Text-A-Tree:

Mapping relationships with urban trees in Halifax

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Contents

1.0 Acknowledgements

I've never understood how acknowledgements could be so short. In my experience, meaningful things come out of communities, not individuals. I'd like to thank the community behind Text-A-Tree;

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You've all made this possible <3

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2.0 Introduction

2.1 Concept

Increasingly over the last 20 years, prominent works such as Richard Louv's *Last Child in the Woods* (Louv, 2008) are calling for reform and reconnection with the natural world. While progress is certainly being made towards more biophilic cities (Kellert, 2016), the paradigm shift proposed by Louv and others has been slow to take shape. All the more concerning is that 81.2% of Canadians now live in urban areas (Worldometer Info, 2019), where access is limited to what are traditionally considered wild and natural spaces. Cities can contain an abundance of life and play host to a myriad of ecosystem services (Goddard et al., 2010). Despite this, research suggests that modern people are more disconnected, both emotionally and physically, from nature than previous generations (Bartlett, 2008; Vinning, Merrick & Price, 2008). If urban dwellers are not developing relationships with nature in the places they live and work, there is concern they may not develop those relationships at all.

Urban nature has the capacity to greatly enrich the lives of people experiencing it (Chiesura, 2004), and for many, it is the only nature accessible to them. There is growing evidence to suggest that while the technologies used by humans are changing, the desire to connect with nature is not. For example, a red oak tree in Massachusetts became a hit on Twitter when it began sharing insights and concerns about climate change (npr, 2019). Earlier in 2010, the European magazine Eos launched "The EOS Talking Tree" in which an urban tree was fitted with various sensors which were used to produce representations of the tree's emotions and opinions (Galle, 2016).

In 2013, a remarkable phenomenon took place in Melbourne, Australia, following the implementation of a tree-maintenance program (Lafrance, 2015). The city launched a project enabling citizens to locate and identify city-owned trees via an online map, which also provided the tree-codes of each tree. These codes could then be used to email the city and inform them of issues or maintenance concerns of specific trees (Lafrance, 2015). With the new service, citizens wrote thousands of love letters to the city's trees, and some city representatives even began replying on the trees' behalf. In the summer of 2018, a local agave plant in the Halifax Public Gardens garnered unprecedented admiration and media attention (Berry, 2019).

It is clear that people still want to connect to, and communicate with, the life around them. While it may seem novel according to traditional Western thought, within the Mi'kmaq tradition the desire to connect to and communicate with plant life can be understood as an extension of the personhood shared by all living things (Legge and Robinson, 2017). Given the growing awareness of the contributions which urban forests make to sustainability, biodiversity, economics, and mental and physical health (van Wassenaer, Schaeffer, & Kenney, 2000; Jay and Schraml, 2009; Sullivan et al., 2014; Ordonez-Barona, 2017; Hansen, Jones, Tocchini, 2017: Steenberg, 2018), it

seems appropriate to focus on the relationships between humans and trees in urban areas. As proposed by Conway (2016), residents play a key role in the management of urban forests, and thus there is value in understanding their preferences and decision-making processes. Likewise, Ordoñez et al. (2017) argue that understanding public values and testing engagement strategies is vital to urban-forest management.

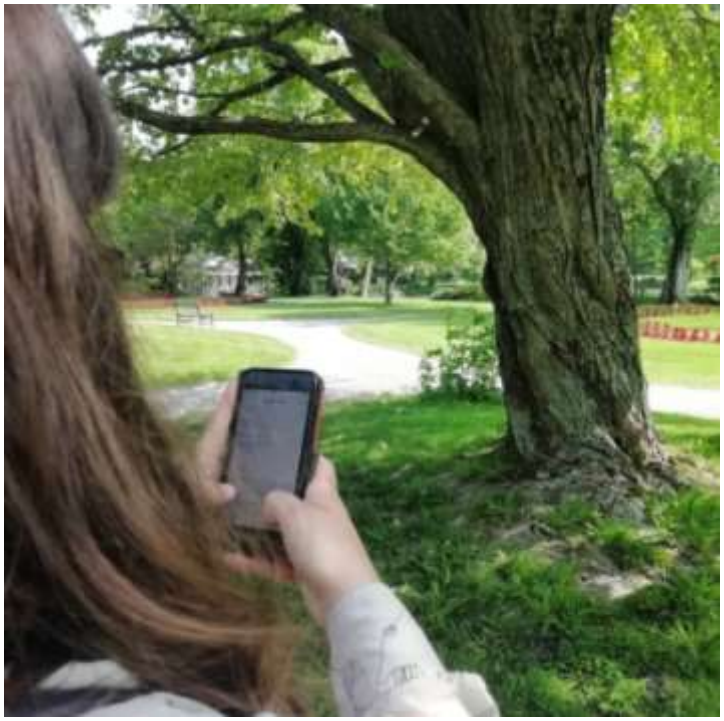

Figure 1. Volunteer demonstrating an interaction with The Wish Tree, one of fifteen textable trees

2.2 Purpose

Digital technology has become such a constant part of life in Western society that it now informs the way we experience the world around us (Fors, 2015). This calls for the development of engagement models in which personal technology can be used to promote the formation of relationships between people and nature. It was proposed that in order to foster relationships with nature, an effective model should emulate the way people develop relationships with one another. For many Canadians, texting is now a regular part of relationship-building (Coyne, Stockdale, Busby, Iverson, & Grant, 2011). The basic concept was to create a platform in which participants could text trees on public land and engage in conversations with them (Figure 1). Trees would be "voiced" by volunteer "tree-speakers", and messages received would be saved for research. The data collected during the project could then be used to inform management practices and future community-engagement strategies. This project, dubbed "Text-A-Tree", was created with five primary objectives in mind (Figure 2).

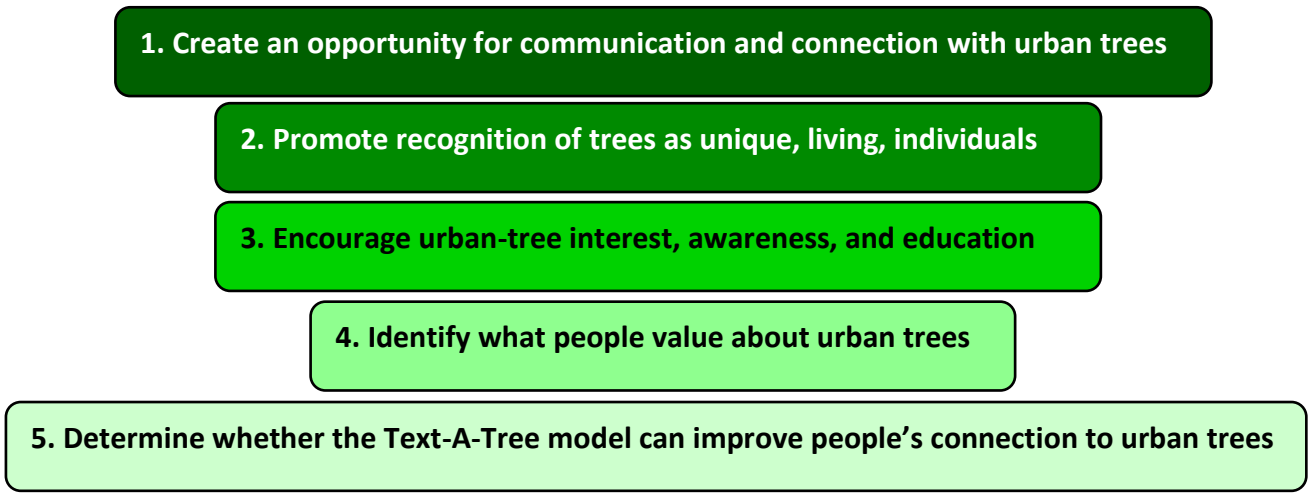

Figure 2. Primary objectives of Text-A-Tree

2.3 Context

The proposed text-based study of people's interactions with urban trees in Halifax was intended to add to the growing literature on values elicitation for urban forests (Tyrväinen, Silvennoinen, & Kolehmainen, 2003). For example, research conducted by Peckham, Duinker, and Ordóñez (2013) identified a significant disparity between the values of citizens and those used to guide urban-forest management. Participants reported most highly valuing the non-material benefits of urban forests, particularly those of an emotional, intellectual, and moral nature (Peckham, Duinker, & Ordóñez, 2013). Likewise, professionals in the public health sector have called for the use of community engagement and social marketing programs to nurture connections between people and the green spaces in their communities (Shanahan, Lin, Bush, Gaston, Dean, Barber, & Fuller, 2015).

Past studies have largely engaged in street-side interception surveys, which, by necessity, capture information from those individuals who are both old enough and comfortable enough to engage in surveys. Furthermore, Barry (2014) argues that surveys have a tendency to favour negative feedback and thus may not provide an understanding of public values which is conducive to public outreach and education. It was proposed that a text-based values-elicitation strategy might allow younger participants, those less acquainted with English, and those made uncomfortable by the interview process to participate. In fact, a news article in 2016 revealed that the Government of Canada was considering conducting its own surveys via text, in light of declining response rates (Press, 2016). No existing examples were known to me in which participants engaged with trees via text-messaging prior to Text-A-Tree.

2.4 Expectations

Little could be reasonably predicted for a project such as Text-A-Tree, and yet in planning, I had to base decisions on anticipated levels and kinds of participation. For a project with data collection spanning two months, I hoped a few hundred participants would engage. Without any similar projects to compare to, however, it was impossible to make any confident prediction. I believed that participants would likely favour interactions with larger trees, particularly those with greater heights and trunk diameters as compared with others in the selected group. Two models were proposed for the kinds of behaviours participants would most strongly display; 1) amplification of self, and 2) information-seeking. The first model was formed based on the research of Squire and Dikkers (2012), which elucidated the way in which personal phones have become tools for learning and communication, and act to amplify the self. The model was bolstered by patterns shown in digital communication, in which platforms such as Facebook, Twitter, and Instagram are used to project views, opinions, and values. According to the amplification-of-self model, participants were expected to interact with the textable trees in much the same way as those who shared their appreciation and values by email in the Melbourne event.

In the information-seeking model, it was anticipated that the context of the Halifax Public Gardens would encourage participants to think specifically in terms of history and biology. It was expected that most engagements with trees would be question-oriented, with a focus on botany and the nature of the Gardens. In both models, it seemed likely that when given the opportunity to engage with various trees (in close proximity), participants would seek interactions with several trees to maximize their personal gain.

3.0 Methods

3.1 Theoretical Framework

A. Philosophy

The unique concept of the project required the formation of an equally unique approach to implementation. As a pilot project, few resources could be relied upon for direction regarding the practical elements of research design. The primary decision-making force ultimately became my personal values. This may be likened to the approach described by Charmaz (2006) in which emphasis is placed on the values and beliefs of the researcher rather than on prescribed methods of research. With this values-based approach in mind, Text-A-Tree was designed primarily as an educational experience, and secondarily as a research project.

Scant literature exists on the practice of using text-messaging to create narrative data, and even less where the researcher is directly involved in the dialogue. Text messaging is a particularly

personal form of interaction (Squire and Dikkers, 2012), more so than email and arguably even more so than phone calling. For example, it is not uncommon for a cell-phone user to receive calls from unwanted or unknown sources (telemarketers, political campaigns, fundraisers, scam artists), or from their place of work. Such interactions generally do not occur over text messaging, which largely remains a personal activity. Positioning the text-messaging landscape within the private or personal sphere requires that even greater care be taken by researchers than what is considered the norm for research using emails and phone calling. This is reinforced by the practical understanding that in order for people to feel comfortable engaging with the textable trees, a sense of trust must be cultivated between participants and the people "behind" the tree. The guiding theory behind Text-A-Tree was thus best conveyed by paraphrasing artist Mark Gilbert (see Gilbert, 2014): the researcher must care more about the participants than about the research.

B. Grounded Theory

The objectives of Text-A-Tree demonstrated the exploratory nature of the project, and desire to examine the processes, actions, and interactions produced by the text-based communications between participants and tree-speakers. It was thus appropriate to employ a theory which would help the researcher understand how individuals experienced a process (Creswell & Poth, 2016). Given the prominent role of my personal values in designing the project, Charmaz' (2005) approach to grounded theory was especially applicable. Charmaz did not minimize the role of the researcher but rather acknowledged the way in which personal values, experiences, and priorities influence the research process.

3.2 Location

The project was established in the Halifax Public Gardens (HPG) thanks to the support of The Friends of the Public Gardens and the City of Halifax (see Appendix A for all partner relationships). The HPG is a hub in downtown Halifax, located at the west end of the popular shopping area of Spring Garden Road, and near the Halifax Citadel National Historic Site. Established in 1867, the HFP has become a tourist attraction in its own right, with public events, tours, and celebrations throughout the summer (Parks Canada, n.d.). Tour buses bring visitors directly to the Gardens (Ambassatours Gray Line, 2019), and many local people pass through on their way to work or during lunch breaks. While patrons tend to be older adults, young people frequent the area in part due to the proximity of Sacred Heart School, Citadel High School, and Dalhousie University. The release of the mobile game PokemonGo additionally draws people to the Gardens, which contains a high density of in-game rewards that can only be received by travelling to real-world locations within the Gardens (Hansen, 2016).

3.3 Tree Selection

Twenty candidate trees were initially selected throughout the Gardens. Of these, 14 trees were chosen by volunteers, and a final tree was chosen by me to be the silent "Wish Tree" (Appendix B). The number of textable trees was limited to 15 in an attempt to limit the number of volunteers needed, and to ensure that tree-personalities did not become repetitive. In accordance with the second objective of promoting trees as individuals, each textable tree was to have its own personality. The popular Jung personality typology was useful in determining the maximum number of tress, as it defines no more than 16 different personality types (Sharp, 1987). Only trees whose canopies or trunks were within 3 m of existing pathways were considered. Additionally, we required that a tree be selected near each of the five entrances (Figure 3).

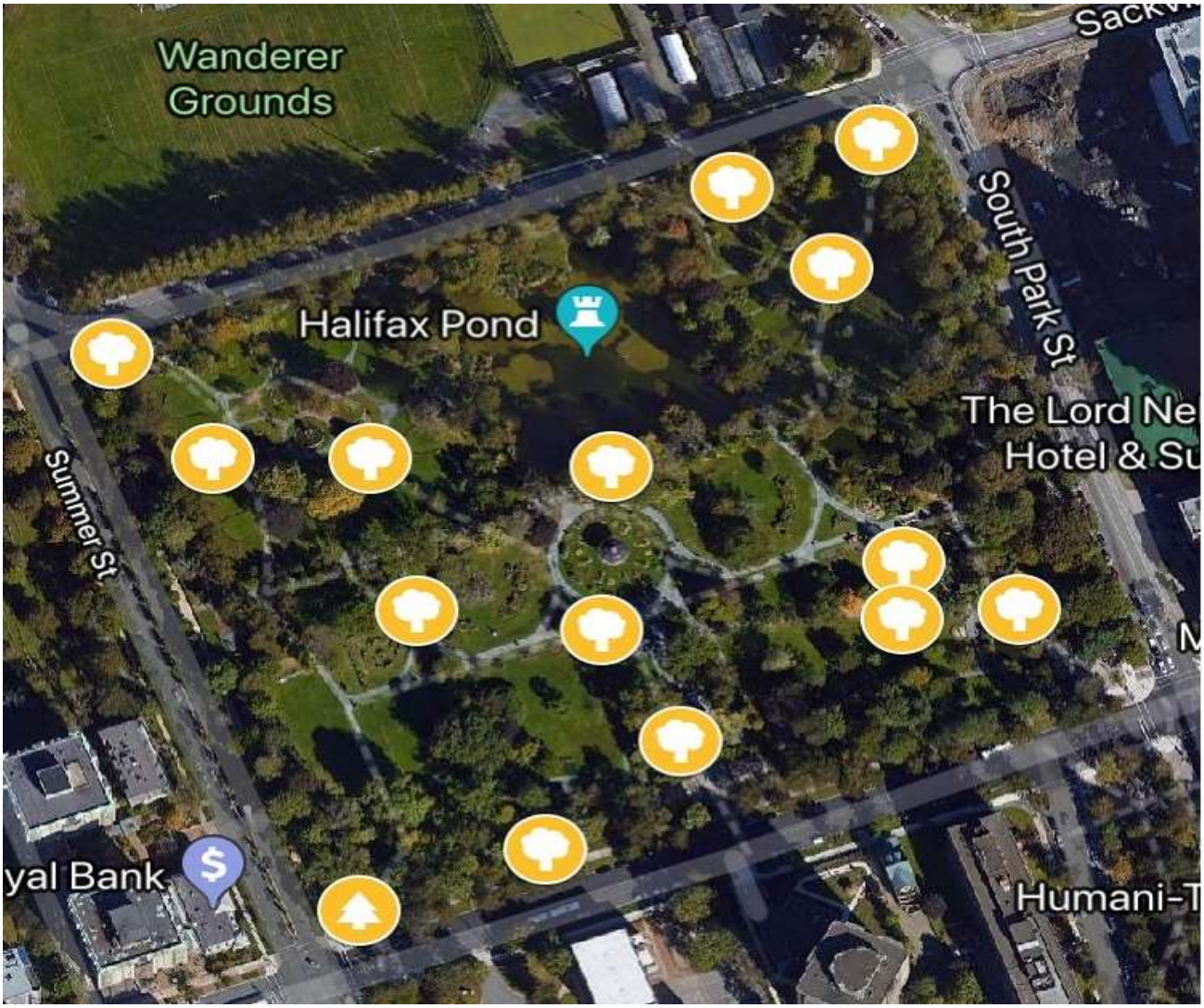

Figure 3. Map of the 15 textable trees within the Halifax Public Gardens

Of the 15 trees, four native species were chosen for their connection to Mi'kmaq culture (i.e. red spruce, yellow birch, black ash, sugar maple), and four for connection to Japanese culture (i.e. magnolia, Ginkgo, Japanese katsura, Japanese tree lilac) (Appendix D). The remaining seven trees were selected based on variety, spatial consideration, and character. Each tree was given a name, phone number, and sign (Figure 4), and no species was repeated. The full list of species can be found in Appendix B.

Figure 4. Sign for "Leaf Erikson", one of 15 textable trees in the Halifax Public Gardens

3.4 Communications

A. Texting

From July 7 to August 31 2019, a 38 cm x 38 cm wooden sign was staked into the ground along the pathway in front of each of the 15 designated trees. The signs contained information explaining the project and the consent process, as well as the name of the tree, the species (in English and when appropriate the name in Japanese or Mi'kmaq), and a unique phone number. Communication between participants and tree-volunteers was initiated when a participant texted a message to the provided phone number. Texts did not incur any additional charge beyond individuals' regular local texting rates as per their phone plans. Messages were received by a

cloud-based customer-service platform called Zendesk. This US-based platform stored all messages and phone numbers securely, allowing me to determine access, monitor activity, and control for quality.

Figure 5. Simplified representation of the messaging pathway employed by Text-A-Tree

Participant messages were automatically assigned to the account of the designated volunteer (one account per tree) within Zendesk. This would trigger an automatic message to be sent from the system to the participant in the form of a text message. Auto-messages contained an introductory message from the individual tree (Appendix C), as well as a reiteration of the ethics and consent information. The volunteer would then access their password-protected account, and use their phone, computer, or other device to reply to the message within 24 hr. Volunteers aimed to reply approximately within the hours of 08:00 and 22:00 ADT. The volunteer would continue responding to messages from participants until the participant signalled the end of the conversation (e.g. “Thanks, bye!”). There was no limit on the number of messages or the number of days over which messages could be received. A simplified representation of the messaging pathway between participants and volunteers is shown in Figure 5.

When volunteers encountered a potentially problematic message (unclear intent, question they could not answer, rude or inappropriate behaviour), they would notify me, in which case I would take responsibility for determining the appropriate course of action. As a guiding principle, participants exhibiting “trolling” behaviour were treated as opportunities for positive engagement. Therefore, the volunteer or I would not ignore or rebuff such messages/participants, but instead attempt to use humour and creativity to produce tree-relevant responses.

B. Consent

In addition to the information provided on the sign and in the automated messages, greater consent detail was provided on the website www.halifaxtreeproject/textatree. Participants were directed to this website with tree-signs, automated messages, posters, social media, and informational pamphlets. The project followed an opt-in approach, in which informed consent was understood to have been granted by the decision to text a tree. In clear language, all consent information explicitly stated that those under the age of 16 years must gain permission from a

trusted adult before texting. Those who wished to withdraw their participation could text "opt-out" to any tree or by emailing me prior to Sep 7, 2019.

3.5 Volunteer Training

Volunteers were found through existing relationships within my network and community, as well as via advertisement with digital posters distributed to local communities and associations (Appendix E). The Halifax Tree Project website and Text-A-Tree Facebook and Instagram feeds were also employed. Volunteer candidates provided resumes and were assessed by my supervising professor, Dr. Peter Duinker, and I. Successful applicants were asked to choose their partner tree from the 20 candidates selected by the research team and were subsequently provided with biological and cultural information associated with the chosen tree (Appendix F). All volunteers were provided with training and materials, which included:

- Discussion of the importance of urban forests
- Elaboration on the philosophy and vision of the project
- Guiding activities to support the creation of tree personalities
- Protocols for participant engagement as tree-speakers
- Practice writing messages in response to examples
- Training on the Zendesk platform
- Signing of a confidentiality agreement

Two principles were developed to guide volunteers during their conversations with participants, these being that with each message volunteers should seek to 1) provide information (e.g., did you know...?), or 2) create space for expression (e.g., what brings you by today?). The higher-than-expected volume of text messages resulted in an unforeseen need for additional help, and a total of 19 volunteers acted as tree-speakers. Volunteers were offered the opportunity to pair up with new recruits and to share the role of tree-speaker for a single tree. I provided coverage for volunteers whenever needed, and permanent replacement-volunteers were found when requested. With the exception of me acting as a tree-speaker for all texting-trees as needed, and one volunteer supporting two other tree-speakers, each volunteer was assigned to a single tree. The only tree that was not managed by a volunteer tree-speaker was The Wish Tree, which instead acted as a silent receiver of texted wishes.

3.6 Data Analysis

Two sets of data were analyzed for the purpose of this report; *total* and *subset*. The *total* results of Text-A-Tree included the data collected between July 7 and Aug 31 2019. Analysis of these data was purely quantitative. Due to limited resources, an intensive mixed-methods analysis was only performed on the *subset,* which included data obtained by selecting 100 messages from each tree

(using a random number generator) for a total of 1500 messages. All data were encrypted and stored on a password-protected computer (Appendix G).

A. Qualitative Data Analysis

Following the methods of Charmaz (2006) and Huberman and Miles (1994), emphasis was placed on the emergent process of theory formation rather than the application of a strict framework. This entailed the use of note-taking throughout the active phase of the project, and reflections on incoming messages during their collection. Once data were cleaned (see Appendix F), I engaged in line-by-line open coding and memoing using Atlast.ti®, returning through the entirety of the sample for a second round of quality control (Agar, 1980). The creation of codes was an iterative process, involving both pre-formed and emergent codes relating to the primary objectives of the project. Coding focused on the apparent purpose or intent of a message, rather than relying on the collection of key words. A total of 35 codes were identified, which were checked for consistency of ideas and then split or joined as necessary.

In keeping with Charmaz' (2006) model, the procedure of axial coding did not include organizing data according to conditions, actions/interactions, and consequences. Instead, I organized families of codes relationally, and sought to illustrate the emergent relationships as a logical chain of evidence. Review of the coding process allowed for an emergent theory to be identified, which was tested against evidence in the analyzed text, quantitative data, and peer-reviewed literature. Priority was placed on understanding the linkages between categories, rather than explaining them (Charmaz, 2006).

B. Quantitative Data

Mixed-methods approaches can be seen in the work of prominent researchers such as Huberman and Miles (1994), whose methods included reporting the frequencies of codes. This and other sources of quantitative data were used to inform the qualitative analysis of Text-A-Tree (Figure 6). The data were downloaded from Zendesk, including the phone numbers of participants, the messages they sent, as well as the time and recipient-tree of the messages. These data were analyzed and visualized using Microsoft Excel®

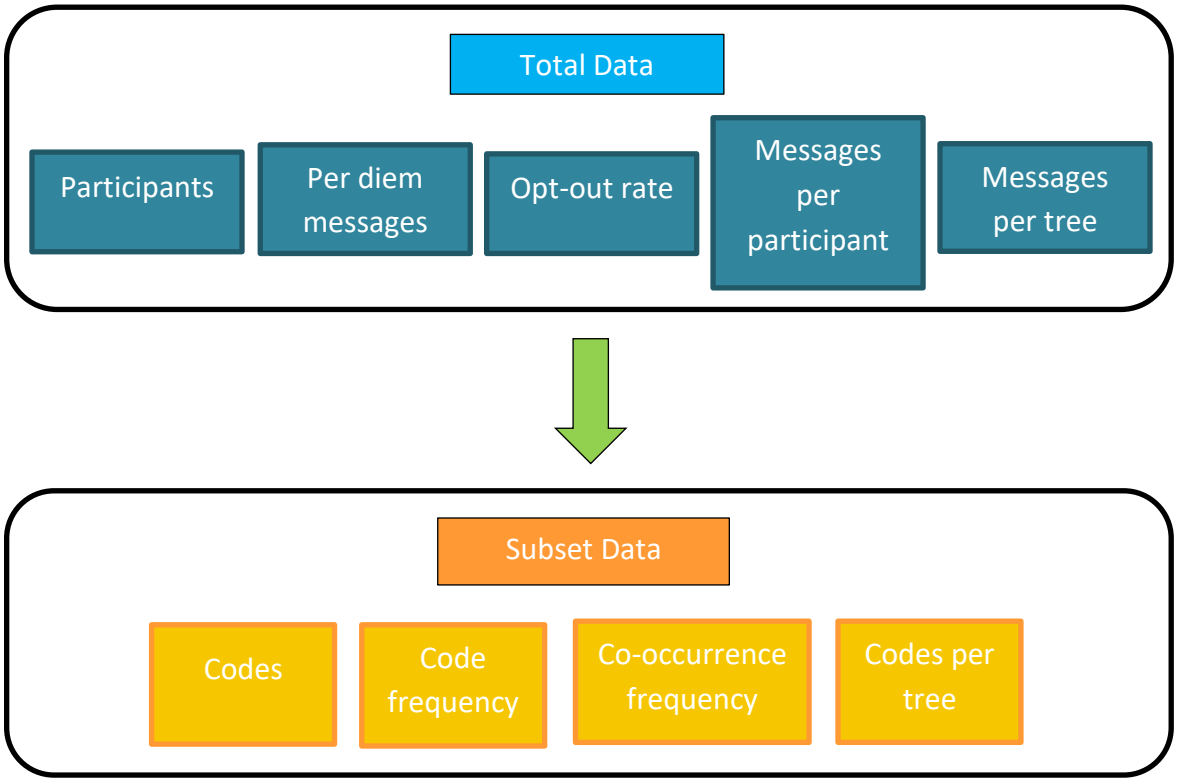

Figure 6. Relevant aspects of analysis for the two datasets reviewed

4.0 Results

The following results are derived from the cleaned data (Appendix H). After processing the subset data, an error was found in which the Zendesk system had mis-identified a tree's message as one from a participant. This error was found twice in 1500 messages, and was manually corrected for in the subset data. It is expected that a similar rate of error exists in the total data set. Future analyses will include the manual removal of such errors.

4.1 Total Data Analysis

During the period of data collection, a total of 10,805 messages were received from 2,905 unique phone numbers. An additional 296 participants chose to opt-out (including three whose material was removed due to inappropriate conduct), resulting in a 9% opt-out rate. A mean of 193 messages were collectively received by trees each day, with a maximum of 498 and a minimum of 41 (Figure 7). On Aug 22 and 23, a survey was distributed by the research team via text (Appendix I), resulting in higher-than-normal daily responses. During the first two weeks of the active phase, participation decreased at a relatively consistent rate, and it had been anticipated that a point of exhaustion would be reached after a month. The plateau that was maintained for the remainder of the project thus came as a welcome surprise.

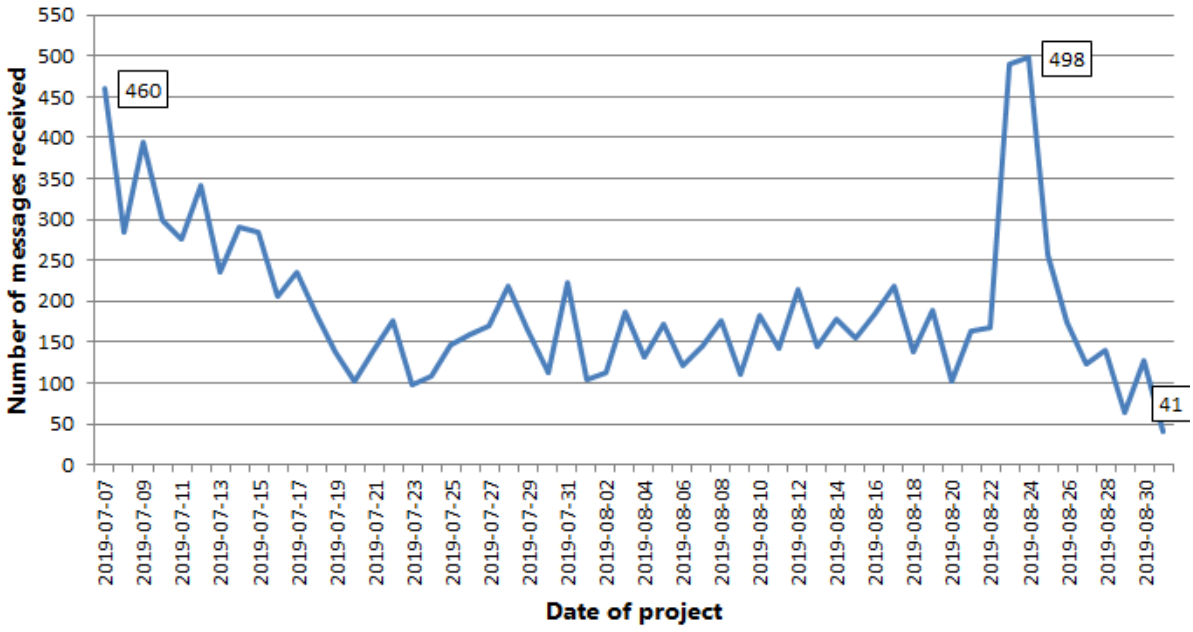

Figure 7. Per diem messages received from participants between July 7 and Aug 31 (n=10805, μ=193, x̃=170.5, *Mo*=284).

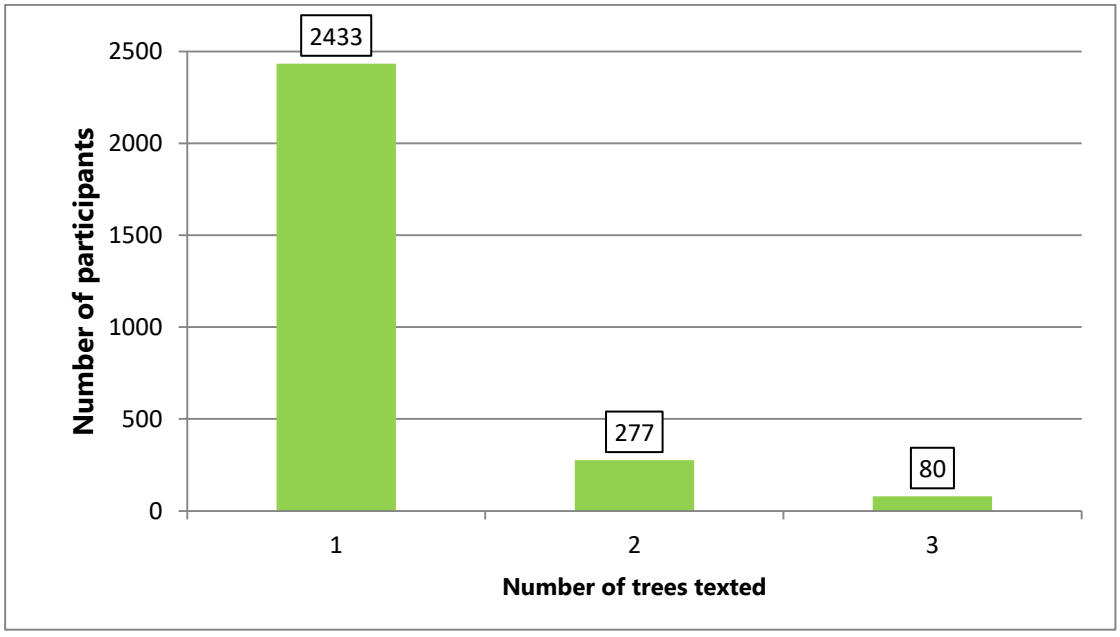

Figure 8a. Number of participants who texted 1, 2, or 3 trees between July 7 and Aug 31 (n=10,805, μ=1.4 , x̃=1, *Mo*=1).

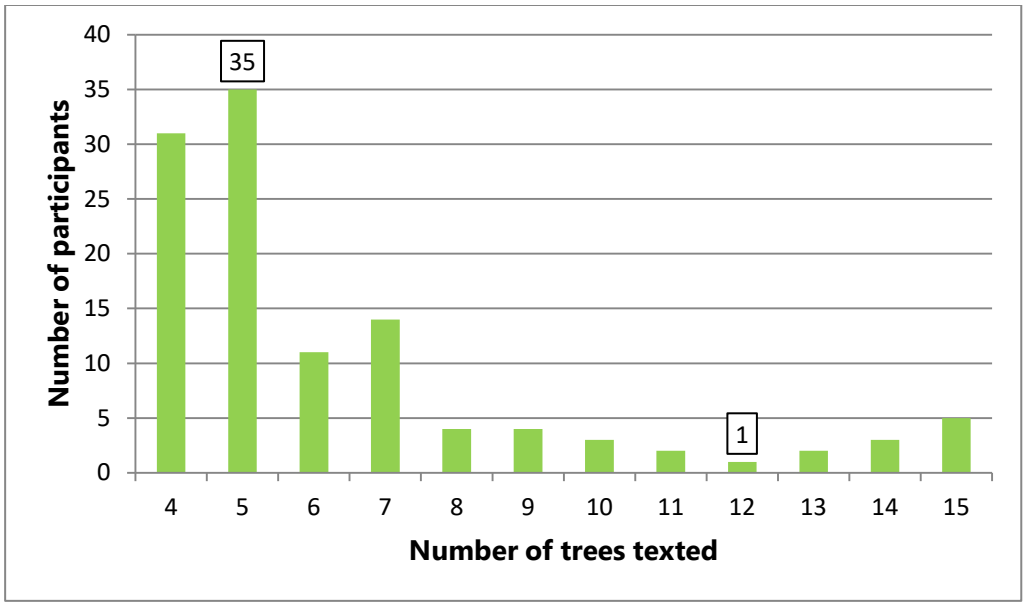

Figure 8b. Number of participants who texted 4 or more trees between July 7 and Aug 31 (n=10,805, μ=1.4 , x̃=1, *Mo*=1).

The vast majority of participants (83.8%) sent messages to just a single tree (Figures 5a and 5b). This was in contrast with the average of 3.7 messages sent by participants, as most participants sent between one and five messages to trees (Figure 9a). Few participants sent more than 14 messages to trees (Figure 9b). Only 28 participants sent thirty one or more messages, the maximum being an individual who sent 215.

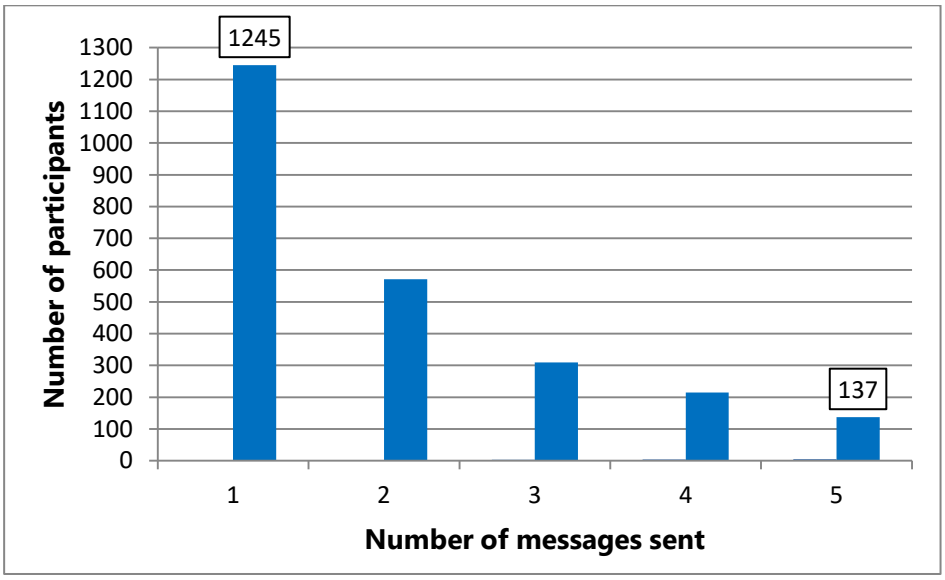

Figure 9a. Number of participants who sent between 1 and 5 messages in total, between July 7 and Aug 31 (n=10805, μ=3.7, x̃=2, *Mo*=1).

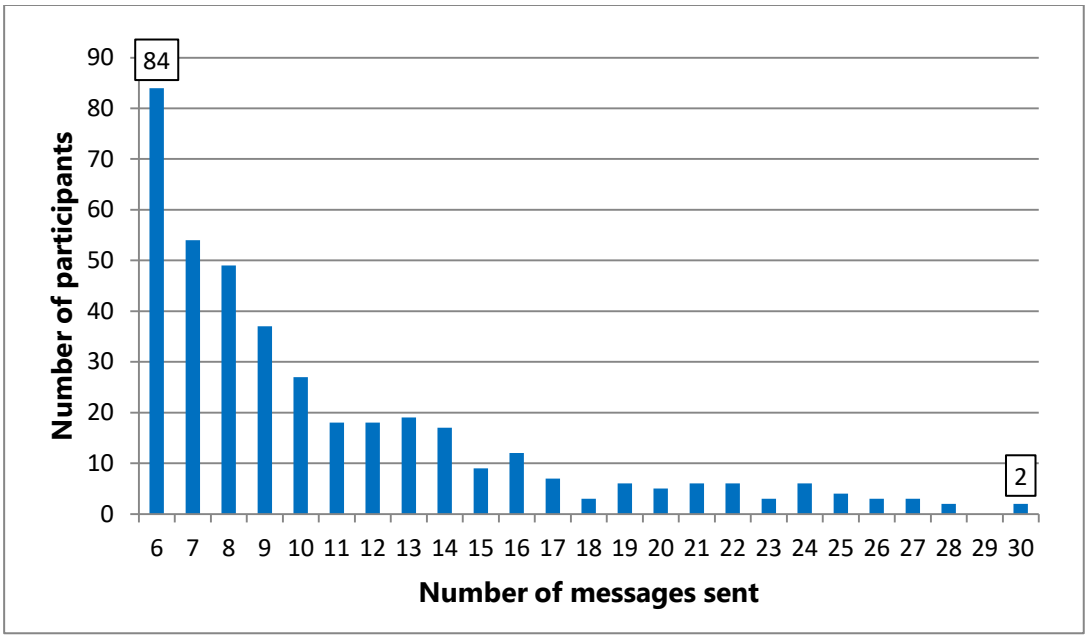

Figure 9b. Number of participants who sent between 6 and 30 messages in total, between July 7 and Aug 31 (n=10805, μ=3.7, x̃=2, *Mo*=1).

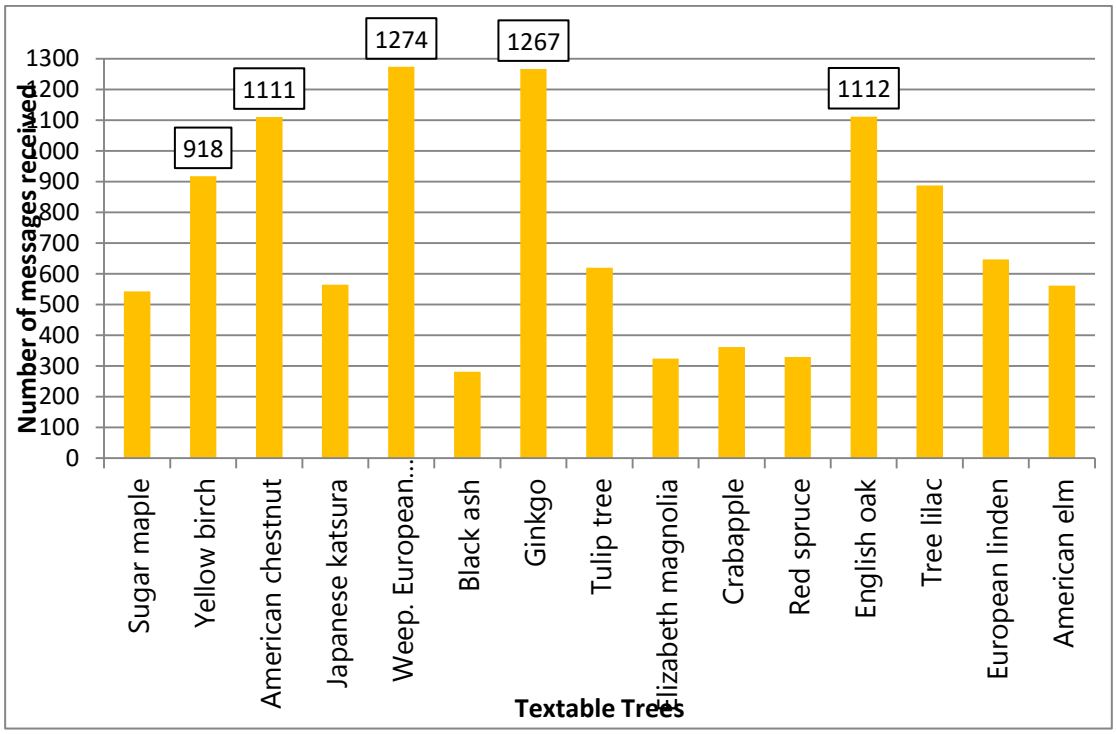

Figure 10a. Number of messages received by each tree between July 7 and Aug 31, with the top 5 recipients highlighted (n=10805, μ=720 , x̃=620)

The number of messages sent to each tree varied considerably, with a range between 282 and 1274 messages. 50% of these messages were received by just five trees (Figure 10a). When comparing trees by their relative locations in the Gardens, 43% of messages were sent to trees near entrances, while 67% were sent to those further within the Gardens (Figure 10b). This suggested that the location of trees in relation to entrances was not a significant factor in determining the frequency of messages they received.

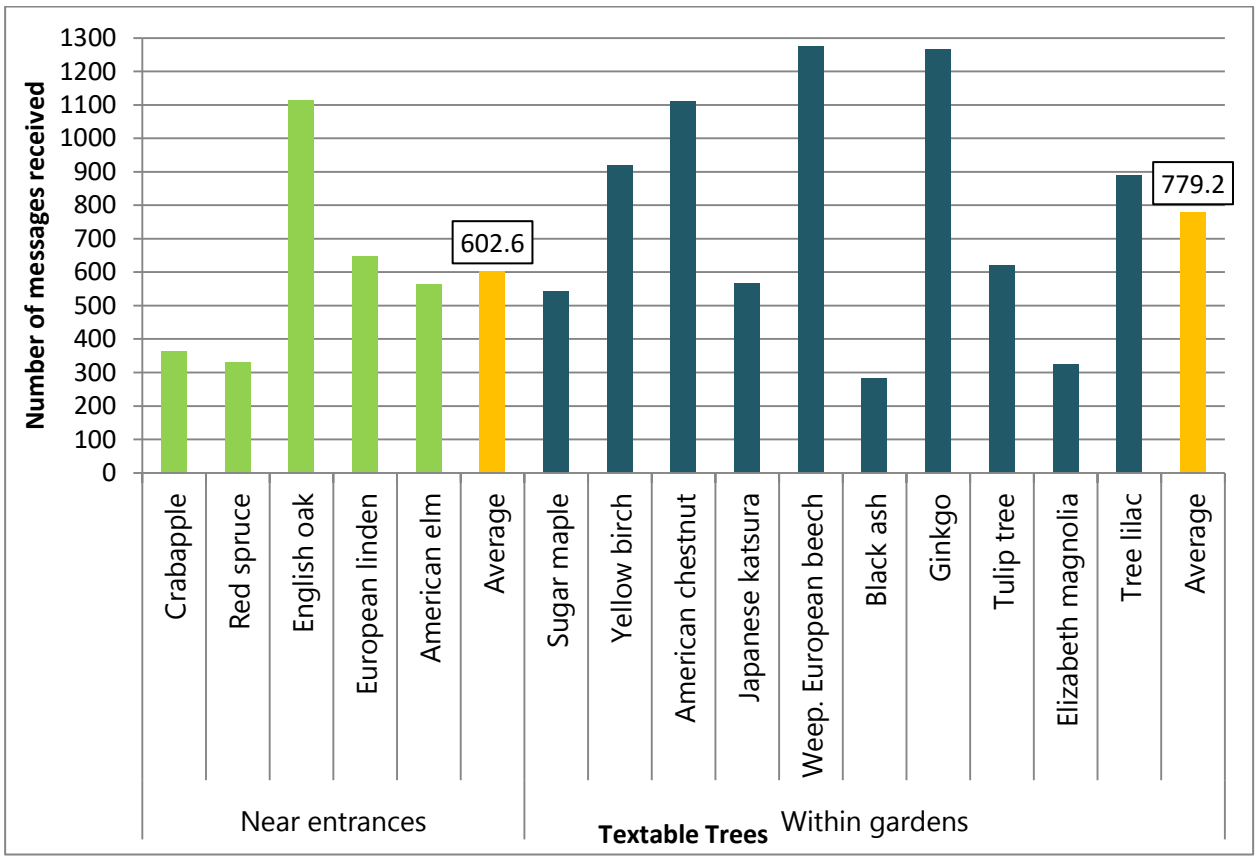

Figure 10b. Number of messages received by each tree between July 7 and Aug 31, organized by general location (n=10805, μ=720 , x̃=620).

4.2 Subset Data Analysis

33 codes were applied to the data, with an additional 15 codes used to assign tree names to data segments (Appendix J). Of particular interest was the frequency of compliments. Second only to the code "you", the code for compliments and expressions of love/appreciation appeared 113 times. When viewed collectively, codes related to biological questions (e.g. interesting tree facts) appeared 168 times, the most common being questions and comments regarding the age of the tree. These frequencies were only slightly higher than the frequency of personal questions, which totalled 136. The most prominent personal questions were centred around the well-being of the tree.

The frequency of questions supported the proposed information-seeking model rather than the amplification-of-self model. However, the co-occurrence of the code "you" with codes for biological questions revealed that 83% of biological questions were phrased in a personal manner. Similarly, the most prevalent value coded for was beauty, the mention of which was almost exclusively (90%) made as a compliment to the tree. Though values statements could fall under the amplification-of-self model, the expression of these values as compliments pointed more towards relationship-building.

Codes were organized into three main categories, as discussed below: sharing personal experience (SPE), sharing in other's experience (SOE), and social norms (SN). Of these, sharing in other's experience was the most heavily populated with codes (358 times), followed by social norms (283), and sharing personal experience (224). Within SOE, messages sent to the black ash tree (Baskets, *Fraxinus nigra*) were the most prevalent. The Japanese katsura tree (Wish Tree, *Cercidiphyllum japonicum*) received the least, which was expected given that it did not reply to participants. Of the conversive trees, the sugar maple (Sweetness, *Acer saccharum*) received the fewest codes.

The high frequency of the code for compliments and expressions of love and appreciation associated with the weeping beech tree (Miss Luna Ruby, *Fagus sylvatica pend.*) made this tree the highest receiver of codes within the SN category. Again, the least was the Japanese katsura tree (Wish Tree, *Cercidiphyllum japonicum*), and of the conversive trees the red spruce (Syliboy, *Picea rubens*) received the least.

For the SPE category, the weeping beech (Miss Luna Ruby, *Fagus sylvatica pend.*) again received the most codes, with the The Wish Tree receiving the least. Of the conversive trees, the European crabapple (Malus, *Malus spp.*) received the fewest codes.

5.0 Discussion

5.1 Emergent Theory

The major theory derived from the above analysis was a rejection of the proposed information-seeking and amplification-of-self models in favour an emergent relationship-building model. Initial evidence for this hypothesis emerged from the quantitative analysis of participant messaging patterns. Had participants primarily sought information from the trees, one might expect the average participant to engage with several trees in order to collect information on/from them. Likewise, if participants sought to amplify their opinions or sentiments and had little interest in interacting, one would expect participants to visit several trees but send very few messages. As demonstrated in figures 8a and 8b, participants strongly preferred interacting with a single tree

but did so multiple times (Figures 9a and 9b). This suggested that the greatest benefit as perceived by participants could not be gained by increasing the number of trees interacted with (as posed by the previous models) but by investing in interactions with one.

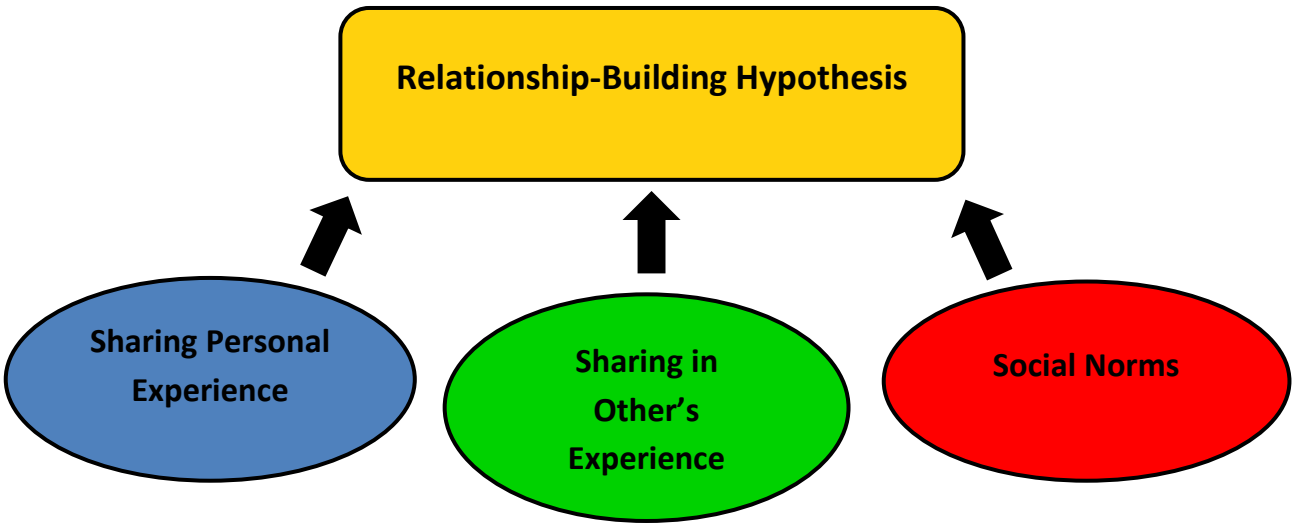

Figure 11. Major emergent themes forming the relationship-Building Hypothesis

As one might expect, the most frequently used words (as identified using Atlas.ti®'s WordCloud function) were greetings such as "hi" and "hello". However, when previewing messages from the total dataset, I was surprised by how frequently participants would send a message in which the *only* sentiment was a greeting. Viewed from either the information-seeking or amplification-of-self hypotheses, one would expect the initial message to indicate a purpose by asking a question or making a statement. It is possible that participants sending greeting-only messages were uncertain or uncomfortable leading the conversation and were looking for feedback from the tree to determine how to proceed with the interaction. As classically described by Firth (1972), greetings can be understood as a signal indicating that an ensuing interaction with a person is socially acceptable. Thus, it may have been that while the participants had a specific intention in mind, they were interested in seeing the tree's response before continuing. It may also have simply been an artifact of in-person interactions in which it is expected that an individual greet and be greeted before engaging in further discussion. Though these explanations are only speculative, they may suggest an inclination towards relationship-building behaviour.

As stated previously, the coding process centred around the apparent purpose or intent of messages rather than looking for keywords. Grouping codes according to purpose resulted in the emergence of three major themes: sharing personal experience, sharing in other's experience, and social norms (Figure 11). These themes created a framework for the relationship-building theory, which proposed that participants of Text-A-Tree used the project as an opportunity to

engage in relationship-building rather than as a source of information, or receptacle of opinions, as was initially hypothesized.

A. Sharing Personal Experience

Trigger Warning: The following section discusses emotional experiences voluntarily shared with Text-A-Tree, which may be upsetting to some individuals (content: miscarriage)

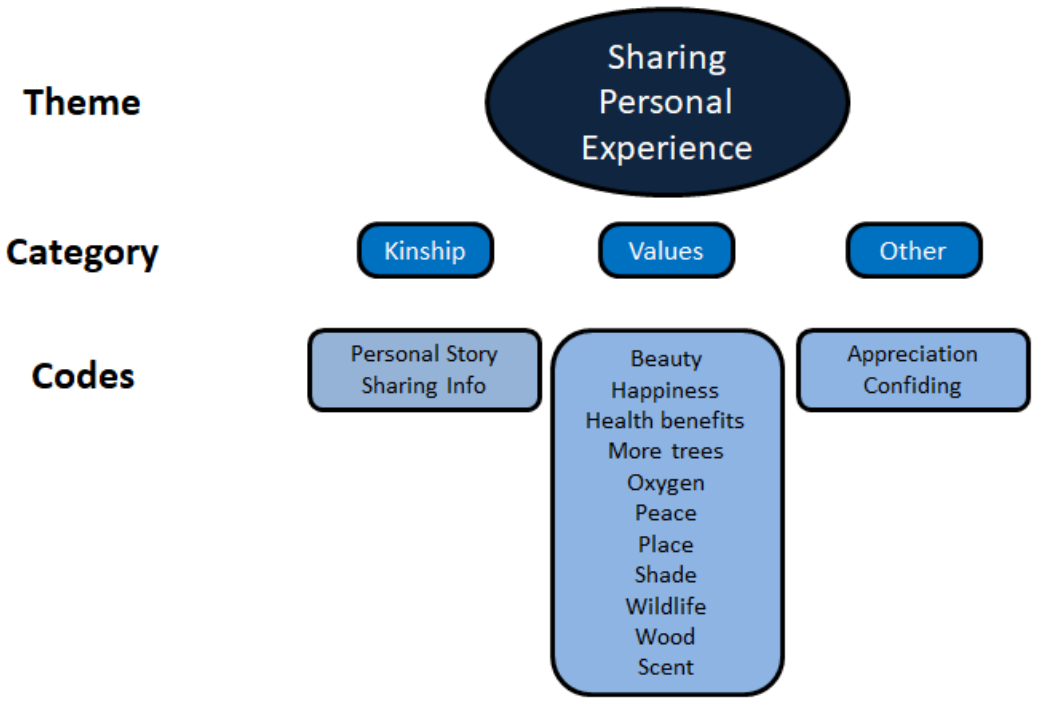

Figure 12. Organization of codes and categories forming the Sharing Personal Experience theme

One of the most surprising results from Text-A-Tree was the willingness of participants to share aspects of their personal lives. At no point did volunteers inquire after the names or ages of participants, yet these were not uncommonly offered. The desire to identify oneself was made all the more clear by participants who sent selfies to the trees. Unfortunately, as the consent information communicated to participants did not refer to photographs, details regarding the photos were not saved and cannot be reported. What can be derived from this response is that participants were using their mobile phones as part of meaning-making process of Text-A-Tree (Fors, 2015).

Participants often responded to pleasantries by offering details which would not necessarily be expected in polite conversation between strangers. For example, when asked how they were doing that day, one participant replied “Great! I went on the Harbour Hopper today with my husband and daughter. How are you?” If the participant had a particular intention in speaking with the tree, such as asking a question or wishing to make a statement known, it is likely that the participant would simply reply that they were “well”, before continuing on with their intended purpose. This participant, and others like them, appeared to be interacting with the tree for the sake of the interaction itself. Sharing a quick story offers more than the minimally required “I’m well, thanks”, and provides substance with which to further the conversation or find commonalities. Since the Harbour Hopper conducts a loop around the Gardens, it was likely that this participant chose to share this information in an attempt to find something in common, a strategy which Kim (2000) describes as being integral for developing relationships.

The values expressed by participants (e.g. beauty, peace, shade, wildlife) were similar to those found in previous research in urban-forest values (Peckham, Duinker, & Ordóñez, 2013; Conway, 2016; Ordóñez, Beckley, Duinker, Sinclair, 2017). Unexpected, however, was how infrequently these values were expressed (Appendix H). Based on the reports of the Melbourne event, it seemed likely that conversations would largely centre around what people valued about trees. Yet values-codes accounted for just 10% of the total codes applied to the subset data, with half of these belonging to beauty. This was significant because, as previously noted, 90% of beauty-codes co-occurred with the code for compliments, meaning that the discussion of beauty may have had more to do with the participant wanting to compliment the tree than about beauty being something they highly valued.

Most striking was the depth of emotion and intimacy communicated by some participants. While these messages were rare, they demonstrated a level of significance which the research team had not anticipated. In these cases, trees became confidants, keepers of secrets, and perhaps agents in healing processes. One participant broached the subject of personal conflict, writing: “Hi, I'm facing a dilemma, I've been building wooden boats as a profession for the past 35 years… On my last project I used 47,500 lbs of wood, this consumption rate is not sustainable. I despair for our Forrest's [sic]”. This message in particular addressed the increasing phenomenon of eco-guilt (Fredericks, 2014). Such comments opened an intriguing line of discussion and posed the question as to whether textable trees may have a role to play in helping people cope with eco-guilt and climate-change anxiety (Doherty & Clayton, 2011).

Perhaps most poignant was the participant who shared her experience of a tragic, personal loss, when texting the weeping beech (named Miss Luna Ruby). Messages such as these were not only challenging emotionally, but required that a great deal of care and respect be invested when crafting a response. I was honoured to bear witness to the grace and resilience of the participant

who wrote: “You see, Luna Ruby, its been bit of a rough year [sic]. My husband and I have been trying to have a baby for a couple of years… You see, Luna Ruby, I lost my baby.” In the wider dataset, she went on to describe the complications of her pregnancy, the challenges of accepting and coping with the loss, and hope that in the future she would be able to bring her children to meet the tree. From these interactions, it was made abundantly clear that the messages and their meanings were meant for the tree and not for the human volunteer voicing it. Though difficult to receive, this message was deeply impactful to me both as a researcher and as a person.

Messages containing deeply personal experiences helped form the wider framework and illuminate the largely unreported meaning that trees can have for communities. Further, the use of textable trees as confidantes may be informed by the prominent research of Pennebaker & Beall (1986), which publicized the important role which confiding plays in the health and recovery in the survivors of trauma. Most relevant to Text-A-Tree was the conclusion that the process of confiding need not be oral for it to be meaningful. Currently the role of trees in this process remains absent from the literature and may represent an important additional value of urban trees.

Collectively, it seemed that the purpose behind the messages in this category was to share aspects of the participants’ lived experiences. Though these individuals may not have desired a long-term friendship with the tree, the act of divulging lived experiences demonstrates a desire for connection. As found in a study on mental health, personal sharing is a contributor both to relationship building and to recovery (Marino, Child, & Campbell Krasinski, 2016). It may be especially valuable to consult Indigenous knowledge-keepers on the significance of personal sharing with trees. At the very least, the sharing of experiences advances the theory that participants sought to create and reinforce personal connections with the trees; this emerged as a major theme in the Relationship-Building hypothesis.

B. Sharing in Other's Experience

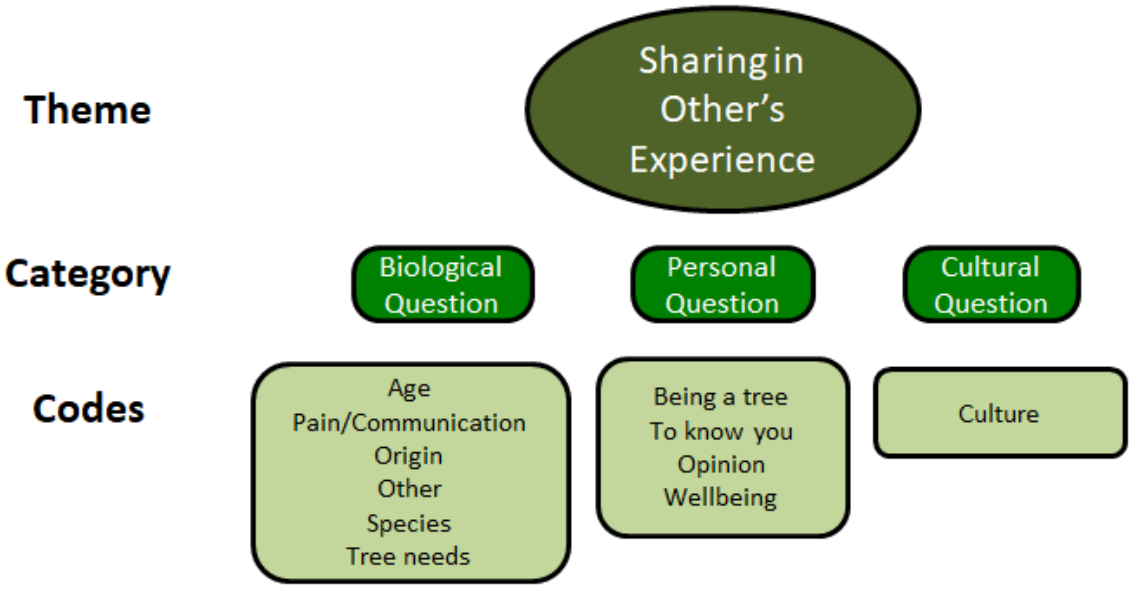

Figure 13. Organization of codes and categories forming the Sharing in Other's Experience theme

As noted earlier, the personalization of biological questions and the expression of values through compliments indicated that participants may have been practicing relationship-building behaviours when interacting with the trees. For example, the most commonly asked question within the subset data was "how old are you?". The phrasing of the question was significant, as participants could have made the decision to speak directly to the volunteer when inquiring about the tree's age. Instead, participants overwhelmingly engaged in the premise of the tree speaking (texting) for itself. Neugarten's (1968) seminal work found that people asked for or guessed the age of others in order to help place them within cultural and social contexts, which may explain why so many participants wished to know the trees' ages. History may also have contributed to the question of tree age. For example, in the total dataset, a participant asked whether the European beech had been present for the Halifax Explosion of 1917. This question placed the tree within the cultural and historical context of Halifax, perhaps helping to forge a sense of place (Jive´n & Larkham, 2003).

Another frequently asked question was any variant of "where are you from?". When considering introductions, the question of where one is from is among the most common and used to create possibilities for further discussion or help speakers understand one another (Myers, 2006). While

some inquirers asked which area the trees were native to, others asked in more general terms, such as “how did you get here”, which pointed to an interest in identity rather than species range. One participant seemed to have found common ground regarding identity and origin, writing “Oh my family is also from China but me I was born here in Canada”.

Despite the wide variety of questions fielded by trees, from their size to their favourite colour, the vast majority of questions appeared to relate to experience. This was mostly clearly exemplified by those texters who asked variants of “what’s it like being a tree?”. Further to this, some participants asked whether trees were capable of communicating or experiencing pain. These questions denoted a desire to understand what trees experience, rather than what they are or do, and led to the creation of the theme “Sharing in Other’s Experience”.

Perhaps most illuminating were questions that indicated concern for the wellbeing of the trees. Multiple participants asked whether the trees were receiving enough water, one texting “I shared my water bottle but doubt you could notice. I wish you rain to cool you [sic] branches and reach your roots”. When taken together, the questions of age and origin suggested that participants were attempting to gain a sense of “who” the trees were, and to share in their experience.

C. Social Norms

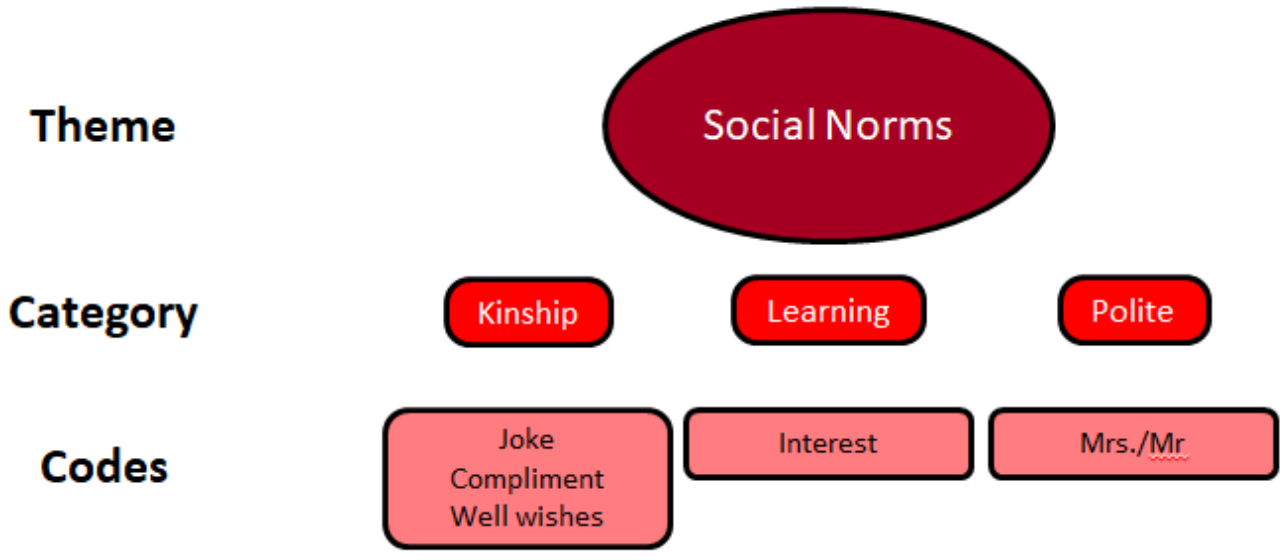

Figure 14. Organization of codes and categories forming the Social Norms theme

The etiquette exhibited in conversations with textable trees mirrored polite and even intimate human relationships. Participants often used prefixes when addressing trees for the first time, despite only one tree having a miss, mrs, ms, or mr in their name. The use of formal language was unexpected, especially when considering that digital communications such as those of online forums frequently result in antagonistic behaviour (Lange, 2007). Cyber-bullying is a well-documented example in which online interactions not only tend to forgo pleasantries but can cause significant psychological harm (Campbell, 2005; Holfeld & Leadbeater, 2015). This tendency has not been limited to public discussions but was reported in private conversations as well. A Canadian study found both texting and emails to be actively used for bullying in students of 11 to 13 years of age (Rivers & Noret, 2010). Given that participants were interacting with effective anonymity, the cordial nature of the messages received during Text-A-Tree represented something of a departure from the norm.

One analytical difficulty was trying to determine whether a comment was expressed out of genuine interest, courtesy, or perceived social pressure. As previously discussed, it appeared to me that the high frequency of beauty codes was due at least in part to the important role that complimenting plays in social dynamics (Wolfson & Manes, 1980). As well, though expressions of interest (e.g. “Wow! I never knew that!”) were initially coded as evidence of learning, they could equally be reflective of participants’ desire to encourage conversation with the tree. Affirmations in conversation could signal a desire to continue interacting and can act as positive reinforcement. Similarly, it was difficult to determine whether well-wishes were stated in earnest or out of habit, such as when a participant wrote “I hope you have a great day”. Taken in the context of the surrounding evidence, however, it seems likely that such questions were part of the overall relationship-seeking behaviour.

The commitment to etiquette and the positive use of social norms illustrated what appeared to be the desire for connection between participants and the trees. This was reinforced by the fact that since the conversations were private, it was doubtful that participants used such language due to social pressure. The incorporation of puns and humour further illustrated the use of social norms to increase rapport and build friendship. Studies of healthcare professionals, for example, found that the use of humour helped to produce a more positive environment for nurses and patients (Åstedt-Kurki & Isola, 2001). The active use of relational strategies such as verbalizing interest, offering compliments, well-wishing, and joking contributed to the overall theory that participants were using social norms as part of relationship-building with the trees.

5.2 *Fulfillment of objectives*

1. Create an opportunity for communication and connection with urban trees

By virtue of having successfully launched Text-A-Tree, the research team created an opportunity for members of the public to communicate and connect with urban trees. The participation rate of Text-A-Tree eclipsed all expectations, with the goal of engaging a total a few hundred participants being exceeded on the first day. Furthermore, the overwhelming positive responses of appreciation, gratitude, interest, and sharing suggested that Text-A-Tree created space for meaningful engagement.

2. Promote recognition of trees as unique, living, individuals

The recognition of trees as individuals was significant based on the assumption that people more readily develop relationships with individuals than with groups. Text-A-Tree sought to garner recognition of trees as unique, living individuals rather than as background. This idea was heavily influenced by the Mi'kmaq concept of *M'sit No'kmaq* (Appendix H). The overwhelming use of individualized language (e.g. referring to the trees by name or as "you") point to the willingness of participants to regard trees as individuals, or that participants already view trees as individuals. This was not necessarily unexpected, since the introductory messages sent by trees encouraged the use of personal language.

Another indicator of recognition of trees as individuals was in the preference of participants to text some trees over others. As demonstrated in Figure 10a, just five of the 15 trees received 50% of the total messages. As evidenced in figure 10b, proximity to entrances was not an effective predictor of texting load, suggesting that participants were not simply messaging the first textable tree they encountered. This, combined with the preference to engage with a single tree, suggested that the decision of which tree to interact with was based on the characteristics of the individual tree. What these characteristics were remains unclear. While it was predicted that trees with the greatest trunk girth and height would receive the greatest number of messages, this proved not to be the case. By this standard, the sugar maple, American elm, and European linden should have been among the most popular trees, and yet were not.

Some clues as to which characteristics may have influenced tree preference reside in the subset data. For example, the weeping beech was coded more frequently for compliments and expressions of love and appreciation than any other tree. They also received the most codes for place values, with messages such as "when I see you from a distance, I suspect that there is some

secret space; cool and earthy, hidden from the crowds. I am surprised every time I walk under your canopy". The weeping nature of the tree likely created a sense of safety or comfort. As described by research in a Danish therapy garden, participants may be more inclined to feel at peace, calm, and safety in natural settings in which they are somewhat enclosed but still able to see out (Sidenius, Stigsdotter, & Dahl Refshauge, 2015), a description that could easily be applied to the experience of standing beneath the weeping beech. This feeling of safety may help to explain why some participants felt able to describe such personal experiences with this tree in particular.

3. Encourage urban-tree interest, awareness, and education

The high frequency of questions, along with the expressions of learning and interest revealed in the coding process, illustrated that participant learning did in fact take place. Due to the engagement of local media and public participation, it was also likely that the project improved (at least temporarily) awareness or consciousness around urban trees. An unanticipated educational application of the project was brought to light by an English-language teacher who, in their messages with trees, described how their adult students were practicing conversational skills by texting with the trees. This strategy may be mirroring the increasingly popular literacy programs in which students practice reading to dogs (Hall, Gee, & Mills, 2016).

In terms of urban-forest management, it may be prudent for managers to provide communities with resources that facilitate awareness and appreciation for trees. As Conway (2016) states, residents are key urban forest managers. This means that municipal foresters will benefit from cooperation and collaboration with local home-owners. Knowing what information communities are interested in could serve to improve communication and strengthen relationships between formal and informal forest-managers. For example, participants in Text-A-Tree most commonly asked about the age of trees, whether this be how old the tree currently is or how old it could potentially become. When looking for support from the community, it may be useful to focus on areas of interest, such as the age of a group of trees in need of care or attention (e.g. importance of root-collar protection for young street trees).

4. Identify what people value about urban trees

Traditional tree values such as those related to shade and beauty occurred less frequently than anticipated. What was identified, however, was a variation in the values associated with different trees. The magnolia tree received the most codes relating to beauty, while the sugar maple (Acer

saccharum) received the most codes relating to the support of wildlife. The ginkgo tree (*Ginkgo biloba*) was the only recipient of health-related values codes, while the Japanese tree lilac (*Syringa reticulata*) drew values relating to scent. The data also suggest that people valued trees as confidantes and possibly even as friends. As one participant wrote, “I have lived for 7 years in Halifax and have always had a tree crush on you! It's such a pleasure to meet you!”. The non-uniformity of values associated with each tree strengthened the conclusion that diverse species provide diverse values.

Within the context of the emerging hypothesis, it seemed that what participants most valued about the trees of Text-A-Tree were the relationships themselves. Some relationships were clearly established long before the project launch, as evidenced by a participant who wrote “Hello Tree!Before [sic] my wife and I retired we always enjoyed having lunch under your shade. Thank you.” Others appeared to be more newly established, as with the participant who wrote “[name], [name] and I went to the Gardens to meet you and your other Tree friends”. Relationally based values such as these are reflected in the environmental values framework discussed by Dietz, Fitzgerald, and Shwom (2005).

5. Determine whether the Text-A-Tree model can improve people’s connection to urban trees

Considerable evidence has been presented to propose that Text-A-Tree facilitated the further development of people’s connections with urban trees. Formal assessment will take place at a later date, following the analysis of the survey administered during the project. Future implementations of the model in different communities will be required to test its rigour and make improvements.

6.0 Conclusion

6.1 Lessons learned

While future research following the Text-A-Tree model will alter methods depending on the desired outcomes, a few lessons should be considered. The only complaint drawn from the subset data, and one reiterated throughout the total data, was the issue of timeliness. This was best summarized by one participant who remarked: “I think this is brilliant, though response time needs to improve to really keep users engaged”. Future projects may wish to consider implementing waking hours during which the trees will actively respond. Statements clearly indicating that the project was run by volunteers were evidently not sufficient in meeting some participants' expectations. It is possible that trees whose volunteers responded more quickly to participants could have elicited different kinds of responses than those who took longer. Though

not recorded in the downloaded data, Zendesk's automatic analytics had identified the American elm (Leaf Erikson) and American chestnut (Woodrow) accounts as having the fastest response times. Predetermined waking-hours could make response times more consistent and thus mitigate their potential influence.

Managing volunteer expectations was an equally significant aspect of the project. Without having a reference point, the research team had no way to predict the huge participation rate. This resulted in some volunteers becoming overwhelmed and burnt-out, resulting in their needing support or having to step away from the project. Perhaps each tree should have been represented by multiple volunteers from the outset, and volunteer commitments limited to no more than a month. In hindsight, I should have made volunteers aware of the potential for deeply moving or upsetting messages from participants. That said, the open and continuous communication maintained between me and the volunteers appears to have been successful in creating a supportive environment when volunteers were faced with emotionally challenging messages.

6.2 Limitations

As with any research project, it is important to acknowledge the limitations which affected Text-A-Tree. Without demographic data, little can be said about the population of Text-A-Tree participants. Some respondents identified as being tourists, while others stated they had not been to the Gardens personally but had received the number from a friend. Thus, the findings of this research do not necessarily reflect the values and experiences of the general public of Halifax, but of those who came into contact with the project's phone numbers during the active phase and were inclined to engage.

It must be acknowledged that it is effectively impossible to separate the volunteers from the trees they voiced, making it possible that the unique characteristics, biases, and (rarely) errors of those volunteers may have had an influence on the outcomes. It is also entirely possible that at least some of the connections formed with the textable trees were dependent on the tree being able to respond. Ongoing research will be required to determine whether these relationships or the general sense of connection to the urban forest remain once the tree loses its texting capacity. Lastly, practical challenges arose and were mitigated by virtue of Zendesk having been designed for customer support rather than qualitative research. These limitations were addressed and determined to be acceptable for the purpose and objectives of the project.

6.3 Closing Remarks

According to Charmaz (2005), any conclusions developed by grounded theorists are suggestive, incomplete, and inconclusive. That is not to say they are trivial, as such methods help to understand a phenomenon. Text-A-Tree was the first known example of an experience in which

participants could engage with trees in the real world using text-messaging. Though originally designed as an educational experience, the results indicated that the meaning created by participants was one of relationships. The relationship-building hypothesis reflected this and has helped me to understand some of the patterns and interactions observed. While the analysis could not outright explain the interactions between participants and the textable trees, it revealed that these interactions were often imbued with meaning.

In terms of meeting objectives, Text-A-Tree was very clearly a success. Not only did the level of engagement far exceed expectations, but members of the public clearly engaged with urban trees and through their interactions appeared to develop relationships with individual trees. Participants also engaged in learning, as evidenced by questions and exclamations of interest. In an unexpected twist, participants' responses suggested that within the context of Text-A-Tree, what people valued most about the trees was the ability to form relationships with them.

The model explored in this paper is as yet the unpolished first attempt at what appears to be a promising tool for engaging the public with urban nature. Perhaps more than answering questions, the project succeeded in identifying new queries to pursue. Future research should look to modify and improve upon this pilot project to meet the unique characteristics of communities. The possible applications of nature-based text-messaging systems are limited only by the imagination and desires of a community. Gardens and arboretums across Canada may consider launching temporary projects modelled to improve the visitor experience. Cities or towns may establish automated treasure hunts or similar games where clues are gathered by texting plants in the community. Municipalities may develop interactive walking trails in which textable trees offer directions, encouragement, or information. Hospitals, rehabilitation centres, and mental health networks may consider launching "Grandmother trees" to provide safe spaces in which participants can share feelings and experiences, and seek help from trained personnel. Schools may offer counselling services mediated through school-yard trees. Place-based learning could use technology to help engage students in history or storytelling, as participants move across physical space to collect the pieces of a story.

In the past several years, environmental proponents have proclaimed the importance of integrating nature into our daily lives. Text-A-Tree demonstrated that this integration need not, and perhaps *should* not, be limited to inclusion in our physical lives, but should extend into our emotional and perhaps technological lives as well. It's not about getting back to nature; it's realizing we never left.

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8.0 Appendices

Appendix A: Partner Relationships

The success of the project was heavily dependent on the successful navigation of partnerships within the community. Interactions between the research team and both EyeCandy Signs and Zendesk followed the relatively simple customer-vendor relationship. However, a significant and complex relationship emerged between the research team, the Dalhousie Research Ethics Board, the City of Halifax, The Friends of the Public Gardens, the Dal Japan Society, the Government of Nova Scotia, local media, and Jock and Janet Murray of the Suellen Murray Educational Bursary. Managing these relationships became a critical, and unexpected, contributor to the success of the project.

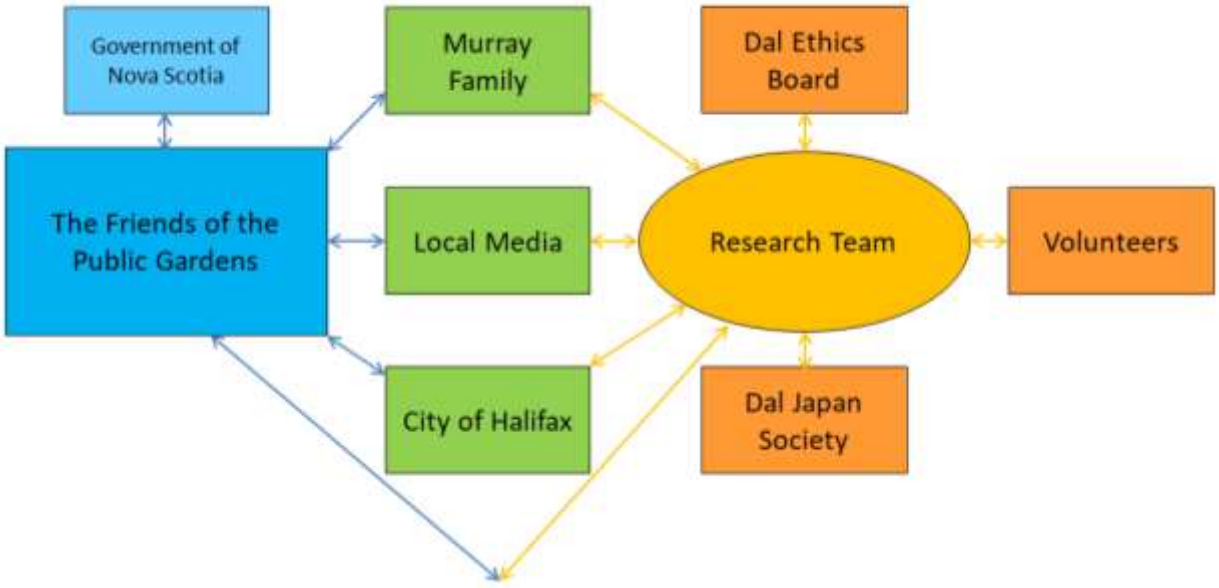

Figure 1A. Communication and relationship pathways involved in Text-A-Tree

When the concept of Text-A-Tree was first conceived, The Friends of the Public Gardens were immediately supportive and suggested that the project be held entirely within the Gardens. They, in addition to our Mi'kmaq guide, and two professors from Dalhousie, became my circle of advisers. It was through The Friends that the research team learned of the Suellen Murray Educational Bursary, which was funded by the Murray family and donations. Though all partnerships remained positive throughout the project, there were challenges in ensuring that the proposed project met the vision of the research team, while fitting with the goals of all partners. Several factors worked in tandem to navigate these relationships, these being; consultation with

experienced professionals, clear and honest communication, a willingness to compromise, and ample time to allow for planning setbacks.

When planning for the project-launch event, the research team worked with The Friends of the Public Gardens, the City of Halifax, and the Dal Japan Society to host a Tanabata Event. Helping to maintain these relationships was the constant understanding that as volunteers, any and all contributions were valuable and should be met with gratitude. The research team took the approach that while roles could be delegated, responsibility could not. Responsibility remained with the research team at all times, and ultimately with myself.

The partnership between the research team and The Friends of the Public Gardens eventually led to the successful application for funding from the Communities, Culture and Heritage department of the Government of Nova Scotia. In-person meetings became integral to the management of these funds, as well as the practice of sending follow-up emails confirming the results of each discussion as understood by the team. Careful and continuous record-keeping was key in preventing miscommunications and serving as a useful resource for future interactions. Having a clearly defined and agreed-upon set of objectives for the project also helped keep both parties aligned.

Partnerships in the community, such as those addressed above, are an indispensable resource for small research projects. Not only do they enable the vision of the researcher to be realized, but such partnerships create opportunities for research to benefit an even wider audience. These relationships inform the research process and contribute to social credibility, acceptance, and palatability. Researchers should be prepared to accept some vulnerability, which is inherent to shared partnerships, knowing that this shared vulnerability can ultimately lead to shared success.

Appendix B: Tree names and locations

Figure 1B. Locations and names of all 15 textable trees

Tree Name	Species
Baskets	***Fraxinus nigra***
Ichiro	***Ginkgo biloba***
Leaf Erikson	***Ulmus americana***
Linette	***Tilia cordata***
Maggie	***Magnolia x brooklynensis***
Maiko	***Syringa reticulata***
Malus	***Malus spp.***
Miss Luna Ruby	***Fagus sylvatica pend.***
Molly Talltree	***Liriodendron tulipifera***
Percival	***Quercus robur***
Sweetness	***Acer saccharum***
Syliboy	***Picea rubens***
Tree Tree O'Hara	***Betula alleghaniensis***
Wish Tree	***Cercidiphyllum japonicum***
Woodrow	***Castanea dentata***

Table 1B. Names and species of all 15 textable trees

Appendix C: Automated Messages

1. **The Honourable Percival Reginald-Montgomery**

Fond greetings; I am currently deep in thought and am unable to respond to your message at this moment. But I've got your message and will leaf you something in return within 24 hours. Below is some consent info you need to know, because this is an academic study.

2. **Baskets**

Kwe! I'm currently taking a rest from fighting off the spread of Emerald Ash Borer beetles, but I'll be back to you within 24 hours! Below is some consent info you need to know, because this is an academic study.

3. **Ichiro**

Kon'nichiwa! You've reached Ichiro. I'm busy hanging out with my squirrel friends, but I'll endeavor to reply to you within 24 hours. Below is some consent info you need to know, because this is an academic study.

4. **Leaf Erikson**

Thank you for messaging me - I'll get back to you within 24 hours. I'm not one of those young saplings who's glued to their phone all the time... It's not easy being green, you know! Below is some consent info you need to know, because this is an academic study.

5. **Linette**

Guten tag! You've reached Linette, the European Linden. I'm busy chatting with visiting honeybees, but I'll get back to you as soon as they finish pollinating me! Don't worry, it shouldn't take more than 24 hours. Below is some consent info you need to know, because this is an academic study.

6. **Maggie**

Kon'nichiwa, got your message :) Give me some time to consider your message, and I promise to be back within 24 hours! Below is some consent info you need to know, because this is an academic study.

7. **Maiko**

Kon'nichiwa! Arigatou (thanks) for sending me a message! I'm busy practicing dance, so can't respond to you right now. I'll get back to you within 24 hours. Below is some consent info you need to know, because this is an academic study.

8. **Malus**

Sorry I missed ya! I'll be back within 24 hours with some fun facts about why I'm the coolest tree in this place! Below is some consent info you need to know, because this is an academic study.

9. **Miss Luna Ruby**

Salut! You have reached Miss Luna Ruby, the Weeping European Beech. I am unable to return your text at this time, but I will get back to you within 24 hours. I am probably reading over someone's shoulder, meditating, or working on my belly dance. I've been learning to dance, very, very, slowly! Below is some consent info you need to know, because this is an academic study.

10. **Molly Talltree**

Sorry I missed you. I'm busy practicing my sun salutations (very slowly!) but I'll get back to you within 24 hours. Below is some consent info you need to know, because this is an academic study.

11. Sweetness

Well kwe and hello dear! I'm feeding the birds at the moment, but I'll be with you within 24 hours! Feel free to lounge for a while if the weather's nice and listen to the lovely lovely birds, oh how beautiful they sound! Below is some consent info you need to know, because this is an academic study.

12. Syliboy

Kwe! Thank you for messaging me. I'm excited to speak with you. If you want to know more about me, stay tuned! I will catch up with you within 24 hours. Below is some consent info you need to know, because this is an academic study.

13. Tree Tree O'Hara

Kwe! Hey hunni! I'm busy being absolutely fabulous right now, but I'll get back to you within 24 hours! Below is some consent info you need to know, because this is an academic study.

14. Wish Tree

Thank you for sharing your wish with me! I am just a silent wish receiver, so I won't text you back, but I promise my friends around the gardens will! Follow us on Facebook and Instagram to see if your wish was anonymously posted as the wish of the day! Below is some consent info you need to know, because this is an academic study.

15. Woodrow

I'm sorry that I can't respond.

I promise that it won't be long,

until we have a chance to chat.

I hope that you're okay with that

Consent

I will get back to you within 24 hours. Below is some consent info you need to know, because this is an academic study.

**By continuing to participate, you consent to receiving a survey, and the use of your messages and phone number for research purposes. Data will be stored using Zendesk (an American software company). Opt-out at any time by texting "opt-out" to any tree. For more information on the project and study visit www.halifaxtreeproject.com/textatree

Appendix D: Inclusion of culture

When engaging in values-based research, the question must be asked of whose values are being collected. Previous studies have engaged in street-side interception surveys, which, by necessity, are limited in capturing information from individuals over the age of 18 and those comfortable engaging in interviews. An additional potential source of bias in such studies is that some members of the public may not be comfortable engaging in a street-side survey with the research team based on factors such as language skills, social skills, religious beliefs, past experiences, fear of judgement, and racial concerns. Text-A-Tree hoped to build on previous values-based research by having trees serve as the “interviewer”.

The incorporation of both native and introduced tree species was intended to reflect the diversity of cultures found in the human population of Halifax. It was not possible to integrate every cultural group in Halifax through the trees available in the HFG, however, it was hoped that by respectfully honouring two non-dominant cultures it would signal that the Gardens are an inclusive space for all. Mi’kmaq and Japanese culture were the focus of these efforts. Trees associated with either culture would greet participants using either *kwe* (Mi’kmaq) or *kon’nichiwa* (Japanese), and have their species names presented in both English and their cultural language. Additionally, the launch of Text-A-Tree took place on July 7th to coincide with the Japanese celebration of Tanabata, during which a Wish Tree is traditionally designated. With the help of the Dal Japanese Society, cultural activities and events were held in the Public Gardens as part of the Text-A-Tree launch. The Wish Tree remained active throughout the project, as a silent receiver of wishes which participants could make via text.

Appendix E: Media

All information regarding the project was posted to the pre-existing website of the Halifax Tree Project. Posters and pamphlets were given to The Friends of the Public Gardens, who distributed these from the help desk located in Horticultural Hall of the Public Gardens. The Friends also used their Facebook page to advertise the project. Posters were set up around

downtown Halifax, and given to my peers to distribute in their communities. Members of the public were encouraged to interact with the Facebook and Instagram pages for Text-A-Tree, by following, commenting, posting, and using the hashtag #TextATreeHalifax. This media was managed by the research team. The processing and analysis of the Text-A-Tree social media data will take place at a later date, and as such will not be included in the current report.

Local media outlets became an unexpectedly robust source of advertisement. Several interviews were aired on news and radio stations, along with written articles about the project and its progress. Though initially limited to local news, at least one interview reached a nation-wide audience. Interest beyond Nova Scotia has continued since the completion of the active-phase of Text-A-Tree, such as the American Botanical Society's recent publication of the Plant Science Bulletin featuring Text-A-Tree.

Appendix F: Example Tree-package

AMERICAN ELM

Urban Trees

Urban trees are pretty much just the best thing ever. They contribute to a myriad of "ecosystem services". To name just a few, urban trees contribute to:

- **social values such as beauty, peacefulness, spirituality, and a sense of connection with nature**
- human health and improving patient-recovery time
- recreational experiences
- a sense of community and place
- habitat and food for birds, pollinators, and small mammals
- property value
- energy efficiency of homes due to shading and slowing wind
- carbon dioxide removal from the atmosphere
- road and other infrastructure lifespan by protecting them from sun
- shading people and helping protect them from damaging radiation from the sun
- decreasing the overall temperature of the area; releasing moisture into the air and helping to counter the urban-heat-island effect, which is what makes cities hazardous during heat waves
- tourism (think of fall leaf-viewing!)
- decreased crime rate in treed areas
- removal of air particulates by catching them on leaves and twigs
- slowing down and absorbing storm water to prevent flooding

- HRM has stated that for every 1$ spent on trees, we receive 7$ back in measurable benefits.

Cultural Perspective

We will be honouring both the Mi'kmaq and Japanese perspectives while taking on the role of trees. But we will not speak on behalf of cultures which we personally do not identify with; instead we will speak on behalf of the trees. We believe the trees would be proud to share how they've shaped the local cultures here in Halifax.

Humans have been representing trees as humans, and humans as trees, for a very long time. From Egyptian goddesses to indigenous legends to contemporary literature, the line between human and tree has been blurred on many an occasion. There seems to be an almost universal desire to attribute trees with some kind of personhood. The Mik'maq have a beautiful phrase, "Msit No'Kmaq", which translates to "all my relations" or "our people" and describes the land, plants, animals, and humans around us. It doesn't mean related in the hereditary sense we think of, but of literally everything that we in our world are related to. In the Mi'kmaq perspective, trees and many other things are considered persons, because they each experience their existence in the first person. So talking to trees really isn't that strange. In fact, there is often reference to the idea of a Mother tree. The Mi'kmaq perspective includes great respect for Elders, and in many ways trees are treated with a similar respect, being keepers of knowledge. The Japanese perspective also includes the idea of personhood. The word *kodama* is used to describe a tree spirit, and sacred ropes and ornaments can be found draped around the trunk of an old tree, letting people know the tree possesses a soul. If you've watched the movie Princess Mononoke, then you've seen an artist's rendition of kodama as the little white baby-spirits in the forest.

Learning through conversation, which is what we hope will happen as people text your tree, aligns with the Mi'kmaq oral tradition. In this tradition, important information is often conveyed through stories and conversations, rather than distilled down to the point-form facts. Another way we are incorporating oral tradition is on the Japanese side, in how we are honouring the legend of Tanabata. We are launching the project on the 7th day of the 7th month, in order to coincide with the Japanese festival of Tanabata- also known as the Star Festival. According to the legend (see our website!) on the day of Tanabata, two stars which are eternally separated are granted a single day of union. We thought it was fitting to have the connection between two star-fort cities (Halifax and Hakodate) be commemorated on the day of the Star Festival. On this day many people write wishes upon beautifully coloured strips of paper and hang them on bamboo stands or trees. We will have our own Wish Tree which people can text their wishes to.

One of the many goals of Text-A-Tree is to help people recognize trees as individuals- as members of the community. It is therefore important to recognize the social and cultural significance of trees, and to incorporate them into public projects. When considering how best to manage urban forests, we must consider the values of all the people impacted by them, not just the majority. Incorporating cultural perspectives, such as those of the Mi'kmaq and Japanese communities, is an attempt at ensuring the project is socially accessible to everyone. These multiple perspectives also give us a deeper appreciation for trees, which may help promote their presence and persistence in the urban environment.

Biological Information

Family: *Ulmaceae,* the Elm family

Species: American Elm, *Ulmus americana*

Interesting fact: This tree is very common in the streets of Halifax. Many of the large, stately trees that line the streets of older Halifax neighbourhoods and create a lovely "cathedral" effect over the roadway are elm trees! Dutch elm disease is an issue, however. It has killed many American elms in eastern Canada. This tree in particular was one of the first to be planted with the Gardens open in the 1870's. The group around the Coffee shop are some of the oldest in the Gardens. There were more american elms before, but some were lost during the storm of Hurricane Juan.

Native range: In Canada, American elms are native to Nova Scotia, New Brunswick, PEI, and southern Ontario and Quebec.

Sex determination: "Monoecious" means "single house," meaning that the tree produces both the male (pollen) and female (eggs) gametes. Some trees are then able to self-pollinate, but others still require the gametes of another individual for pollination. "Dioecious", means "double house", meaning each tree produces either male organs or female organs. Elm tree is monoecious. Flowers are "perfect", meaning they are "bisexual", with female and male organs in each flower.

Age range/growth rate: Fast growing tree that can live to be about 200 years old, but there are some as old as 300. They tend to live much shorter lives in urban areas, however

General size: One of the largest trees native to eastern Canada! It can grow to about 35m tall, with a diameter at breast height of 175 cm. The root system is shallow but wide-spreading.

Identifying features: Oval-shaped leaves with an irregular base (looks lopsided, but not heart-shaped like linden leaves), with each leaf vein ending in a tooth. The edges of the leaves are very

jagged, with many teeth. The bark of large trees is scaley. The tree tends to grow in a bouquet shape, which is rather unique among trees. They are also known to have a somewhat "hairy" appearance along their trunk, since many small twiggy branches will stem off from the main trunk.

Environmental benefits: Seeds are eaten by small birds, and fruits and flowers are eaten by some birds and rodents. Elms can also provide habitat for cavity nesters.

Cultural Information

The American elm was not an especially important tree for the Mi'kmaq people, in that it wasn't used for medicine or in making specific things. But it none-the-less has a Mi'kmaq name, and you'll see this on the sign for you tree. The Mi'kmaq name for your tree is Wikpi.

According to the Greek poem, the Iliad, elm trees were planted at the gravesite of fallen warriors from the Trojan war. There is also a Japanese legend with many variations, around the goddess Kamy-huci. In one version, she is born from an elm tree and the god of the sky. In Norse mythology, the first man and woman were made from trees by the gods. The first man came from an ash tree (which interestingly, is the same as in the Mi'kmaq origin story in which Klooscap made the first people by shooting an arrow into an ash tree). There are a few different versions for the first woman, because of issues with translation, but one version says that she was made from an elm. According to one source, the elm represents intuition and inner strength. Perhaps that makes Leif Erikson a particularly appropriate name :)

Useful Links

https://ufi.ca.uky.edu/treetalk/ecobot-american-elm

https://www.fs.fed.us/database/feis/plants/tree/ulmame/all.html

http://forestry.ohiodnr.gov/americanelm

https://en.wikipedia.org/wiki/Kamuy-huci

https://en.wikipedia.org/wiki/Ask_and_Embla

https://treespiritwisdom.com/minor-arcana/hardwood-trees-swords/5447-2/

https://www.housebeautiful.com/lifestyle/gardening/g2373/secret-meaning-behind-common-trees/?slide=6

Appendix G: Data Security

Data collected by the Zendesk platform were: participants' phone numbers, all messages sent to trees, a time stamp of each message, and (when applicable) responses to the survey questions. This information was backed up on the Zendesk server based in California. In an ongoing process, participants who opted-out of the research had their phone number and all associated messages deleted from the database. I used the administrative controls within Zendesk to prevent volunteers from downloading any data. Data was downloaded by myself throughout the data-collection phase as a precaution, and again at the close of participation. Information was saved as JSON files, which were manually converted to CSV after downloading. Zendesk messages were limited to 153 characters, meaning that any text-message sent through Zendesk exceeding 153 characters was split and recorded as 2 messages within Zendesk. Data were encrypted and stored on a password-protected laptop. All back-up devices were entirely encrypted to ensure protection. Prior to data analysis, data were anonymized by replacing phone numbers with unique participant codes. A mixed-method approach was taken, in which both qualitative and quantitative data were analyzed.

Appendix H: Data Cleaning

In the first phase of data cleaning, all text was scanned for the words "opt" and "stop", and any remaining messages (and phone numbers) indicating a desire to opt-out were deleted. Excessively aggressive or belligerent messages were removed, and responsible participants blocked from further communicating with trees, throughout the active phase of the project in order to protect volunteers. All service and notification messages sent by Zendesk were also removed. While working through the data it became apparent that the Zendesk system had at times mislabelled messages as being from participants, when they were in fact sent by volunteers *to* participants. These were corrected.

In the largely-unstructured conversations with participants, it was inevitable that tree-speakers would, to some degree, prompt or guide potential topics. To mitigate the effect this would have on data analysis, volunteer-responses and participant-messages were separated prior to coding. This ensured that the researcher would only see themes explicitly described by participants (eg. "you are such a beautiful tree"). Therefore, if a tree-speaker raised a topic which was of little interest to the participant, and not reciprocated or further addressed, it would not appear in the data being coded. Whenever the researcher encountered a participant-message which was phrased as though in response to a direct question about values or the benefits of trees, the preceding tree-speaker's messages could be looked up for verification. In such events, when volunteers asked questions or prompted beyond the guidelines set out in the volunteer training, the content of the resulting participant-messages were disregarded.

Appendix I: Survey

On Aug 22 and 23, two survey questions were sent to all active conversations received by trees. Participants were made aware of the survey as part of the previously-discussed consent information. Due to a function of Zendesk, this meant the survey was sent as a reply to all messages which were received within the last 28 days. As a result, participants who engaged in conversations with multiple trees in the previous 28 days received multiple requests for surveys. The survey question was sent as a continuation of the conversation held with a tree, in which the tree requested that the participant help me (referred to by name) by answering two questions. This enabled us to engage in additional data collection, without disrupting the human-tree dialogue. In keeping with the relationship-driven model of Text-A-Tree, no follow-up surveys or reminders were sent out to participants. It was determined that maintaining the friendship-forming interactions between the trees and participants was more important than potentially increasing the survey return-rate.

Embedding the surveys into existing conversations ensured that informed consent could be obtained and no additional software or programming were required. It also enabled participants to reply without having to go through additional or inconvenient steps. Unfortunately, the method resulted in complications in data processing. As participants were able to continue messaging with the tree following the survey, separating survey-responses from regular conversations could not be automated and required manual processing. The qualitative analysis of data from Aug 22 to Aug 31 (end of active phase) will therefore take place at a later date.

Appendix J: Codes

Code	Frequency
APPRECIATION- unspecified	7
BIOLOGICAL QUESTION- age/life expectancy	66
BIOLOGICAL QUESTION- do trees feel pain/communicate	5
BIOLOGICAL QUESTION- height/size	12
BIOLOGICAL QUESTION- how tree got there/where tree is from/native range	31
BIOLOGICAL QUESTION- other	55
BIOLOGICAL QUESTION- species/ identification	20
BIOLOGICAL QUESTION- tree needs	9
CONFIDING- feeling sad, facing dilemma, existential questions	11
Cultural Questions- value, significance, use of tree	25
Kinship-Joke	31
KINSHIP- compliment, expression of love and appreciation	113
KINSHIP- personal story/poetry	46
KINSHIP- sharing information	11
KINSHIP- well wishes/encouragement	55
LEARNING- expression of interest	67
PERSONAL QUESTION- being a tree	22
PERSONAL QUESTION- getting to know you	20
PERSONAL QUESTION- opinions	48
PERSONAL QUESTION- wellbeing	46
POLITE- Mr/Mrs/Miss	18
VALUE- Beauty	62
VALUE- happiness	3
VALUE- health benefits	1
VALUE- more trees	4
VALUE- oxygen, air	4
VALUE- peaceful	7
VALUE- place (to dream, magical, safe)	11
VALUE- shade	16
VALUE- wildlife	15
VALUE- wood	4
VALUE-scent	2
YOU/name	385
TOTAL	1232

Table 1J. Codes and their frequencies