choreography before I was accustomed to the movements.

I discussed movement with Alan Buckley at Bud's. "What do you think your interaction with your bees is? Do you move slowly? Do you move fast? How do you think one should move when working around bees?" I asked Alan. "It totally depends on what you're doing," he answered. Alan looked at the trailer of almost a dozen hives behind us where new, and veteran beekeepers worked. "I could blow through these hives pretty quickly if it was me, and one other person if I needed to," stated Alan. "If I need to get in there and move, I can, and I can move pretty fast through my hives. Otherwise I can just slow down, and play with them. This is playing right here," Alan explained as we sat down watching beekeepers go through and learn about hives.

Figure 12. Beekeepers splitting hives at Bud's gathering.

A few months after attending Bud's gathering, I drove up to Fort Payne, Alabama to meet Alan and his beekeeping friend, Jerry. I met the two at a gas station near the interstate, picked up some snacks for the day, and then followed the two to one of Jerry's bee yards. During the interview, the importance of movement in the bee yard was discussed. Alan compared movements in beekeeping as instinctive knowledge, "but it's more of getting a background," said Alan. "It's almost like martial arts. You know after you start… after you've learned the basics, you start to train your body to remember those movements in there with you." Jerry compared this instinct to learning how to catch and

throw a baseball. “Once you learn how to catch that ball, you don't you don't really think about it…. It’s like pitching a baseball, you know. Like playing baseball. Once you learn the basics and movements and where to put your glove, you start not to think about it just do it.” To clarify, my informants didn’t so much view movement as common knowledge, but more specifically described a kinesthetic experience in the form of an “instinctive reaction,” as Alan put it. “Or like driving?” I asked. “Exactly!” replied Jerry.

I continued with the analogy of when a person first learns how to drive, many may have been taught to keep our hands on “10 and 2.” For the new driver, there can be no distractions, and their mind is completely on steering the vehicle. Five years down the road, however, the veteran driver can drive with one hand. They are comfortable enough to look at their surroundings, to tune the radio, maybe even eat a hamburger and french fries while talking on their cell phone. Jerry agreed with my analogy, “Yeah, you're dead-locked when you first start driving when you are sixteen. Later, you can do all kinds of different things and doing stuff you're not supposed to be doing.”

I gathered more insight throughout the day as I worked with Alan and Jerry and watched them move through Jerry’s hives. Alan first showed me how to work in a hive, moving slowly and giving direction. Closer to the end of our fieldwork, he and Jerry demonstrated how quickly they move through the hives when necessary. Though Alan and Jerry were both moving fast, they moved fluidly and with intention. During this time, I noted there was a low casualty rate.

Alan explained how his movements vary depending on the situation. “I used to go through about 150-160 hives in a day by myself and have done what needed to be done. There were other times where I could just go in and do a quick exam without opening the

hives and still know if everything was going okay. But to do this, you got to spend a lot of time in them [hives] so you'll know what you saw the last time you came, and have a picture of that and be able to compare that to what you're seeing now. You're looking for changes in their flight patterns, and things like that," said Alan. “Just make sure to be slow, and deliberate. Move with the bees.”

I remembered Mike and Alan discussing movement at Bud’s. “Sometimes you can get away with a little faster movements until the bees start telling you, ‘Hey you need to slow it down.’ They are keyed-in on our movements,” said JP. “So when moving with my bees, and you can see these on my videos, I'm very slow and methodical. I approach, but I'm very aware of the signals they're giving me. The things they do sometimes and their aggressive posture would be kind of shaking a little bit and they’ll kind of raise their butts, spread their wings. Shaking.” I had observed the movement of bees lifting their butts, up and down before at Bud Watt’s. “They're saying ‘We're on edge.’ When I see something like that, I kind of…slow it down.” Lowering his voice, JP moved hands as if he were pushing down on the ground a little, and concluded, “I look at them… I might even give them a puff of smoke.”

I told Mr. Johnny about movement being an important section of my thesis research and asked if I were a new beekeeper if there was a certain way I needed to move with my bees and what that would look like. “Yes, methodical. No herky-jerky movements. Move slow and steady. Try not to drop anything,” said Mr. Johnny. “The worst thing to do is drop a frame, and then bees fly everywhere. As long as you're moving your frame slow, and steady, you're good.” I had noticed this earlier that day when I watched Johnny and his family work with their bees to find queens. The family

would pull a frame out, flip it back and forth checking the comb and look for the queen, moving slow and steady. “You need to be slow especially when you have a bunch of them. If you get in too big of a hurry you're just going to cause more problems than you can fix,” Mr. Johnny explained. “It's amazing how accepting bees are of us going in and doing what we do. You know, taking their hives apart, flipping them, messing with them, moving frames from one place to another, bringing them over here, taking them back over there. As long as you keep a steady pace, do not get into big of a hurry, they're pretty accepting of what you do with them. I don't like to beat them against things. I mean the quickest, and easiest thing to do is just bump a frame that has a few bees against something, and knock those few bees off and go on. I mean I don't want this to sound bad, but when you’re working with bees, you are going to kill one or two bees. You're in the hive, you're opening and closing it, moving some frames. You're going to kill some bees.... I mean you were down there with us,” explained Mr. Johnny.

In an attempt to gain more data regarding this novel perspective, I asked Mr. Thompson what his method was when he had to knock bees off something, particularly a frame. "I don't know if there's a good way or a bad way. There’s just times you need to get bees off a frame. The time when I'm going through my cell builders, I have to shake the bees off, and check for queen cells." He went on to explain the process and how it was absolutely necessary when checking for queen cells to remove the bees from the frame so he could search for the queen cells. “Yeah, but you really did not kill that many bees,” I stated. “Trust me. I watched.” It was true. As I watched the Thompson's work, I always looked to see the casualties, as I did with all beekeepers I observed.

It may sound sad, but since I have obtained my own bees I am less sensitive to accidentally crushing one bee. This could be attributable to the fact that I have heard so many beekeepers reiterate that a hive is a collective super-organism, where bees may be conceptualized as more of a single cell than an individual. Alan had discussed this during our interview as did Mr. Johnny. "You try not to kill bees because that's how you make your living. There's no way not to kill one every once in a while. You never deliberately want to kill one, but it just happens occasionally. We kill bees every once in a while, but we're raising them by the millions, raising queens, and start new hives. It all comes at a price. There's no way you can do it without killing a bee. If you say I'm going to keep bees without killing one, you never get anything accomplished. You try to not kill them, but it's going to happen. By doing it the way we do it, we are raising so many more…more than would survive out in the wild, still a net gain."

When I started my fieldwork, I did pay attention to bee casualties in the field and was, maybe, hypercritical if a bee was killed during beekeeping. Yet, I probably killed 10 bees the first week I had my own hive, not intentionally, but out of clumsiness. Exceedingly careful in my attempts, I was simply inexperienced and did not know how to move as fluidly as beekeepers I had followed. They had made it seem so easy to work with young larvae, which is actually very difficult.

At dinner at the Mauldin's home, I asked Morgan Freeman what he would suggest for a new beekeeper. I wanted a rundown of how to move around beehives. Doug Mauldin jumped in to assert that most critical rule is to not stand in front of the hives. Doing this obstructs the bees' pathway in and out of the hive. It is thought by some that bees perceive those obstructing their path as intruders and will take action and sting the

potential predator. “Stand on the back or the side,” Doug cautioned. Morgan agreed, “That's number one. Number two, relax. If you don't smoke marijuana, you need to," said Morgan, smiling. “It works,” said Doug. I explained Justin Irby's method of partaking in marijuana use before going out to inspect his hives to Draper who nodded with approval, before going back to discussing methods and movement. “When you go in, move your hands. Move slow. Don't do jerks because Doug did it yesterday. He pointed his finger down real quick, and five got him on the hand. Ease in there, go slow, and let them know that you're there to help them - not there to destroy the hive.”

Schwanee agreed that slow movement was important in the apiary. “I have people come to my apiary, and they’re newbies and I show ‘em. I open up a hive, and let ‘em come to the top, and I’ll just take my hand and just pass it… I’ll say ‘Just watch how they react,’ and there’s really no reaction. Then I’ll take the same hand and…” Schwanee moved his hand quicker over the imaginary hive, “they’ll flare up and raise their legs and wings. They’re giving you a warning like, ‘Hey watch that.’ You might have a few fly out, and bump your hand. But if you go right back over ’em real slowly, they’ll go back to normal. If you move real fast, bad things are going to happen.”

Schwanee believed that bees had the ability to read humans and their fear. “I swear I’ll go out to my hives and I’ll be mad, and they can tell. It seems like they’re more aggressive just because I am. That could also be because of my movements though.” When I asked Morgan Freeman about the topic of bees noticing fear, he responded, "Oh definitely yes. Not fear, but excitement.” Doug Mauldin added to Mr. Freeman’s statement, saying, “It's excitement. If you come out to a hive, and you are moving too quick, they will come after you." Mr. Freeman nodded his head and added, “Yeah, I don't

think it's like a horse or like a dog or something like that that can smell it on you. It's the excitement. Bees don't want to be excited, you know. They're saying, 'I'm doing this, and I got to do this.' If they ever have to think about you, then they're going to be on you."

There are various modalities of communication between bees and their keepers, but aspects such as methods, attire, and movement of beekeepers can enhance or inhibit the exchanges between humans and bees. Moore and Kosut elucidated, "the intimate common worlds of humans and bees, and what happens when we come in close contact with each other" (Moore 2013:88). They discussed the experiences that beekeepers have while in the bee yard and the different emotions brought out by the insects. From this, I thought that it was essential to discuss the exchanges that occur between beekeepers and their bees and what the two gain from one another.

Exchanges in the Bee Yard

Every relationship has its gives and takes. Honey and pollination aside, I wanted to know the tradeoffs of the relationship between bees and their keepers. What do beekeepers get from their bees, and what do bees get from their keepers? When asked why beekeepers kept bees, answers of course involved economic and pollination reasons. However, there were others who included therapeutic reasons, both mental and physical.

Some beekeepers discussed more physical forms of therapy they obtained from their bees such as api-therapy. This physical form of therapy was largely discussed by the Mauldins who stated the benefits from being stung by bees. "Some use stings to treat arthritis", Draper explained as he went into the benefits of beekeeping. "You use it for joints. You can use it for arthritis, tendinitis." Neither Tommy nor Johnny believed there are benefits from getting stung. During my research, there had been discussion about

whether these things were good or bad for human health. Beekeepers like Johnny Thompson believed that bee stings had little benefit, while other beekeepers like Tommy McCaffrey had said that it might work, but it didn't work for him. “I'm the beekeeper with arthritis!” he laughed.

As we searched for queens, Caleb Thompson provided his insight on the matter. “A lot of your small-scale beekeeper's, I kind of say they're grown-up hippies. They're the back to nature kind of people. They like to get stung by bees, and eat honey. Some of them are strange, but most of them are really nice people.” Johnny added, “Some are just a little different, and will let the bees actually sting them in their joints for arthritis. I have arthritis in my joints a little bit, and I get stung a lot so I don't see a big help.” Caleb turned to his grandfather “Pop, do you think the bee stings help you?” he laughed. His grandfather kept working, and said, “They make you want to make a move when you don't really feel like it. They energize you.” He looked up and grinned.

Many beekeepers stated that being around their bees calmed them. I could agree with this. As strange as it sounds, being around thousands of insects that could sting you is calming. Beekeepers like JP simply found bees to be enamoring. “Once you step into their world you can't help it. You become enamored with them. Once they get under your skin, that's it. Just like anything your passionate about you know you should probably be sharing it with other people, and you want to share what this is about.” He looked around at Bud's front yard. “And that's what I do with my customers. I always try to get them involved. They may not have another opportunity to get involved with bees. I get to spread the word about these bees instead of just these insects with stingers on the end of them. A lot of people you know think a bee is a wasp is a yellow jacket, you know. A lot

of what I do is educate the public, and let them know that honeybees can be such wonderful creatures," explained JP. “It’s rewarding.”

Justin Irby felt the exchange was mutual because the bees get a custodian, a role which he enjoyed. He went on to describe how beekeeping is fulfilling for two reasons, “One, it’s the most Zen thing I do in my life. You wouldn’t think it, but it really is. And the other thing is being a custodian for a super organism. I mean how many people get to say that, you know? Bees are like a super organism, and I’m in charge of them. I’m helping enrich their lives, and maintain their quality of life. That’s a pretty cool thing. I mean that’s how I approach it.” Many people obtain multiple benefits from honeybees, with a combination of therapeutic benefits, the intention to help the environment, as well as economic viability, but it is also important to realize the effects that bees have on the humans who work so closely with them.

CHAPTER V – CONCLUSION

Although the same type of communicative platforms between bees and humans do not exists due to physiological differences between the species, knowingly or unknowingly, willingly or unwillingly, the results of this study confirm that beekeepers do communicate with their managed honey bees. Beekeepers who perceive their hive as a machine may not believe they communicate with their bees, but they do listen to the hive and read its cues just like a mechanic would with an engine. Beekeepers like Ralph and Johnny Thompson both discussed in their interviews picking up on sounds, visuals, and scents that helped them understand if there were any problems in their hives that needed to be fixed just like with any engine. Whether or not one believes communication exists between themselves and their honey bees, just as with a mechanic and an engine, it is important that beekeepers be able to read their hives.

Many anthropologists see the study of human and non-human animal interaction as beneficial to the discipline. Anthropologist Eugenia Shanklin believes "human and animal interactions could be one of the most fruitful endeavors of anthropology," helping us not only understand human perception of animals, but also to better understand ourselves (Shanklin 1985:398). Anthropologists like Shanklin believe deriving meaning from how animals are used, and perceived by humans is ethnographically significant.

Tim Ingold (1986) argues that humans exist as organisms in a world inhabited by both humans and non-humans. Instead of looking at "social relations," Ingold contends that anthropologists need to look at the "ecological relations." He seeks to remove the division between human and non-human animals in his anthropological studies through his description of human-animal relations and commonly associated interfaces. Samantha

Hurn (2012) builds on this idea, noting the ways in which people view, perceive, and interact with their environment. Hurn argues that it is the duty of anthropologists to include the environmental perspective, and thus move away from human exceptionalism. Instead of objectifying animals, and making non-humans the foreign "other," much like early anthropologists have historically depicted "primitive" societies, it is critical for anthropologists to recognize the importance of animals while doing ethnographic fieldwork.

As I outlined in the literature review, there is a growing movement of anthropologists who have reached general consensus regarding these trends and are striving to reframe contemporary anthropological research to include a perspective beyond anthropocentrism. Similarly, these trends are also evident in the works of Myra J Hird who tries to survive "humanism" by reworlding species (Hurn 2012; Hird 2010). Anthropologists such as Heard define and depict the complex relationship between humans and their environment, involving diverse factors such as ecology and biodiversity. By integrating an ecosystem-based approach, anthropologists are taking a step back to look at the interface between nature and culture from a broader perspective. I argue that by no longer simply emphasizing the anthropocentric interactions between human societies, ecological anthropology is an increasingly important component of a contemporary anthropological approach because it enables humans to become more environmentally conscious about their actions and their relationship with the environment.

During fieldwork, it became apparent that there are beekeepers that identify with various apicultural sub-cultures but reject others. This was evident through one beekeeper

claiming that he did not believe in human- honey bee communication and expressing that he “was not a tree hugger,” but then later explained his perceptions of interspecies communication in great detail. When the informant explained his perceptions, he was careful to frame his perspectives from the view of becoming highly attuned with the local ecology rather than through perspectives that might be associated with a more “radicalized” sub-culture of beekeepers. These seemingly minute distinctions may highlight the complex flows of phenomena between place-based apicultures, interspecies communication, and manifestations upon human cultures practices and norms, Support for this contention can be seen with the variety of beekeepers interviewed for this thesis and their reasons for beekeeping. For these reasons, it was critical to the work of this thesis to successfully utilize a larger scope of research that looked beyond the anthropocentric perspective historically adopted by anthropological field methods. Current literature regarding this phenomena and relationships between humans and other species is currently lacking and should be given more consideration by honey bee specialists and anthropologists in the future.

Working around hives also helped me to understand that although there are socio-cultural divergences between beekeepers, there are some strong commonalities amongst beekeepers regarding perceptions of nature and organisms. Johnny Thompson’s son, Caleb explained, "I just think it takes a certain type a person to want to do bees.” Though the beekeepers I met varied as drastically as their reasons for keeping bees, all talked of the enjoyment they experienced while working with their bees. Even Richard Adee, owner of the world’s largest beekeeping operation, explained his love for the insects that he made his living from. And those like Ralph, who believed bees were more like a

machine than an organism to socialize with, still had a passion for working with them. All of my informants have something in common and that is, unlike many, they feel comfortable with working with honey bees to collect honey and other hive by-products.

Moore and Kosut indicated that the ability to work successfully as a beekeeper may require a person that has a special sensitivity to ecological awareness, with heighted sense of perception and movement that would allow them to successfully interpret visual, olfactory, and auditory cues (Moore and Kosut 2013:91). Through my own experiences, I echo this perception that it takes a special person to become attuned with the complexities of a dynamic natural organism and to be able to work symbiotically as a steward of a large colony of insects. This fieldwork has helped magnify my own understanding of the fluidity between humans and nature, as well as the dependencies and flows between culture and environment and humanity's critical role as agri-environmental stewards. Respect and understanding for the environment seemed to be very widespread amongst beekeepers in this study, and many beekeepers indicated that they already had a strong relationship with the natural world even before they began beekeeping.

Literature has also indicated that humans may experience a fundamental shift in perception after working with honey bees in which they may feel a sense of healing, ecological assemblage, and interconnectivity with the natural world, this clearly asserted by Moore and Kosut (2013:102-103). Managing honey bees therefore may indeed act as a canary in a coal mine. Like many of the beekeepers I interviewed, my perception of the environment has also vastly changed since becoming closer with the honey bee.

Johnny and Caleb Thompson discussed the ways in which beekeeping can alter an individual's perception and worldview to include a greater appreciation for the state of

the environment. During an interview, Johnny Thompson explained, “When you become a beekeeper it also changes how you look at things.” He expounded that he is now more aware of factors like the ecology of local plants, the status of weeds and flowers in highway and interstate medians and fields. “I never thought of the bees I was killing as a byproduct of killing the bugs that were in the fields,” stated Johnny. He explained that when going into a field, he now monitors the impacts of spraying pesticides on not only harmful pests that are causing crop damage, but also to the health impacts of the pesticides on the honey bee colonies. Johnny discussed how managing bees has altered his perceptions, ‘I never thought about that until I became a beekeeper. And now, it's kind of changed the way I look at things.” Johnny continued to explain how his perception of nature evolved after obtaining bees. “We used to spray herbicide to kill the weeds in our field and in the pasture that were competing with the grass that we wanted to grow to feed our cows. Since we've got bees, [we] don't look at those weeds as weeds anymore. They’re wildflowers that the bees depend on. They're nectar and pollen. It changes your outlook on what a weed is.” Thus, the practice of managing honey beehives seems to have a positive correlation with beekeepers’ perceptions of regional ecosystem services and environmental awareness.

Mike discussed his insight into environmental perceptions among beekeeping communities, “At least for me, and most of the people I'm around in beekeeping, they're definitely more aware of what's going on around them. I guess you could say they are in tune with nature. One of the things you hear from people when they first get started beekeeping is, and this is the same for me too, you start paying more attention to flowers, you know? You start paying more attention to what's blooming around you. We grew up

fishing, and hunting and the weather was always a factor of what was going on. I think once you started dealing with the bees, and interacting with them you can become acutely aware of what's going on around you. In this way, if you have a beekeeper who is not in tune with nature or their natural environment, they are not going to be a very good beekeeper. You kind of have to know what's going on, and what's fixing to go on. If you don't, you're always being reactive, and you're kind of staying behind the curve of what the bees are doing."

Beekeeping can change the day-to-day interactions beekeepers have with other organisms, both human and non-human. Mike added to this idea, "The things you learn interacting, and keeping bees translates over into our relationships and communication with humans. They're kind of picking up that language I guess." Because of this insight, I followed up with JP regarding his opinion about the changes humans experience while tending to bees. "Bees are social insects so I believe there's a carry over there. Humans are social creatures too. There's got to be a carryover, and like Mike said about the body language, I agree with that. Assume that dealing with these would kind of make you a gentler human being. At least it should make you a better person." There seemed to be a consensus among beekeepers in this study that human temperament and qualities such as patience play a strong communicative role between beekeeper and their managed colonies.

In this study, it became apparent that the practice of managing bees can have direct impact on one's worldview and perception of the relationship between humanity and the environment, thereby causing ripples in local cultures. Those who consider themselves not to be tree huggers or environmentalists may begin to have a different

perspective of the environment that they can share with non-beekeepers around them. Take for instance, Johnny Thompson, who stated that since realizing the effects of mowing and killing weeds, he has informed his wife about the importance of not mowing the yard as frequently or spraying weeds which to him are just another flower like his wife grows in the garden. Working as a farmer, Johnny has most likely had an effect on the agriculture world, sharing his knowledge about the importance of realizing the effects of certain agricultural practices. From this, I wonder if not all farmers should keep bees. By doing so, they may look at farming from a more holistic approach and realize the importance of understanding what effect they have on the environment and its inhabitants, including humans.

Another example of how beekeeping can cause ripples in local cultures is myself. Since writing this thesis, I have obtained so much information on how my day-to-day practices affect bees and the environment, and so have those around me. My mother no longer uses weed killer. Instead, she uses salt to kill vines and weeds that climb the side of her house. My cousin even texted me to ask if carpenter bees were pollinators because they were destroying her wooden swing set. After being informed that carpenter bees were pollinators, my cousin refused to kill them. Anyone who knows about my thesis topic has been affected by it and become more ecologically aware. It is as if they are catching the "buzz" that Moore and Kosut talk about, showing the powerful effect of the honey bee.

In conclusion, this thesis addresses the complexities of interspecies communication between beekeepers and their honey bees. This research has also helped unravel the ways in which this interspecies relationship changes a beekeepers' perception

of what it means to be human and has highlighted the interrelationships between bees and their stewards. Data collection included a case study of 21 semi-structured interviews and vast participant observation with regional beekeepers regarding their perceptions. Beekeepers' perceptions of interaction and communication with their bees were catalogued and analyzed through olfactory, optical, touch, and mechanical sensory modalities. The impacts of beekeeping methods on beekeeper-honey bee communication were also explored in-depth within each individual modality, including factors that may impact communication such as: attire, smoke, movement, veils, and gloves.

Although there is a lack of scholarship pertaining to these interspecies relationships and interactions, the importance of probing into these issues cannot be denied. If beekeepers can successfully learn to understand the nuances of honey bee "language," they can therefore improve the management of their beehives through increased understanding of critical ecological knowledge. Consequently, anthropological and sociological research pertaining to beekeeper-bee relations holds profound philosophical, socio-cultural, economic and ecological implications.

Beekeepers in this study reported mixed responses when directly asked if they had a communicative relationship with their managed bee colonies. Upon analyzing these mixed reactions, it became clear that when the term "communication" becomes magnified to include not only verbal communication, but rather as an umbrella term that refers to a wider perception of various manifestations of signals and cues, there was widespread consensus that beekeepers and their bees communicate.

The practice of managing honey beehives seems to have a positive correlation with beekeepers' perceptions of ecosystem services and agro-ecological awareness. In

this study, it became blatantly apparent that the practice of managing bees can have direct impact on one's worldview and perception of the relationship between humanity and the environment, thereby interacting dynamically with the fabric of human cultures and potentially instigating sociocultural change. Managing honey bees therefore does pose as a canary in a coal mine. Like many of the beekeepers I interviewed, my own perception of the environment has also become vastly more illuminated since becoming closer with the honey bee.

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