Design and Study of Emotions in Virtual Humans for Assistive Technologies

by

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

This thesis presents the design and study of emotionally aligned prompts given by virtual humans for persons with cognitive disabilities such as Alzheimer's disease and related dementias (ADRD). Our goal is to understand how emotions in virtual humans are interpreted by people. Persons with ADRD often need assistance from a care partner to complete activities of daily living such as washing hands, making food, or getting dressed. Artificially intelligent systems have been developed that can assist in such situations by giving automated prompts or cues.

Our long term aim is to enhance such systems by delivering automated prompts that are emotionally aligned with individuals in order to help with prompt adherence and with long-term adoption. As a step in this direction, we designed and conducted user study with three different virtual humans, who expressively communicate prompts for a simple handwashing task.

The user study was conducted in two phases. The phase I study had all age group people as participants and involved a female virtual human character with facial expressions and body gestures. The phase II study had elderly people as participants and involved both male and female virtual human characters with a focus on their facial expressions. Prompts were evaluated with respect to three basic and important dimensions of emotional experience: evaluation, potency, and activity. The results of the phase I study showed that, people generally agree on the evaluation dimension, whereas in phase II, we had more consensus on evaluation and potency dimensions and were close to consensus on activity. This thesis gives an overview of the hand washing system, and then details the design of the virtual human character and prompts and the results and analysis of the user study for both phases.

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The dream of pursuing Masters in Artificial Intelligence has been very special to me. My interest and passion in AI research and studies brought me back to the University almost a decade after my Bachelor studies. I enrolled as a part-time student with a full-time job, but in my mind I was always a full-time student with a full-time job. This wonderful journey of 3 years was possible because of the support of some wonderful people who were part of my life earlier and some whom I met on my way.

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Dedication

I dedicate this thesis to my Sat Gurus, my parents, my brother, my grandparents and my family.

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Chapter 1
Introduction

"The face is the soul of the body."[1]

"We see emotion. - We do not see facial contortions and make inferences from them (like a doctor framing a diagnosis) to joy, grief, boredom. We describe a face immediately as sad, radiant, bored, even when we are unable to give any other description of the features.—Grief, one would like to say, is personified in the face."[2]

- Ludwig Wittgenstein

These were some of the striking thoughts of Philosopher Ludwig Wittgenstein, who was fascinated by human facial expression and its perception and regarded the face as naturally expressive of the mind. Facial expressions play a major part in social interactions as non-verbal signals. The human face is generally expressive of mental states or in other words a display of inner affective states. Emotions expressed in various forms via face or bodily gestures, generally give a human touch in any interaction. Incorporating emotional intelligence into a computer system makes it more human-like instead of being just a system. In this thesis, we explore expressive virtual humans for giving face to an affective system that can interact naturally with people with cognitive disabilities and be able to connect with them at an emotional level.

People with cognitive disabilities such as Alzheimer's disease and related dementias (ADRD) have trouble completing activities of daily living (AD) and are usually assisted by a human care partner. The use of computerized intelligent cognitive assistants (ICAs) can help reduce a care partner's burden, and can increase feelings of independence and control in a care recipient. These ICAs take the form of automated methods for monitoring a person and inferring their activities, combined with some form of prompting to provide assistance when necessary. However, even when this technology satisfies functional requirements, people often reject it. We believe that a major reason for non-adoption is the lack of an affective (emotional) connection between technology and human.

For example, [20] demonstrates a prompting system called the COACH (Cognitive Orthosis for Assisting with aCtivites in the Home) that can monitor a person with Alzheimer's disease while they are

[1] (Wittgenstein 1998)

[2] (Wittgenstein 1970)

trying to wash their hands, detect when they have lost track of what they are doing, and play a prerecorded assistive prompt. The COACH is effective at monitoring and making decisions about when/what to prompt [20], and works well for some persons, but not as well for others. Considering the heterogeneity in socio-cultural and personal affective identities, a primary reason for lack of effectiveness may be the static, non-adaptive nature of the "canned" (pre-recorded) prompts. While we have made significant effort to design prompts founded on the methods and styles of human caregivers [38], a simple "one size fits all" style of prompting may be limiting. While one person may find a prompt helpful and motivational, another may find it imperious and impatient. The first person is likely to follow the prompt, to feel respected, valued, and in control, and to adopt and recommend the technology. The second person, on the other hand, may feel confused by the prompt and discontinue the task. However, a different style of prompting (i.e. a more subtle prompt, perhaps with a different tone of voice, or with a different wording), may be much more effective for the second person, but not for the first. Each person comes from a different background, has a different sense of "self", and has different emotional responses to prompts. In this thesis, we make use of a sociological theory of identity and the "self" called "Affect Control Theory" (ACT) [9, 16]. ACT posits that humans seek emotional consistency in their interactions, and value others who understand and respect their emotional sense of self (their "identity"). Affective identity is believed to be a powerful tool for reasoning about illness in general [15]. Studies of identity in Alzheimer's disease have found that identity changes dramatically over the course of the disease [23], and that persons with AD have more vague or abstract notions of their identity [31].

Our long-term aim is to build technology that will detect and adapt to these differences. In this thesis, we describe a study that looked specifically at the emotional interpretation of audio-visual prompts involving virtual humans. We tried to determine the mapping between the delivered prompt and the affective space, considering full-body gestures and facial expressions. Our study took place in two phases. In phase I, described in [18, 19], we customized a virtual human character in a full body pose and created a set of audio-visual prompts, using a Virtual Human Toolkit (VHT)[3] developed by the University of Southern California's Institute for Creative Technologies. We built a set of six audio-visual prompts (for different steps of the handwashing task) with five different emotional deliveries (e.g. "bossy", "motherly" or "bored"). We then did an online survey to measure human responses to these thirty different prompts. Most of the participants were in age group ranging from 18-54 yrs. and one was in the age group of 65 yrs. and older. We measured responses on three important emotional dimensions of Evaluation (valence),

[3] http://ict.usc.edu/prototypes/vhtoolkit

Potency (power/dominance) and Activity, termed as EPA. We analyzed the results from 27 respondents primarily in terms of the consensus of respondents within each measured dimension (EPA). We show that while the respondents seemed to agree (reach consensus) on the evaluation dimension ("good" vs. "bad"), there was less clear agreement on the potency ("powerful" vs. "powerless") or activity ("active" vs. "asleep") dimensions. These considerations will be important in the pursuit of widely accepted and personally effective assistive technologies.

In phase II study [17], we developed prompts using virtual human characters from the Interactive Assistance Lab[4] at University of Colorado at Boulder [35]. We used their web API to customize for our purpose and achieved better dynamic interaction control. The characters also had few head and eye movements when in the idle state. For this phase, we had a close-up image of the characters with a primary focus on their facial expressions as they deliver the prompt. The goal of phase II study was to determine the facial expressions and EPA space mappings of the new virtual humans' expressive prompts by conducting a survey with an elderly population (65 yrs. and older) without Alzheimer's disease.

In order to develop prompts for assistive technologies, we will need to do a survey such as the ones we describe here, but with participants strictly from the target user group (elder persons with cognitive disabilities). However, this is not possible at such an early stage, due to the challenges posed by this population and the lack of any previously published work on automated emotionally aligned prompts. Without prior work, it would be very difficult to get ethical approval for studying prompts that react to and change the emotional state of persons with Alzheimer's disease, who generally cannot provide informed consent. Thus, surveying non-cognitively disabled persons is a critical building block towards an eventual survey of target user group.

This thesis is structured as follows: Chapter 2 gives background on dementia and the need for assistive technologies for ageing population. It gives an overview of an existing handwashing system and details the enhanced version of the system and the theories behind it, along with some related work in the area of virtual humans and emotions. Chapter 3 describes the design of the virtual human character and video prompts for the phase I study. Chapter 4 describes the phase I user study and results analysis. Chapter 5 describes the design of the virtual human characters and prompts for the phase II study. Chapter 6 describes the phase II user study, and results analysis. Chapter 7 concludes and discusses potential future work.

[4] http://interactive.colorado.edu/

Chapter 2
Background

Dementia is a set of symptoms that are caused by disorders affecting the brain. Symptoms may include memory loss and difficulties with thinking, problem-solving or language, severe enough to reduce a person's ability to perform everyday activities. A person with dementia may also experience changes in mood or behavior leading to depression or aggression. Different types of dementia are caused by different physical changes to the brain and most of them are not reversible. The most common cause of dementia is Alzheimer's disease, accounting for as many as 70-80% of all cases of dementia. According to the World Alzheimer Report 2015[5], 46.8 million people were living with dementia worldwide, and the figures are predicted to nearly double every 20 years, increasing to 74.7 million by 2030 and 131.5 million by 2050. Incidence of dementia increases exponentially with increasing age. In 2015, the global population of older persons (60 years or over) was over 900 million[6], which is predicted to grow by 56% by 2030, reaching 1.4 billion. By 2050, it is projected to reach nearly 2.1 billion.

With fast ageing population and growing healthcare costs, the use of assistive technologies becomes more important than ever. Such technologies aim to help patients to perform activities of daily living more independently, thereby reducing burden on caregivers and lowering overall healthcare costs. In this thesis, we focus on one such assistive technology called COACH (Cognitive Orthosis for Assisting with aCtivites in the Home) [20] for helping patients to wash their hands. The handwashing task may seem a simple one at first, but for people with cognitive disabilities, such a simple task is also very challenging.

The task of hand washing activity consists of five essential steps: turning water on, using soap, rinsing hands, drying hands, and turning water off. The assistive handwashing system COACH uses a video camera placed above the wash basin that captures the current activity by tracking hand and towel positions. An artificial intelligence module determines an appropriate action to take: either 'prompt the user' for one of steps of handwashing, or 'summon the caregiver' or 'continue observing the user activity'. A prototype of an enhanced version of COACH [11, 14] that incorporates a model of social interaction based on Affect Control Theory (ACT) and emotional intelligence was recently developed, which is a step towards making the system more human-like and thereby improving interaction with the

[5] http://www.alz.co.uk/research/WorldAlzheimerReport2015.pdf

[6] http://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2015_Report.pdf

user. The speaker of the prompt is not currently visualized in all versions of the COACH system, which still limits the interaction between the patient and the system from being a more natural interaction between the patient and the caregiver.

Affect Control Theory (ACT) arises from work on the sociology of human interaction [9]. ACT proposes that social perceptions, behaviors, and emotions are guided by a psychological need to minimize the differences between culturally shared fundamental affective sentiments about social situations and the transient impressions resulting from the interactions between elements within those situations. Fundamental sentiments, f, are representations of social objects, such as interactants' identities and behaviors or environmental settings, as vectors in a three-dimensional affective space. The basis vectors of the affective space are called Evaluation/valence, Potency/control, and Activity/arousal (EPA). The EPA space is hypothesized to be a universal organizing principle of human socio-emotional experience, based on the discovery that these dimensions structure the semantic relations of linguistic concepts across languages and cultures [26]. They also emerged from statistical analyses of the co-occurrence of a large variety of physiological, facial, gestural, and cognitive features of emotional experience [7], and relate to the universal dimensionality of personality, and social cognition [32].

EPA profiles of concepts can be measured with the semantic differential, a survey technique where respondents rate affective meanings of concepts on numerical scales. In general, within-cultural agreement about EPA meanings of social concepts is high even across subgroups of society, and cultural-average EPA ratings from as little as a few dozen survey participants are extremely stable over extended periods of time [10]. For example, the EPA for the identity of "nurse" is [1.65, 0.93, 0.34], meaning that nurses are seen as quite good (E), a bit powerful (P), and a bit active (A)[7]. Comparatively a "patient" is seen as [0.9, −0.69, −1.05], less powerful and less active than a "nurse". Social events cause transient impressions, τ, of identities and behaviors that deviate from their corresponding fundamental sentiments, f. ACT models this formation of impressions from events with a minimalist grammar of the form agent-behavior-client. Consider, for example, a nurse (agent) who ignores (behavior) a patient (client). Observers agree, and ACT predicts, that this nurse appears (τ) less nice (E), and less potent (P), than the cultural average (f) of a nurse. The Euclidean distance between τ and f is called the deflection (D), and is hypothesized to correspond to an aversive state of mind that humans seek to avoid (the affect control principle). For example, the nurse who "ignores" a patient has a deflection of over 15 (very high),

[7] EPA values range from -4.3 to 4.3 by convention

whereas if the nurse "comforts" the patient, the deflection is 1.5 (very low). The affect control principle also allows ACT to compute normative actions for artificial agents: those that minimize deflection. ACT has been shown to be a powerful predictor of human behavior [16]. One of the studies which tests and validates the principles of ACT applied to nonverbal behaviors is given in [33]. A software tool that implements ACT is Interact[8]. It has a dictionary of various datasets across six nations, ranging from 1977 to 2007, and consists of EPA profile ratings for words (actor, behavior and object), rated by male and female raters. This is useful in cross-cultural and historical analysis. In addition, it also displays interactant's facial expressions based on the Ekman's principles [8]

Recently, a probabilistic and decision theoretic generalization of the ACT model was proposed called BayesAct [11]. BayesAct allows the principles of ACT to be used to guide artificially intelligent systems on an emotional level. It also allows ACT to model more complex affective sentiments, including ones that are multi-modal. A proposal to use BayesAct in the COACH system was presented in [11], and a proof of concept integration was presented in [14]. This combination created an "enhanced" COACH system that could choose an appropriate action with an EPA output that minimized deflection according to ACT principles. In this thesis, we develop a set of prompts given by various virtual humans that can be used by the COACH system enhanced with the BayesAct engine. The measured EPA values given by the study can provide a reference for the resulting system to output the best (emotionally aligned) prompt expressively communicated by a virtual human, for a desired user action step. A proof of concept system using the measured EPA values of the prompts from phase I of the study and integrating COACH with BayesAct was presented in [14]. The measured EPA values of the prompts from phase II, given by elderly people can be integrated in the enhanced COACH system in the near future.

2.1 Related Work

With the aim of designing and developing a virtual human interface for the enhanced COACH system, in this section we explore related work in the area. To be able to comfortably interact with the virtual human on an on-going basis, virtual human should be accepted and liked by the elderly population. Some studies described below give hope that the target population can embrace virtual humans.

A study on evaluation of interfaces [24] was conducted with three groups of elderly people. The first group had no cognitive impairment, the second group had mild cognitive impairment and the third group were in the moderate stage of Alzheimer's disease. They evaluated three interfaces viz.,

[8] Available download at http://www.indiana.edu/~socpsy/ACT/

conversational virtual character interface, text and speech interface and text only interface. The results showed that all groups correctly performed the requested task 92% of the time when asked by the virtual character, 75% of the time when using text and speech interface, 66% of the time when using text only interface. They also evaluated recognition of six basic emotions by each group and found that the most identified emotions by all groups were joy and sadness.

Another study was conducted with individuals having mild Alzheimer's disease to evaluate and compare the task of answering questions posed by a virtual agent system and the same questions posed by a human partner [39]. Based on the utterance of syllables, all subjects uttered 74% syllables in agent condition, whereas they uttered 100% in human condition. Although, quantitatively, the success rate was more in the human condition, the agent system was considered as a good alternative to a human partner. Qualitative feedback from subjects suggested the virtual agent system was enjoyable and less stressful than human interaction.

Amidst myriad computer interfaces that exist today, the need for having natural human-like interaction with a computer system can be fulfilled by virtual humans [12]. They describe a virtual human system, which is an integrated system combining various AI technologies like speech recognition, natural language understanding and generation, dialog management, cognitive modeling and reasoning, virtual human architectures and computer graphics and animation. Such systems can interact with users affectively and respond with verbal and non-verbal output. Some examples of implemented virtual human systems in healthcare context are SimCoach [29] and SimSensei Kiosk [3]. SimCoach is an online virtual human system, which aims to provide initial intervention and guidance to US military personnel, veterans and their families encouraging them to seek professional help for their healthcare and general personal welfare. SimSensei Kiosk is an interactive virtual human based clinical decision support tool for face-to-face interviews to assess indicators related to psychological distress conditions such as depression, anxiety and post-traumatic stress disorder. The interviews are 15-25 minutes in length and provide users with an environment to comfortably talk and share information. Some virtual human systems have been specially designed for providing speech therapy to persons with Parkinson disease [2] and persons with Aphasia [35]. An interesting seal robot called PARO [37] was created for robot therapy and studies conducted showed that their interaction helped elderly to relieve stress and increase interaction.

A good overview of creating expressive and believable virtual characters for any application considering personalities and emotions, respecting rules of social behavior and expressing through face, gaze, body pose and movement is given in [36] . General recommendations for the creation of an

affective embodied conversational agent (ECA) in healthcare context for elderly people is presented in [6]. They advise using a fictional character as opposed to a model of a real-person to avoid confusion if the real person also interacts with the user. Other suggestions include being careful so as to have as little mismatch as possible with audible and visible age due to voice and face respectively, and that the facial expressions should be accompanied by appropriate level of arousal in speech that matches the intended expressions. A study on interactive learning found out that there are some gender-based and individual differences in the user's perception of a life-like character, which should be taken into account while designing virtual characters. [22]

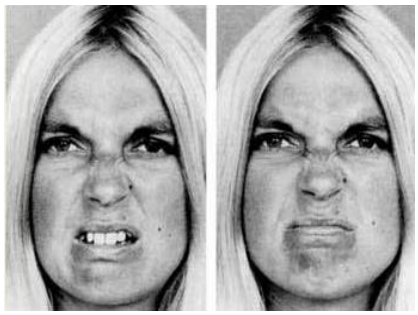
A cross-cultural user study related to virtual human is presented in [28], indicating high correlation between Chinese and non-Chinese group of people in recognizing the valence of emotional states of a virtual human in listening and speaking phases.

In order to guide our design of virtual humans' expressive face in the phase II study and depict emotion on their face, we reviewed work by Paul Ekman's group[9]. Facial expression of emotions has been extensively studied in [4, 5]. They have validated universality of six basic emotions and also studied their corresponding appearance on the three areas of face which are capable of independent movement (brow/forehead; eyes/lids and root of the nose; and lower face including the cheeks, mouth and most of the nose) for two actor models [4]. Table 2.1 lists the key findings and photographs from [4], which helped in deducing principles of mapping EPA profiles to changes in mouth, eyes and brows as reported in [8]. We summarize the principles in Figure 5.2, which forms the basis of our design of facial expression of emotions.

Table 2.1: Facial manifestations of six basic emotions (images and text from [4])

Emotion	***Photograph***	***Depiction on facial components***
Surprise		The brows are raised, so that they are curved and high. The skin below the brow is stretched. Horizontal wrinkles go across the forehead. The eyelids are opened; the upper lid is raised and the lower lid drawn down; the white of the eye-the sclera-shows above the iris, and often below as well.

[9] http://www.paulekman.com/

		The jaw drops open so that the lips and teeth are parted, but there is no tension or stretching of the mouth.
Fear		The brows are raised and drawn together. The wrinkles in the forehead are in the center, not across the entire forehead. The upper eyelid is raised, exposing sclera, and the lower eyelid is tensed and drawn up. The mouth is open and the lips are either tensed slightly and drawn back or stretched and drawn back.
Disgust		**Shown primarily in the lower face and in the lower eyelid** The upper lip is raised. The lower lip is also raised and pushed up to the upper lip, or is lowered and slightly protruding. The nose is wrinkled. The cheeks are raised. Lines show below the lower lid, and the lid is pushed up but not tense. The brow is lowered, lowering the upper lid.
Anger		**Manifested in each of the three facial areas** The brows are lowered and drawn together. Vertical lines appear between the brows. The lower lid is tensed and may or may not be raised. The upper lid is tense and mayor may not be lowered by the action of the brow.

		The eyes have a hard stare and may have a bulging appearance. The lips are in either of two basic positions: pressed firmly together, with the corners straight or down; or open, tensed in a squarish shape as if shouting. The nostrils may be dilated, but this is not essential to the anger facial expression and may also occur in sadness. There is ambiguity unless anger is registered in all three facial areas.
Happiness		**Shown in the lower face and lower eyelids** Corners of lips are drawn back and up. The mouth may or may not be parted, with teeth exposed or not. A wrinkle (the naso-labial fold) runs down from the nose to the outer edge beyond the lip corners. The cheeks are raised. The lower eyelid shows wrinkles below it, and may be raised but not tense. Crow's-feet wrinkles go outward from the outer corners of the eyes
Sadness		The inner corners of the eyebrows are drawn up. The skin below the eyebrow is triangulated, with the inner corner up. The upper eyelid inner corner is raised. The corners of the lips are down or the lip is trembling.

Chapter 3
Phase I Design

In phase I, we aimed to determine full-body gesture in the EPA space and to conduct a survey with all age-groups population. This way we could derive EPA and full-body gesture mappings using the expressive prompts of the new virtual humans, which would help in integrating into an enhanced hand washing system prototype and other systems using virtual human assistants. The prompt videos generated in this phase, consisted of a virtual human character called 'Rachel' created with the Virtual Human Toolkit (VHT)[10]. Figure 3.1 shows virtual humans from VHT. We used the NonVerbal Behavior Generator, the SmartBody module, and the Character Customizer tools that allow for the quick setup of a single-character scene and a set of lines for the character to act out. These modules offer control over camera angles, backgrounds, voices and facial animation. The prompts were entered and the facial expression was configured for each prompt. Certain behaviors were assigned for certain words, so that the character could display accordingly when those words were spoken. Speech was used from one of the standard options 'Microsoft Anna'.

Figure 3.1: Virtual Human 'Rachel' on the left used in the phase I study

[10] Virtual Human Toolkit (https://vhtoolkit.ict.usc.edu)

3.1 Prompts Design

We chose to evaluate 5 archetypal "personalities" for prompting, corresponding to EPAs: (+ + +), (+ - -), (- + +), (- - -), and (+ - +). We refer to these as the "Expected EPA" values as given in Table 3.1. These personalities corresponded roughly to the identities of "big sister", "grandmother", "politician", "bore", and "teenager", respectively, according to the sentiment repository distributed with [9]. These EPA profiles were selected as those we could represent with the VHT and that spanned the space of usual affective identities.

Table 3.1: Behavior/Identities and Expected EPA

Behavior/identities	Expected EPA
discipline/big sister/supervise	+ + +
request/granny/bow to	+ - -
bossy/politician	- + +
unadventurous/bore	- - -
impatient/teenager/little brother	+ - +

We had 5 functional prompts, as in [20], and added one more for goodbye.

Hence we had 30 videos to be surveyed (6 functional x 5 personalities). The full set of prompts (linguistic component only) are shown in Table 3.2.

Table 3.2: Phase I prompts for handwashing steps

Step	**discipline/big sister/supervise**	**request/granny/ bow to**	**bossy/politician**	**unadventurous/ bore**	**impatient/ teenager/little brother**
wateron	*Hi there, good to see you. Let's get started. Try turning on the water*	*Hello. I am so glad to have you here. Please turn on the water*	*Hi. Let's start washing your hands. Turn on the water.*	*Hey. Came to wash your hands? Turn on the water if you want*	*I want you to turn the water on*

soap	*Try putting on some soap.*	*You are washing your hands. Please use the soap.*	*NOW use the soap*	*If you want to put on some soap, there is a soap pump lying around*	*I want you to put on some soap*
wet	*Try rinsing your hands.*	*Please rinse your hands.*	*Rinse your hands NOW*	*Rinse your hands if you want*	*Can I get your hands rinsed?*
wateroff	*Try turning off the water.*	*Please turn the water off. Thank you*	*Will you turn off the water NOW*	*Turn the water off when done*	*I want you to turn off the water*
dry	*Good job. Try using the towel to dry your hands.*	*You are doing great. Please dry your hands using the towel.*	*NOW dry your hands*	*There is a towel somewhere to dry your hands*	*Can I get your hands dried up?*
goodbye	*Good bye. Hope to see you soon*	*Please come back. I shall wait for you*	*You are done. Leave NOW*	*Will see you whatever*	*Can you come back soon?*

Based on Expected EPA we devised a set of non-verbal behavior rules in the Virtual Human Toolkit to match with the speech. For example, to have our character 'Rachel' deliver the prompt in a bossy manner, we put in a rule so that whenever the word 'NOW' occurs in the prompt, the character would use ChrRachel@Idle02_BeatFistMidLf01 as an animation, which depicts a commanding behavior by moving a closed fist similar to a beating movement in an up and down fashion, as shown in Figure 3.2. Also the facial expression was customized to have an angry look on Rachel's face to complement the speech and behavior. The non-verbal rules were designed by the authors according to their intuitive feelings about the expected identities and behaviors as shown in Table 3.1.

Figure 3.2: Phase I design sample frames from a "Bossy" prompt to dry hands

Chapter 4
Phase I User Study

An online survey was conducted in which participants were asked to watch 30 videos and rate them based on Evaluation, Potency, and Activity dimensions (on a discrete scale of -4 to +4 with increments of 1 for a total of 9 options). We applied the standard methodology of the semantic differential, as developed and validated by Osgood (described in detail in [10]). Ideally, we wanted the extreme points on the scale to be -4.3 and +4.3, based on widely accepted scale in affect control theory community, but due to limitations in the online survey tool, we had it all equally spaced. Each video was around 5 seconds or less in length. We showed sets of concepts at either end of the scales as follows:

- Evaluation: bad/awful to good/nice
- Potency: impotent/powerless/little to potent/powerful/big
- Activity: inactive/slow/quiet to active/fast/noisy

These combinations of adjectives are meant to reduce the effects of concept-scale interactions (where the words defining the scales cause changes in participant's responses on the absolute scale values) [10]. Further, the use of a single scale for each dimension is a tradeoff of measurement and economy. The survey took 10 minutes to complete, a significant barrier to getting sufficient respondents. We provided meaning of all three dimensions to the participants before they started the survey and put labels for the ranges to guide them.

The questions were presented in randomized order and the survey was kept active for three weeks. The survey was advertised on local and international mailing lists. Participants were shown a setup video before providing their ratings, so they could confirm if their video and audio was working. They could skip any question or exit the survey at any point in time. At the end of the survey, information on gender, age group, and free-form comments were requested. In the end, an appreciation video was shown. There were total of 27 respondents, with most of them in age-group of 18-54 yrs. and one of them in the group of 65 yrs. or older (16 males/9 females/2 unknown gender with 18 nationals and 9 internationals) who answered more than 90% of questions. An example screen shot showing one of the questions is shown in Figure 4.1.

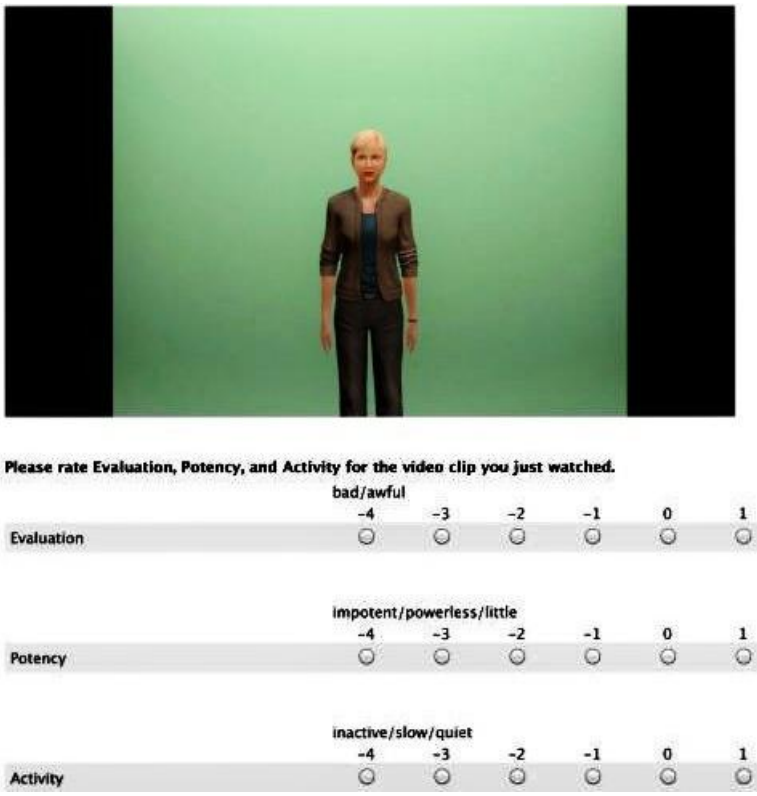


Figure 4.1: Phase I survey sample screenshot of virtual human and three rating scales.

We considered survey result data for total of 30 videos from 27 respondents. The missing entries for each question (E, P, or A) were imputed with the average values across each question. In the following, we analyze the consensus of participants across the 6 functional prompts within the 5 emotional styles.

4.1 Consensus Analysis

To determine consensus amongst participants, we followed the culture-as-consensus model measuring the shared knowledge of the culture within the respondents [1, 34and 10]. The culture consensus model and consensus analysis is based on the following assumptions:

1. Respondents share a common culture (i.e., there exists a single set of answers to the question(s)).

2. Answers are provided by each respondent independently of all other respondents (not by a group nor in consultation with others).

3. The questions asked should all be on a single topic and at the same level of difficulty.

Considering assumption 2 and 3 are true, then this analysis allows measurement of whether respondents homogeneously represent a common culture that explains the similarity in their answers to questions about the cultural norms [30]. The idea is that people who share same domain knowledge will respond with similar answers giving maximum consensus. The others who do not share the same knowledge will not have commonality in responses. This method helps uncover socially shared information if it exists and can provide high level of statistical confidence with even small sample sizes of 4 to 30 participants.

The method computes the Eigenvalues of the covariance matrix of all responses for each of E, P, A separately, where the covariance is computed in the space spanned by the participants, with data given by the questions. Thus, we are computing the principal components that indicate the extent to which respondents agree in their ratings across all items. If there is one large first factor (i.e. the first Eigenvalue is notably larger than the second Eigenvalue), this reflects cultural commonality in the respondent's ratings and provides evidence of one dominant factor governing respondent's judgements [10]. In this thesis, if the first-to-second Eigenvalue ratio is equal or greater than 2.0, it is considered as significant, as suggested by [30, 10]. For our analysis in this thesis, we used MATLAB software, which has a function pca for principal component analysis of raw data using eigen value decomposition algorithm. Syntax is as below:

[coeff,score,**latent**,tsquared,explained,mu] = pca(data_E_inv, 'Algorithm', 'eig')

Here data_E_inv is nq x nr matrix for data for E dimension, where nq is number of questions and nr is number of respondents for the particular analysis

Similarly, we would have inverse matrices for data for P and A dimensions

'**latent**' stores the variances of principal components and gives the eigen values as a column vector.

We then calculate eigen ratio as ratio of first to second values in the latent variable for a particular dimension.

In this study, we first consider consensus across all the data, followed by more detailed analyses across different subsets of the data. Figure 4.2 summarizes consensus highlighted in green. Dark green is for values greater than or equal to 2.0, light green for values 1.8 - 2.0, close to consensus. For raw data and eigen ratios refer [18] and Appendix E, F.

All Data based Analysis: Respondents agreed on the E dimension and were close to consensus on A

Gender based Analysis: We then performed analysis based on gender. For both gender, there was higher consensus for the E dimension. Males were close to consensus on A dimension.

Sub-groups of dataset	Consensus E	Consensus P	Consensus A
All Data	8.5	1.5	1.9
Male Respondents	6.4	1.7	1.8
Female Respondents	8.2	1.2	1.7
Canadian Respondents	7.1	1.5	1.6
Expected EPA + + +	2.2	1.7	2.0
Expected EPA + - -	2.5	2.3	1.1
Expected EPA - + +	3.0	1.9	1.2
Expected EPA - - -	1.9	1.7	2.0
Expected EPA + - +	1.8	3.5	1.3

Figure 4.2: Phase I Consensus Summary

Canadian based Analysis: We performed analysis based on responses from Canadian IP addresses only. Canadians had agreement on the E dimension.

Expected EPA category based Analysis: We analyzed Eigenvalue ratios for each type of expected EPA and the findings were as follows:

+ + +: There was more agreement on E and A dimension.

+ - - : There was more agreement on E and P dimension.

- + +: There was more agreement on E dimension and close to agreement on P dimension.

- - - : There was more agreement on A dimension and close to agreement on E dimension.

+ - +: There was more agreement on P dimension and close to agreement on E dimension.

We see from the above analysis that the first two categories showed consensus in more than one dimension as opposed to all data based, gender based and Canadian based analysis which showed consensus in only E dimension. We computed Pearson's r-values as well, but the results were less conclusive (see Appendix G).

4.2 Discussion

The survey analysis in Figure 4.2 showed a consensus in one dimension (E), but not so much in the other two (P and A). This replicates the results originally presented by Osgood [25, 26] and replicated in many subsequent and cross-cultural studies [10]: the primary factor that accounts for over half the variance observed in cultural consensus studies is the evaluative one (E), with potency and activity accounting for roughly half as much variance again. In our case, we also have non-verbal behaviors, which leads to further lack of consensus. Further, respondent's comments indicated that they may have been somewhat unsure about how to rate the activity dimension, with some respondents believing it had to do only with the level of motion exhibited by the virtual character. The inherent nature of Potency and Activity

dimensions can be one of the causes of ambiguity and hence lack of consensus. For instance, an action displaying more active person can be interpreted as also being powerful.

The results obtained from the survey for each functional step can be incorporated in the enhanced COACH system's prompt selector in different ways. The most straightforward method is to assign an EPA vector for each of these video prompts using the average value from the survey result data and choosing the closest emotional prompt video by calculating the minimum Euclidean distance between the desired emotional EPA vectors (as computed with ACT or BayesACT based on an estimate of the affective identity of the person using the system, e.g. "patient") and the labeled EPA vectors for a specific functional prompt. This method was used in building the system described in [14].

However, lack of consensus can be leveraged by the BayesAct engine, as it is a probabilistic model and can evaluate each prompt decision theoretically, using the information about the lack of consensus amongst the respondents. To demonstrate this, let us take a simple example. Consider we have two prompts, P1 and P2. Suppose in our survey that everyone agreed that P1 had an E-value of 0.0, but 50% of the people said P2 had E-value of 2.0 and 50% said P2 had E = -2.0. This shows a lack of consensus amongst our survey population, but also shows that P2 is evaluated differently by different members of the population. For example, we might imagine P2 uses a certain hand gesture that is evaluated very negatively by about half the population due to a cultural difference, whereas P1 uses no hand gesture at all, so is evaluated as quite neutral by everyone. Now, suppose that BayesAct now calls for a prompt with an E-value of 2.0 (very positive), because it has figured out that this is the deflection minimizing prompt. It can pick P1, which it is certain will be evaluated at E=0.0, causing deflection of 2.0. Or, it can pick P2, which will cause zero deflection 50% of the time, and deflection of 4.0 50% of the time. Decision theoretically, the second choice may be a better one. For example, it may be possible to recover from the larger deflection of 4.0 quite easily, and so it is worth the risk. This way BayesAct can model the development of a consensus i.e., the BayesAct related system and a particular user will develop a dyadic consensus about the meaning of certain prompts.

As a secondary analysis, we also compared the mean EPA values measured in the survey with the EPA values that we chose originally for the videos (our expected EPA ratings for the videos). We compare these only as positive/negative agreement in Table 4.1-4.5 below. The agreement is highlighted in green color. EPA+++ and EPA-++ in particular had same expected and actual signs for E, P and A.

Table 4.1: Expected EPA + + + vs. Actual Mean EPA

	Sample behavior/identities: discipline/big sister/supervise			
Task	All	Male	Female	Canadian
wateron	+ + +	+ + +	+ + +	+ + +
soap	+ + +	+ + +	+ + +	+ + +
wet	+ + +	+ + +	+ + +	+ + +
wateroff	+ + +	+ + +	+ + +	+ + +
dry	+ + +	+ + +	+ + +	+ + +
goodbye	+ + +	+ + +	+ + +	+ + +

In Table 4.1, we have agreement in expected and actual EPA signs for all three dimensions

Table 4.2: Expected EPA + - - vs. Actual Mean EPA

	Sample behavior/identities: request/granny/bow			
Task	All	Male	Female	Canadian
wateron	+ + +	+ + +	+ + +	+ + +
soap	+ + +	+ + +	+ + +	+ + +
wet	+ + +	+ + +	+ + +	+ + +
wateroff	+ + +	+ + +	+ + +	+ + +
dry	+ + +	+ + +	+ + +	+ + +
goodbye	+ - +	+ + +	+ - -	+ - +

In Table 4.2, the agreement is in E dimension and discrepancies are mostly in dimensions of P and A, i.e. according to respondents the virtual assistant was powerful and active, whereas she was expected to be powerless and inactive.

Table 4.3: Expected EPA - + + vs. Actual Mean EPA

	Sample behavior/identities: bossy/politician			
Task	All	Male	Female	Canadian
wateron	- + +	- + +	- + +	- + +
soap	- + +	- + +	- + +	- + +
wet	- + +	- + +	- + +	- + +
wateroff	- + +	- + +	- + +	- + +
dry	- + +	- + +	- + +	- + +
goodbye	- + +	- + +	- + +	- + +

In Table 4.3, we have agreement in expected and actual EPA signs for all three dimensions

Table 4.4: Expected EPA - - - vs. Actual Mean EPA

	Sample behavior/identities: unadventurous/bore			
Task	All	Male	Female	Canadian
wateron	- - +	- - -	- - +	- - +
soap	- - +	- - +	- - +	- - +
wet	- - -	- - -	- - -	- - -
wateroff	- + +	+ + +	- + +	- + +
dry	- - -	- - -	- - -	- - -
goodbye	- - +	- - +	- - +	- - +

In Table 4.4, agreement is mostly in dimensions of E, P and discrepancies are mostly in dimension A, i.e. according to respondents the virtual assistant was active, whereas she was expected to be inactive.

Table 4.5: Expected EPA + - + vs. Actual Mean EPA

	Sample behavior/identities: impatient/teenager/little brother			
Task	All	Male	Female	Canadian
wateron	+ + +	+ + +	+ + +	- + +
soap	+ + +	+ + +	+ + +	+ + +
wet	+ + +	+ + +	+ - +	+ + +
wateroff	+ + +	+ + +	+ + +	+ + +
dry	+ + +	+ + +	+ - +	+ + +
goodbye	+ + +	+ + +	+ - -	+ + +

In Table 4.5 above, the agreement is mostly in dimensions of E, A and discrepancies are mostly in dimension P, i.e. according to respondents the virtual assistant was powerful, whereas she was expected to be powerless. Overall, there seems to be agreement in E and A dimension from the expected EPA sign's perspective.

4.3 Feedback

The free-form comments requested at the end of the survey gave us valuable indications and feedback for future work. The most common comments were focused on the quality of the speech synthesis, which was considered to be "robotic", "not realistic", "too fast" and "not engaging", and the distance that the virtual human seemed to be away, such that facial expressions were hard to see. There were only slight differences in body motions/gestures for some of the prompts, which some participants did not notice at first, and then commented on this subtlety. The speech and gestures, and the distance from the camera to the virtual human were both known limitations of the toolkit, which is a development in progress by the USC group.

Some comments focused on the content/delivery of the prompts specifically. For example, one respondent called for “more politeness-please, thank you, etc.”, another indicated that “the prompts were neither positive nor negative, but strange. For instance “'please come back' sounds like begging, which would be creepy (for lack of a more scientific term) coming from a robotic system.”, while a third said that captions would be helpful on the videos. These comments give us valuable ideas for new types of prompts that can be developed: it shows that some persons would like more politeness or less creepiness. However, it may be that some other respondents preferred lack of politeness (for example), and so we can add more prompts to the set of possibilities.

Other comments indicated that the survey was too long, and that many questions may have been skipped because of this. The software we used did not allow for a progress bar to be displayed, and this may have helped. We hope to use this feedback given by the respondents of the survey to guide our implementation and design choices in future.

4.4 Summary

The user study conducted in phase I paved a way to improve an assistive handwashing system that helps persons with cognitive disabilities. It will transform the system from being just a hand washing assistant ‘system’ to being a ‘virtual human’ assistant having emotions, with the ability to interact through the prompt videos with the users like any other human would do. The lack of consensus in the P and A dimensions that was found in this phase is a significant issue that needs to be addressed. As we have described, the BayesACT engine can potentially be able to handle this in a near-optimal way. On the other hand, our survey may have included people from many cultures with different interpretations of the prompts (especially the non-verbal components). In next phase, we conduct user study with different virtual human characters, with focus on facial expression design and surveying with elderly population.

Chapter 5
Phase II Design

Video prompts design and survey from the phase I user study gave us ideas on designing an improved virtual human. The Virtual Human Toolkit that we used for phase I is a feature-packed software with full body character customization support to some extent and also video recording capabilities. We could customize background, attire of the virtual human, body movements and behaviors for certain words and also add sub-titles. Some downsides were that the virtual human had a robotic voice, getting a close-up image was difficult, and expression control and dynamic interaction support was limited. The software is computationally heavy requiring high memory. Design-wise the videos were static and unrealistic. Further, both facial expressions and body movements had a combined effect on the results.

For phase II, we narrowed our focus mainly on facial expressions by using a close-up image of the character as they deliver the prompts. We explored virtual humans from the Interactive Assistance Lab[11] at University of Colorado at Boulder, shown in Figure 5.1 below. Customization was simpler as the interface is based on a simple API. It provides better dynamic interaction control, the close-up is good. It is not computationally intensive. The characters have a few head and eye movements when in idle state.

Figure 5.1: Virtual Humans used in the phase II study

[11] http://interactive.colorado.edu/

The end goal of the handwashing system is to have an interactive virtual human assistant who can emotionally align with the user. The phase II study aimed to determine the facial expressions in the EPA space and thereby derive EPA and facial expression mappings using the expressive prompts of the new virtual humans, to conduct a survey with an elderly population, and to analyze results. The hope is that this research study would help in integrating into an enhanced hand washing system and other systems using virtual human assistants.

5.1 Facial Expressions

The facial expressions relating to six universal emotions were studied extensively by Paul Ekman [4, 5], indicating how the facial muscles of mouth, brows and eyes contribute towards emotion display on the face. Figure 5.2 shows mappings based on Ekman's work, categorized according to the three basic emotion dimensions (EPA) of ACT. These mappings are those used in the Interact[12] simulator to generate a set of facial expressions in a simple virtual character (outlined in [8]). Formulas for adjusting lips, brows and eyes are carefully defined based on input EPA profile values so that they appear realistic.

Facial component	E, P or A impact	E+	E-	P+	P-	A+	A-
mouth (lips)	EPA	curve the lips up	curve the lips down	move lips higher (esp. upper lips)	move lips downwards	drop lower lip and narrow the lips	raise lower lip and draw the lips outward
brows	EP	increase upward arching of brows	reduce upward arching of brows	lower and close brows	raise and separate brows		
eye	A					widen separation between eyelids	reduce separation between eyelids

Figure 5.2: Facial Expression guidelines

Some expressions for basic emotions, along with their EPA values based on two datasets Canadian dictionary 2001-3 and China dictionary 1991 are shown in Figure 5.3. We chose Canadian as the main dataset, but as the EPA ratings for emotion of disgust was not present in it, we considered disgust from China dataset. The EPA values for the emotional behavior concepts are rated by female raters.

[12] Available download at http://www.indiana.edu/~socpsy/ACT/

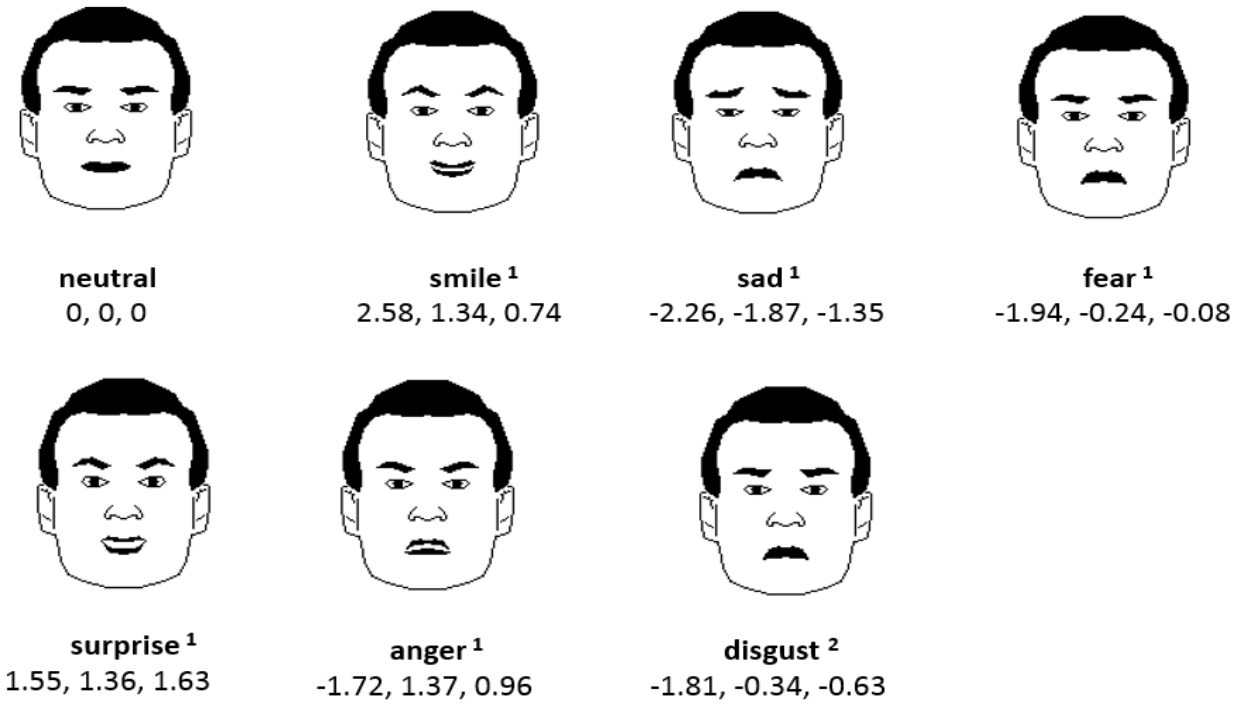


Figure 5.3: Sample Interact simulator results

5.2 Prompts Design

Based on the principles of expressions for EPA profiles, we customized the virtual humans from the Interactive Assistance Lab[13] at the University of Colorado at Boulder. For this phase of study, we considered only the 'water on' step in the hand washing task, so as to focus on studying the emotions of the virtual characters prompting the user for that particular task-step. For other task-steps, similar prompt text could be used with task-step specific words, but with the same expression. Studying the 'water on' step will give us an idea about designing for other task-steps. We customized 11 prompts for each male and female virtual character, resulting in a total of 22 prompts. Based on the principles of expressions for EPA profiles given in Figure 5.2, we customized the virtual humans from University of Colorado [35], using their web-based API, by calling their Javascript functions to create male or female characters with particular screen dimensions and invoking the voice prompt generation function with prompt text, that is

[13] http://interactive.colorado.edu/

tagged with expressions, which is displayed on the character's face as he/she speaks the prompt words. The expression tag details are given below:

[tag] := <[tag_name=amount] duration=[duration_info] side=[side_info]>

[tag_name] := sad, smile, happy, fear, disgust, anger,
turn_right, turn_left, turn_up, turn_down,
look_left, look_right, look_up, look_down,

For the below [tag_name] values, left or right can be specified. Default is both sides

blink,
brow_in_in, brow_in_up, brow_out_up,
top_eyelid, bottom_eyelid,
lip_pull_up, lip_pull_down, lip_smile,
pout, tense, purse

[amount] := [0-100+]

[duration_info] := [number_info][unit_into]
[number_info] := floating point
[unit_info] := [milliseconds_unit] | [second_unit] | [minute_unit] | [word_unit] | end
[word_unit] := word | words | wd
[minute_unit] := min | minutes | minute | m
[second_unit] := second | s | sec | seconds
[millisecond_unit] := ms | milli | millisecond | milliseconds

[side_info] := right, left, both

For example, if we would like the character to smile and have brows arch upwards, (which maps to E+ as in Figure 5.2), then we can tag a prompt words as below

<lip_smile=80><brow_in_up=30><brow_out_up=30>

This is used in the prompt design shown in Table 5.1 for E as positive. For E as more positive, the values of the tags are increased and tags become <lip_smile=110><brow_in_up=60><brow_out_up=60>

Similarly tags for P and A were designed. Some tags like <nose_disgust> had to be used to achieve the right effect and to make the expression more realistic. For neutral expression, no tag was used.

Prompt text and expression were designed based on expected EPA in terms of positive, negative and neutral for each dimension. For example, while designing a prompt for EPA + + + i.e. positive on all dimensions, we devised prompt text as 'Hello. I am so glad to have you here. Turn on the water.' The corresponding expression had lips curved up for smile, brows arched upwards, lips pulled up higher, eyelids widened, and lower lip dropped. The prompts and corresponding expressions designed for phase II are shown in Table 5.1.

Table 5.1: Phase II prompts and expressions designed for 'water on' step

E	P	A	Prompt text	Expression E color P color A color
+	+	+	Hello. Turn on the water	<lip_smile=80><brow_in_up=30><brow_out_up=30> <lip_pull_up=10><nose_disgust=30><blink>
+	-	++	Hello. Please turn on the water	<lip_smile=80><brow_in_up=30><brow_out_up=30> <lip_pull_down=20><surprise=80><pout=10><blink>
+	-	-	Hello. Please turn on the water	<lip_smile=80><brow_in_up=30><brow_out_up=30> <lip_pull_down=20><top_eyelid=20><tense=10>
++	+	+	Hello. I am so glad to have you here. Turn on the water	<lip_smile=110><brow_in_up=60><brow_out_up=60> <lip_pull_up=10><nose_disgust=30><blink>
++	-	++	Hello. Please turn on the water	<lip_smile=110><brow_in_up=60><brow_out_up=60> <lip_pull_down=20><surprise=80><pout=10><blink>
++	-	-	Hello. Please turn on the water	<lip_smile=110><brow_in_up=60><brow_out_up=60> <lip_pull_down=20><top_eyelid=20><tense=10>
++	++	++	Hi. Turn on the water NOW	<lip_smile=110><brow_in_up=20><brow_out_up=20> <lip_pull_up=50><nose_disgust=60><surprise=80><pout=10><blink>
++	++	-	Hi. Turn on the water NOW	<lip_smile=110><brow_in_up=20><brow_out_up=20> <lip_pull_up=50><nose_disgust=60><top_eyelid=20>
N	N	N	Hi. Turn on the water	
- -	++	++	Hey. Turn on the water NOW	<purse=50><lip_pull_up=50><nose_disgust=60><anger=80> <surprise=80><pout=10><blink>
- -	++	-	Hey. Turn on the water NOW	<purse=50><lip_pull_up=50><nose_disgust=60><anger=20> <top_eyelid=20>

Chapter 6
Phase II User Study

An online survey for the newly designed prompts was conducted in which participants were asked to play and watch the 22 prompts and rate them based on Evaluation, Potency, and Activity dimensions (on a scale of -4.3 to +4.3). For each dimension a bi-polar scale called semantic differential was used, labelled as infinitely (-4.3), extremely (-3), quite (-2), slightly (-1), neutral (0), slightly (1), quite (2), extremely (3), infinitely (4.3). We provided meaning of all three dimensions to participants before they started the survey (Refer Appendix Figure A.3). The survey application was built in-house. Sample survey question page is shown in Figure 6.1. The order of prompts always remained same for all the participants. The female and male character prompts were in alternating fashion, with female character prompt shown first. The alternating female and male character prompt pair had same design of expressive prompt. Each prompt was around 5 seconds or less in length.

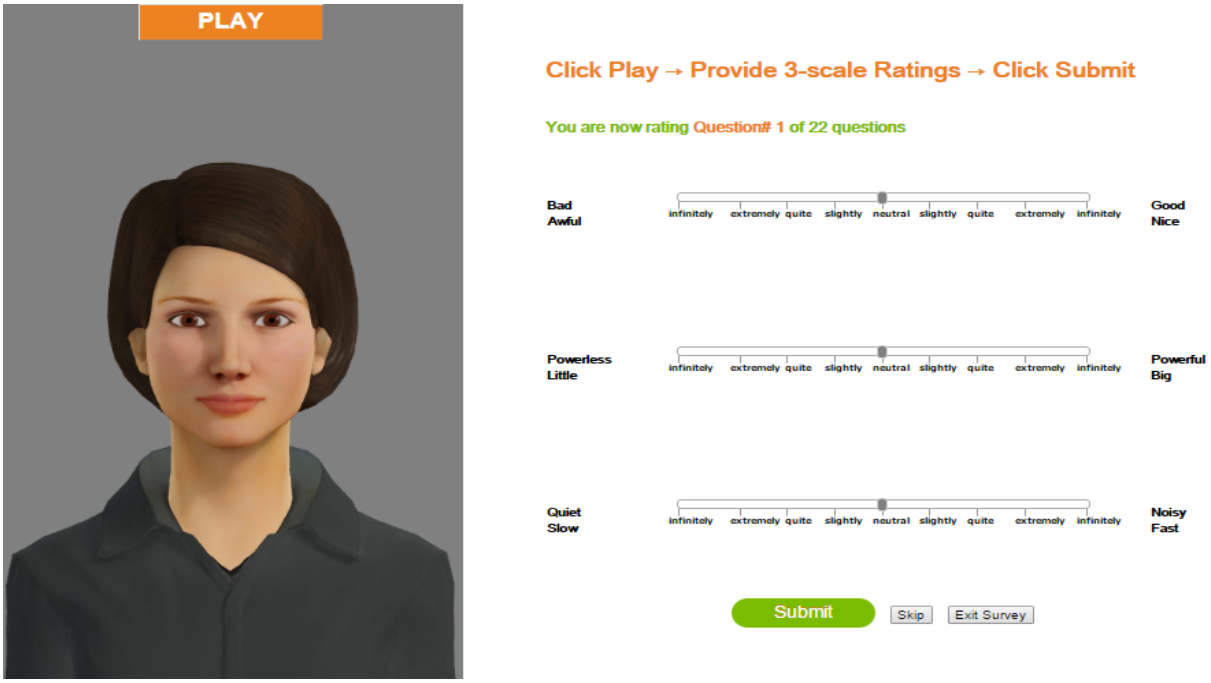


Figure 6.1: Phase II survey sample screenshot of new virtual human and three rating scales

The Canadian participant list for the survey was provided by Waterloo Research in Aging Participant Pool (WRAP), which maintains a database of local healthy seniors' names, contact details and some medical history and who are interested in taking part in research. The inclusion criteria in the

request for participants was that the participants be over 65 yrs. of age, having English as first language or are fluent in English. They should be able to participate in the online survey of a virtual human character speaking prompts. The Exclusion criteria was to exclude individuals with uncorrected eyesight and/or hearing problems.

The participants who confirmed interest were sent the survey link. There were total of 22 respondents (8 males/14 females) who completed the survey[14]. Out of those 22 people, 7 were in age group 65-69 yrs., and 15 were 70 yrs. or older). They also provided their consent online and checked if their audio/video worked fine. The survey was designed such that questions for male and female virtual human characters were provided in an alternate fashion. They were asked to play each prompt before providing their ratings. They could skip any question or exit the survey at any point in time. At the end of the survey, information on gender, age group, and free-form comments was requested. In the end, a Thank You page was shown. The survey took on an average 20 minutes to complete. This may be due to elderly people taking more time to familiarize with the survey and taking time to respond to each question. Other survey pages can be found in Appendix A and raw data in Appendix B.

6.1 Consensus Analysis

We first consider consensus across all the data, followed by more detailed analyses across different sub-groups of the dataset (refer Appendix C). Figure 6.2 summarizes consensus highlighted in green. Dark green is for values greater than or equal to 2.0, light green for values 1.8 - 2.0, close to consensus.
All Data: There is consensus on E and P dimensions and close to consensus on A.

Gender of virtual character: For male and female character, respondents seem to have consensus on E and P dimension, and for female character, they were close to consensus on A.

Gender of respondents: Male respondents seem to have consensus on E and P dimensions and close to consensus on A, whereas female respondents seem to agree more on E dimension only.

Age group of respondents: Respondents in age-group 65-69 yrs. had consensus in all dimensions, and respondents in age-group 70 yrs. and up agreed more on E and A dimensions and closely on P dimension.

As a secondary analysis, for all 22 prompts, we also compared the sign of expected sign of E, P and A based on the design as per Figure 5.2 and the average rating (positive, negative or neutral) on each E, P and A dimension within groups of respondents. The analysis is shown in Table 6.1. A match in sign

[14] Cleared by University of Waterloo Research Ethics Committee

is highlighted. Each group has different color for better visualization. The total matches means that out of 22 questions, how many questions' response matching the designed expectation sign-wise. Highest match achieved was for E dimension, followed by A and P dimensions.

Sub-groups of dataset	Consensus E	Consensus P	Consensus A
All Data	6.3	2.1	1.8
Male Character	3.9	2.9	1.4
Female Character	5.9	5.6	1.9
Male Respondents	4.3	5.5	1.9
Female Respondents	4.7	1.3	1.3
Age Group 65_69 Respondents	11.3	2.7	2.7
Age Group 70 & up Respondents	4.7	1.9	2.4

Figure 6.2: Phase II Consensus Summary

Table 6.1: Expected EPA sign and sign of response data average in different datasets

	All Data			Male Respondent			Female Respondent			Age Group 65_69			Age Group 70_up		
Expected EPA sign	avg E	avg P	avg A	avg E	avg P	avg A	avg E	avg P	avg A	avg E	avg P	avg A	avg E	avg P	avg A
n n n	0.105	0.714	0.086	-0.238	0.963	0.063	0.300	0.571	0.100	0.000	0.629	0.286	0.153	0.753	-0.007
n n n	-1.218	-0.623	-0.295	-0.688	-0.538	-0.125	-1.521	-0.671	-0.393	-0.743	-0.414	0.371	-1.440	-0.720	-0.607
+ + +	0.732	0.645	-0.036	0.350	0.713	-0.075	0.950	0.607	-0.014	0.886	0.571	-0.114	0.660	0.680	0.000
+ + +	-0.418	-0.223	-0.386	-0.025	0.188	-0.288	-0.643	-0.457	-0.443	0.757	0.571	-0.100	-0.967	-0.593	-0.520
+ + +	1.855	1.214	0.245	1.413	1.175	-0.263	2.107	1.236	0.536	2.000	1.429	0.529	1.787	1.113	0.113
+ + +	0.100	0.086	-0.241	-0.125	0.100	-0.713	0.229	0.079	0.029	0.714	0.271	0.143	-0.187	0.000	-0.420
- + +	-2.527	-0.268	0.077	-2.525	-1.063	-0.863	-2.529	0.186	0.614	-2.086	-0.086	0.086	-2.733	-0.353	0.073
- + +	-1.814	-0.773	-0.127	-0.925	-0.913	-0.913	-2.321	-0.693	0.321	-1.457	0.000	0.314	-1.980	-1.133	-0.333
- + -	-2.382	0.114	0.082	-2.438	-1.025	-0.863	-2.350	0.764	0.621	-2.514	0.271	0.114	-2.320	0.040	0.067
- + -	-1.777	-0.700	0.005	-1.588	-0.863	-0.863	-1.886	-0.607	0.500	-1.343	0.086	0.000	-1.980	-1.067	0.007
+ - +	2.059	2.295	0.750	2.488	2.450	0.613	1.814	2.207	0.829	2.243	2.057	0.571	1.973	2.407	0.833
+ - +	1.164	1.073	0.118	1.263	1.113	-0.138	1.107	1.050	0.264	1.671	1.286	0.400	0.927	0.973	-0.013
+ - +	2.050	2.086	0.745	2.075	2.088	0.600	2.036	2.086	0.829	2.086	1.914	0.514	2.033	2.167	0.853
+ - +	1.168	1.077	0.323	0.788	0.988	0.400	1.386	1.129	0.279	1.343	1.429	0.271	1.087	0.913	0.347
+ - -	1.564	1.841	0.845	1.900	1.850	0.688	1.371	1.836	0.936	1.914	1.843	0.357	1.400	1.840	1.073
+ - -	0.632	0.505	0.173	0.963	0.813	0.225	0.443	0.329	0.143	1.386	1.571	0.486	0.280	0.007	0.027
+ - -	1.795	1.764	0.377	1.950	1.938	0.588	1.707	1.664	0.257	2.129	1.786	0.129	1.640	1.753	0.493
+ - -	0.714	0.568	-0.036	0.925	0.988	0.025	0.593	0.329	-0.071	1.529	1.329	-0.014	0.333	0.213	-0.047
+ + +	-0.027	1.218	0.364	0.538	1.200	-0.200	-0.350	1.229	0.686	1.200	1.800	-0.086	-0.600	0.947	0.573
+ + +	-0.032	0.718	0.018	0.388	0.838	-0.400	-0.271	0.650	0.257	0.800	1.014	-0.100	-0.420	0.580	0.073
+ + -	0.409	1.014	-0.005	0.413	0.450	-0.825	0.407	1.336	0.464	1.243	1.329	-0.400	0.020	0.867	0.180
+ + -	0.318	0.091	0.173	1.063	0.850	0.225	-0.107	-0.343	0.143	0.971	0.657	0.357	0.013	-0.173	0.087
total matches	17	8	10	18	8	6	16	8	11	21	10	10	16	6	8

We also looked at the expected sign of the designed prompts and how many people thought the same is given in Table 6.2. The total matches means that out of 22 questions, in how many questions, at least 50% of respondents in that dataset, responded with same sign as was designed. Highest match achieved was for E dimension. We computed Pearson's r-values as well, where we see few correlations in E dimension for all data and that of female character, but others were less conclusive (see Appendix D).

Table 6.2: Expected EPA sign and number of respondents who thought the same

	All Data (22 respondents)			Male Respondent (8 males)			Female Respondent (14 females)			Age Group 65_69 (7 people)			Age Group 70_up (15 people)		
Expected EPA sign	# of Respondents with same sign of E	# of Respondents with same sign of P	# of Respondents with same sign of A	# of Respondents with same sign of E	# of Respondents with same sign of P	# of Respondents with same sign of A	# of Respondents with same sign of E	# of Respondents with same sign of P	# of Respondents with same sign of A	# of Respondents with same sign of E	# of Respondents with same sign of P	# of Respondents with same sign of A	# of Respondents with same sign of E	# of Respondents with same sign of P	# of Respondents with same sign of A
n n n	8	8	9	3	3	3	5	5	6	4	4	4	4	4	5
n n n	3	4	5	2	2	1	1	2	4	2	3	3	1	1	2
+ + +	12	14	6	3	5	2	9	9	4	4	4	2	8	10	4
+ + +	8	10	5	3	4	3	5	6	2	5	4	2	3	6	3
+ + +	19	18	8	7	7	2	12	11	6	6	6	3	13	12	5
+ + +	10	8	4	3	3	1	7	5	3	3	1	1	7	7	3
- + +	22	10	10	8	2	3	14	8	7	7	3	4	15	7	6
- + +	19	7	7	5	2	2	14	5	5	6	3	3	13	4	4
- + -	21	14	7	8	3	4	13	11	3	7	5	2	14	9	5
- + -	19	6	7	7	3	4	12	3	3	7	3	1	12	3	6
+ - +	21	0	11	8	0	3	13	0	8	7	0	3	14	0	8
+ - +	14	4	7	5	1	1	9	3	6	5	0	3	9	4	4
+ - +	19	0	14	7	0	4	12	0	10	5	0	3	14	0	11
+ - +	15	5	10	5	2	4	10	3	6	5	1	3	10	4	7
+ - -	19	1	1	8	0	0	11	1	1	6	0	1	13	1	0
+ - -	11	7	6	4	2	2	7	5	4	4	1	2	7	6	4
+ - -	19	1	4	7	0	1	12	1	3	5	0	2	14	1	2
+ - -	12	6	7	4	1	2	8	5	5	4	0	2	8	6	5
+ + +	12	17	12	5	7	4	7	10	8	4	6	3	8	11	9
+ + +	8	11	6	4	4	1	4	7	5	4	5	2	4	6	4
+ + -	12	15	6	5	5	4	7	10	2	4	4	3	8	11	3
+ + -	11	10	6	6	6	2	5	4	4	4	3	3	7	7	3
total matches	15	5	2	14	5	0	13	6	3	20	8	2	15	5	3

6.2 Feedback

Participants were requested for comments after the survey to collect feedback. Many of them liked the female character more than the male.

"I preferred the girl's prompts; she sounded gentler and more reassuring."

"Male voice did not sound right, the female voice was more pleasing"

"I liked the female better than the male"

They would ideally like a requesting or a courteous prompt rather than an ordering prompt. The audio was considered computerized, which was pointed as one of the areas of improvement.

"In my opinion the avatar sounds too machine-like. The audio can be improved."

"Improve the software to be more human (expressions and voices). Keep the style of 'a request' rather than 'an order'."

One of the participants pointed out below as to what contributed to negative rating.

"The use of the word "now" was negative for me. Some of the facial expressions were also negative."

6.3 Summary

Phase II introduces mapping of facial expressions of a virtual human to the 3 dimensions of emotional space (Evaluation, Potency and Activity), with an aim to improve assistive systems that help persons with cognitive disabilities. The results of the impressions of non-demented elderly persons is a step towards building emotionally aware cognitive assistants. Results show that there is significant consensus on E and P dimensions, and some consensus on the A dimension.

Future improvements to the study include animations of a real person, or speech variations in the character. A study is planned with the target population (elders with cognitive disabilities). We expect differences will be found in the responses of participants, mainly due to the wide range, quickly changing, and more easily suggestible affective identities that are held by persons with dementia [15, 23, 31]. We also expect more usability challenges with this population. We are proceeding first with the current study (with healthy elderly people), and next with an ongoing study towards creating customized prompting style for different affective identities in Alzheimer's disease [13]. Future studies may also evaluate the prompts in different cultures or languages.

Chapter 7
Conclusion

In this thesis, we focused on improving human-computer interaction for assistive technology aimed towards a specific target population suffering with ADRD. We explored the area of virtual humans to give face to the handwashing system, with the hope that it enables the user to interact more naturally with an artificial intelligent system. This could potentially reduce burden from caregivers and assist patients to perform activities of daily living more independently. An affective virtual human can give prompts at the appropriate time to the user, with a human touch to the interaction in the healthcare setting, where patients need it the most. Humans are emotional by nature. An artificially intelligent system may do all the right things at the right time, but without emotional intelligence, it would lack an essential characteristic which makes them more human-like. A similar thought on emotion was quoted by Marvin Minsky [21]

"The question is not whether intelligent machines can have any emotions, but whether machines can be intelligent without any emotions."

Rosalind Picard stated in her work [27]

"I have come to the conclusion that if we want computers to be genuinely intelligent, to adapt to us, and to interact naturally with us, then they will need the ability to recognize and express emotions, and to have what has come to be called 'emotional intelligence."

In the pursuit of creating an emotionally intelligent virtual human for assistive technology, we conducted two user studies, to understand better how real humans perceived virtual humans as they express emotions for the handwashing task. We asked participants to rate their interpretation of various prompt expressions on three-dimensional emotional space of evaluation, potency and activity commonly known as EPA space. In the initial phase, the virtual human design involved full-body gesture with facial expressions, which was very effective in conveying evaluation dimension in general and for certain prompts to convey power. The challenge in creating behaviors in the virtual human, was that a more powerful gesture, automatically would be interpreted as more active and same with less powerful gesture and being less active. In the subsequent phase, we focused our attention to emotions conveyed using facial expressions. Based on Ekman's research on mapping of emotions to manipulation of facial muscles, we designed prompts given expressively by a virtual human in a close-up view. This time we moved one step closer towards our target population, by recruiting elderly people with 65+ yrs. of age. This time, we

got more consensus in E and P dimensions and were close to consensus on A dimension. In phase I, we only had consensus in E dimension. Although emotions are conveyed in a multi-modal fashion, our results may suggest that emotional dimensions of evaluation and power can be interpreted well from the facial mode of expression. The dimension of activity may be more prevalent in other modes of expression such as speech and hand gestures. The inherent nature of Potency and Activity dimensions poses a challenge in designing prompts expression.

Although this thesis focuses on expressive virtual humans interacting affectively with people with cognitive disabilities for the hand washing task, this may be considered as a step towards creating affective dictionaries for multi-modal expressions in any social interaction and advancing the field of affective computing.

7.1 Future Work

Further survey work will need to be done with the target population (people with cognitive disabilities) once a refined set of prompts are developed based on the studies we presented here. We expect significant differences will be found in the responses of participants, mainly due to the wide range and quickly changing affective identities that are held by persons with dementia [15, 23, 31]. Furthermore, less consensus in the A dimensions is still an issue to be addressed.

In both the phases, the participants of the survey were remotely located and their immediate emotional reaction or feeling to each emotional prompt could not be captured qualitatively. Elderly people took longer time to complete the survey. This may have been due to several reasons, one of which could be lack of familiarity with using computers for the online survey. Other reason could be understanding how to rate on the three dimensional scale. Although information was provided to them regarding EPA, but for someone who is not familiar with the concept, it may take some time to dissect an emotion into three dimensions. With elderly population needing assistance using technology these days and more so with target population, it may be beneficial to conduct the study in a lab setting.

People with ADRD have weak sense of their identities, which keeps on changing as the condition becomes worse. Depending on their stage of disease, they would go back in time and may recollect only people or situations until that time. It would be interesting to customize the face of virtual human as some family member whom they adore and encourages them in performing a task. [6] however recommends having fictitious characters so as to avoid confusion with real people who are already interacting with the user. It is not clear how would people with dementia react to a known person as a virtual human.

Based on the feedback of the participants, the virtual characters can be improved to have more human-like voice. Web API does have voice support, which we can explore. Finally, the phase II prompts can be incorporated into enhanced COACH system and trials can be conducted with the target population.

Another possible integration can be to incorporate the facial expression guidelines directly into the API, so as to avoid using some alternative tags to achieve the desired effect.

On a closing note, as we move into the future of AI, our research in improving human-computer interaction and in making computers more intelligent and human-like, would help us uncover more aspects of human-human interaction and human intelligence, which are yet to be discovered.

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Appendix A

Phase II Online Survey

Sample screenshots of online survey for phase II

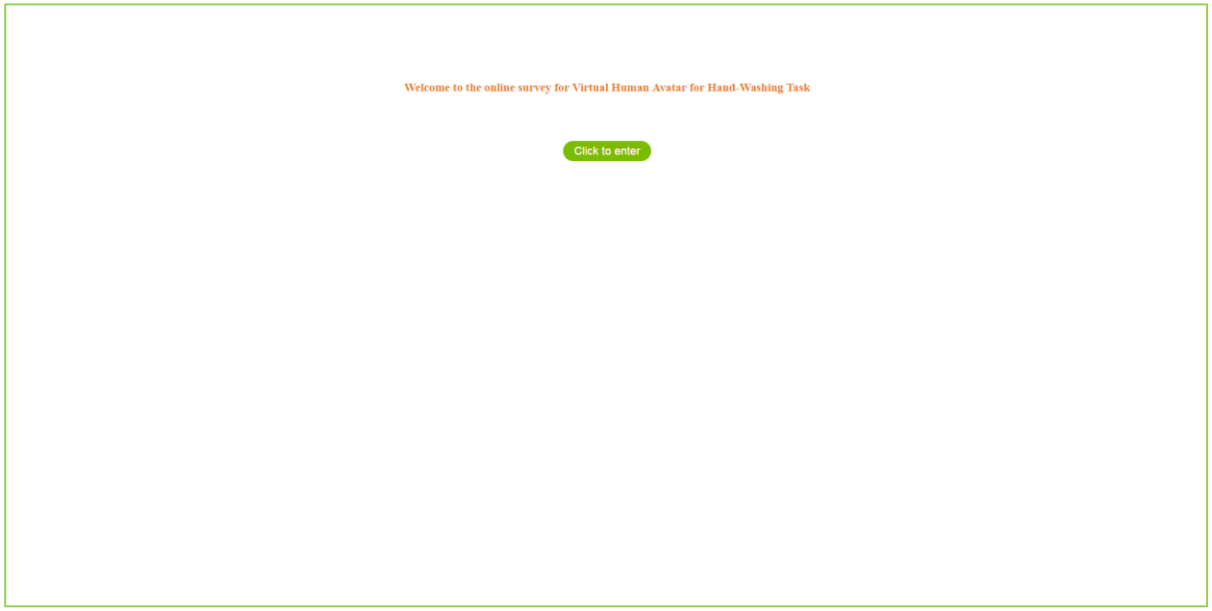


Figure A.1: Phase II survey welcome page

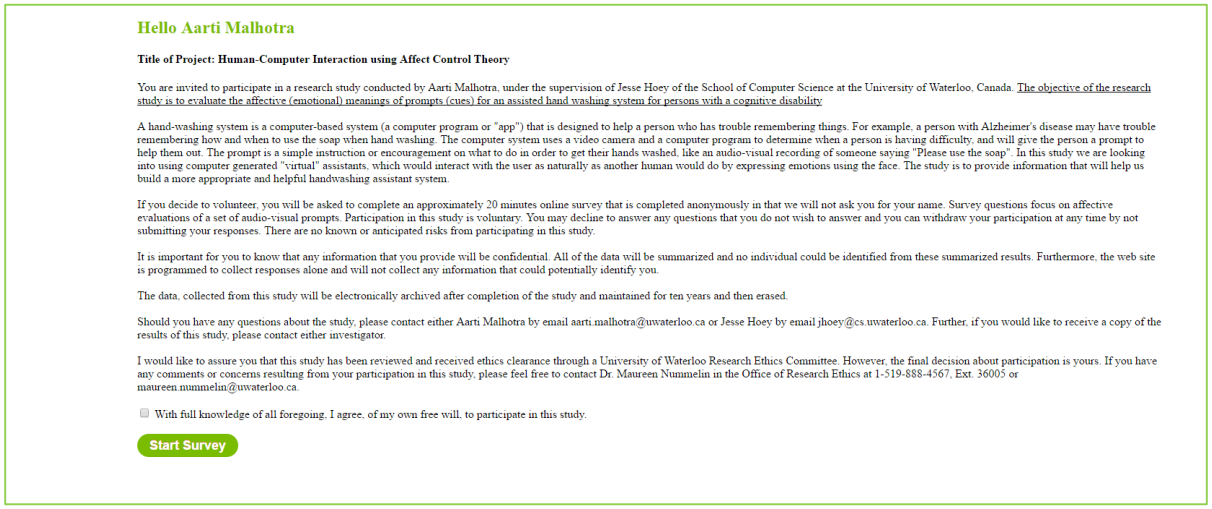


Figure A.2: Phase II survey consent page

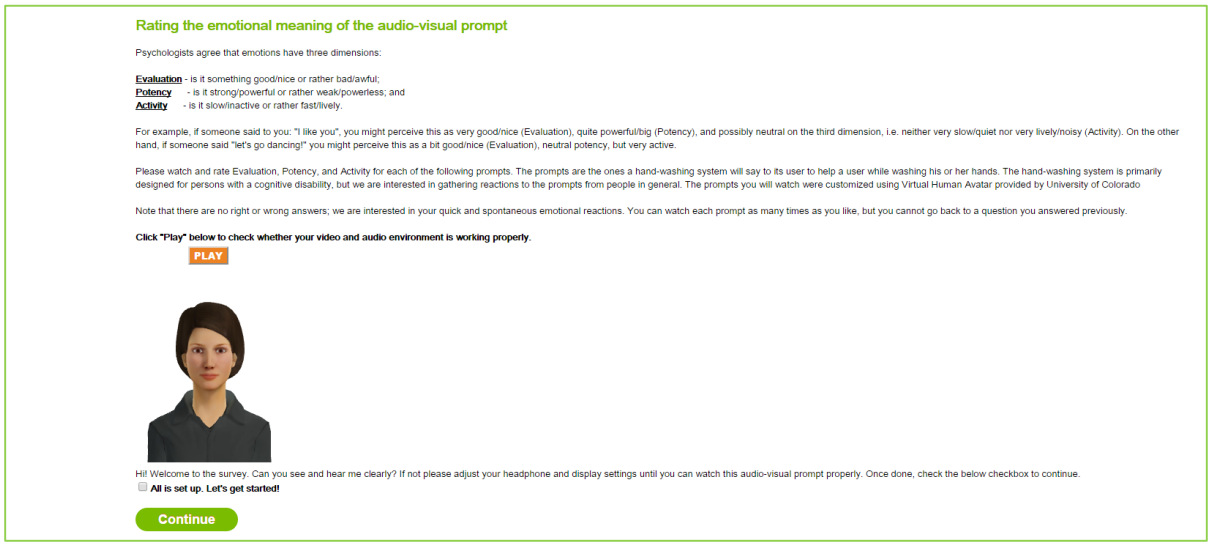


Figure A.3: Phase II survey system setup confirmation page

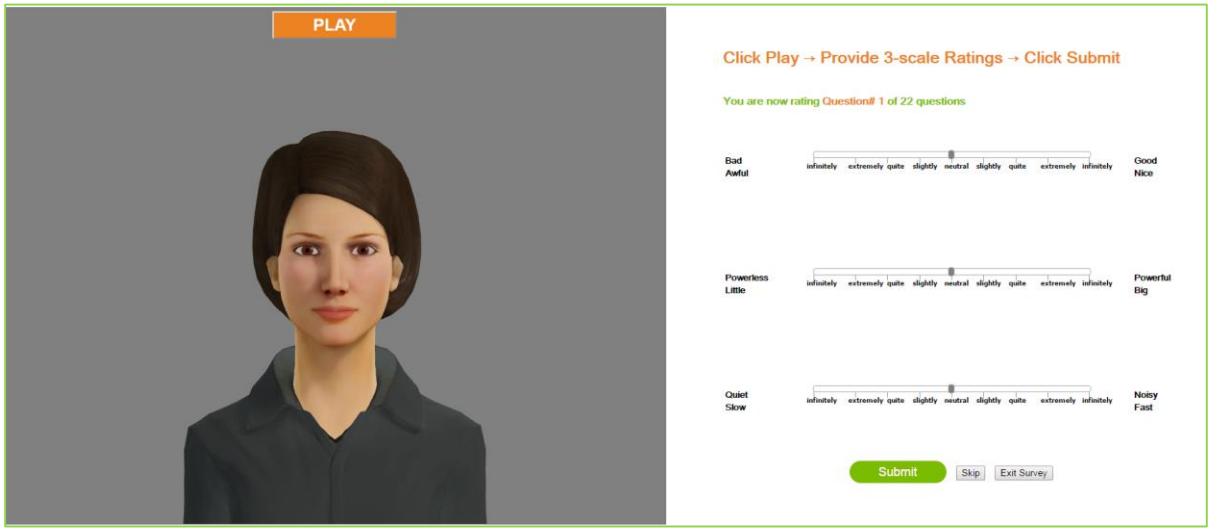


Figure A.4: Phase II survey question prompt play and rate page – Female virtual human

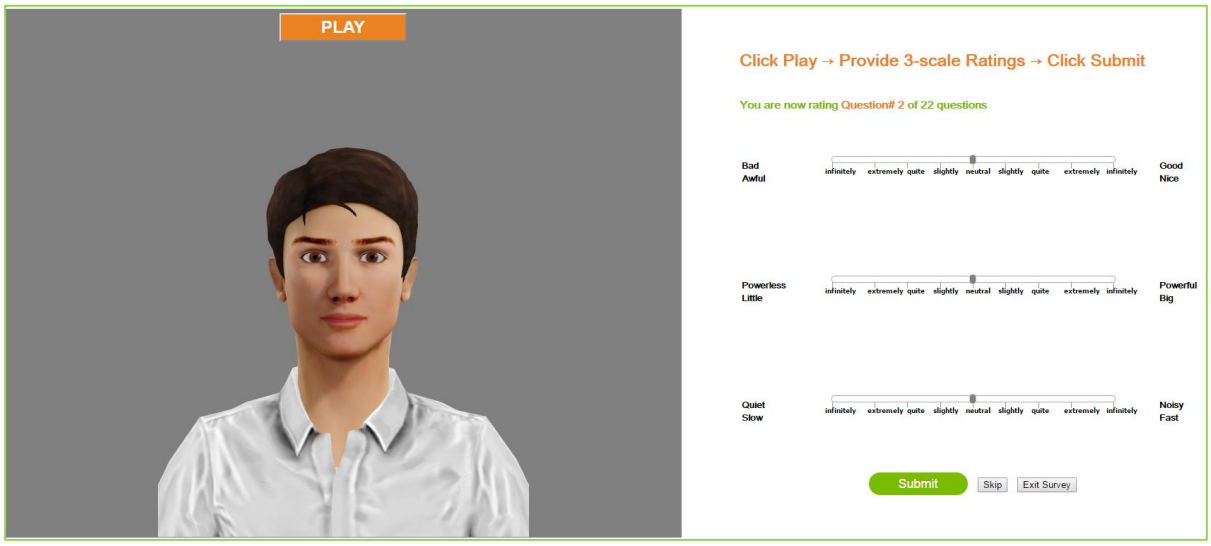


Figure A.5: Phase II survey question prompt play and rate page – Male virtual human

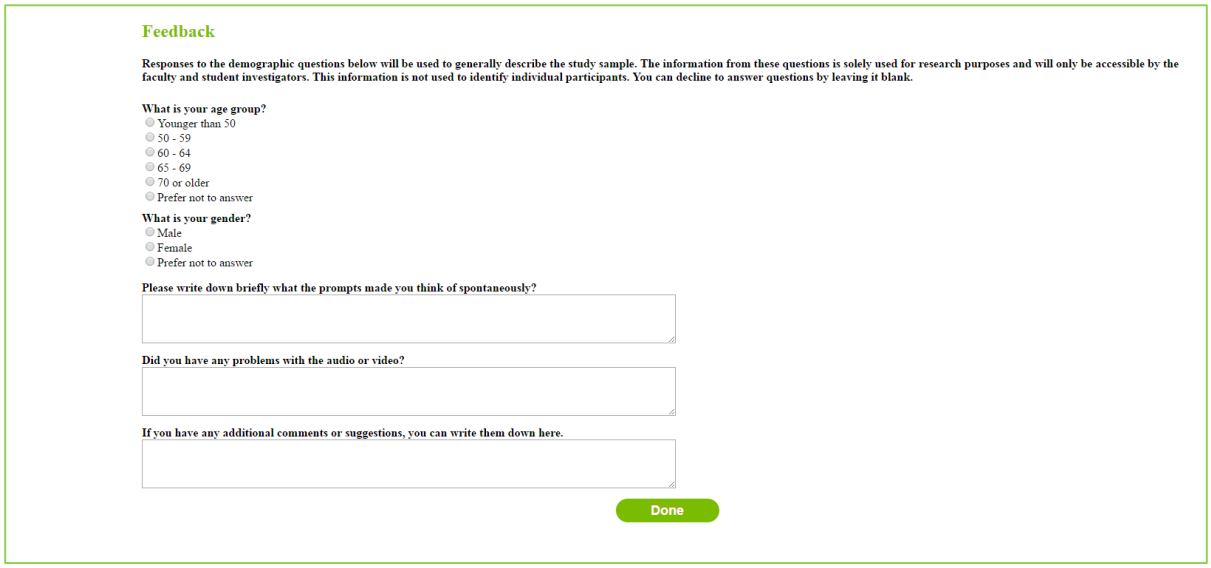
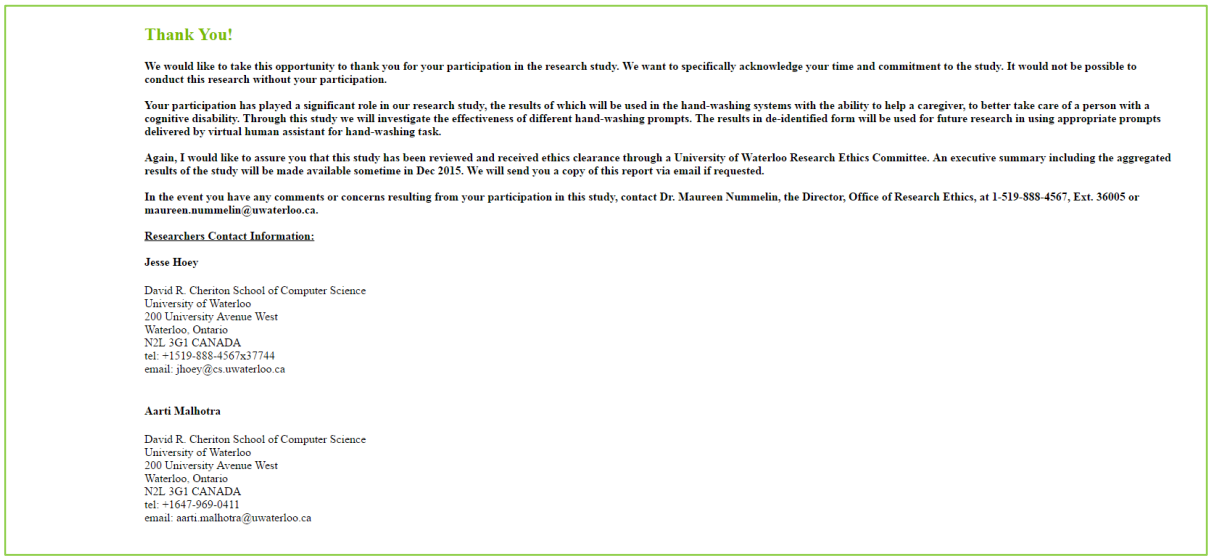


Figure A.6: Phase II survey feedback page



Thank You!

We would like to take this opportunity to thank you for your participation in the research study. We want to specifically acknowledge your time and commitment to the study. It would not be possible to conduct this research without your participation.

Your participation has played a significant role in our research study, the results of which will be used in the hand-washing systems with the ability to help a caregiver, to better take care of a person with a cognitive disability. Through this study we will investigate the effectiveness of different hand-washing prompts. The results in de-identified form will be used for future research in using appropriate prompts delivered by virtual human assistant for hand-washing task.

Again, I would like to assure you that this study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee. An executive summary including the aggregated results of the study will be made available sometime in Dec 2015. We will send you a copy of this report via email if requested.

In the event you have any comments or concerns resulting from your participation in this study, contact Dr. Maureen Nummelin, the Director, Office of Research Ethics, at 1-519-888-4567, Ext. 36005 or maureen.nummelin@uwaterloo.ca.

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Figure A.7: Phase II survey thank you page

Appendix B

Phase II Raw Data

Below tables show response data for all 22 prompts from all respondents.

Note that each prompt in question has response for E, P and A dimension. Hence, say for prompt in question 1 has responses for q1e, q1p and q1a and so on and so forth. Each response value ranges from -4.3 to 4.3. Average values for each question is also calculated, which is helpful in comparing the expected signs of EPA values with the actual sign of average EPA

B.1 All respondents' data

Tables are divided for prompts questions 1-7, 8-14 and 15-22

Table B.1: Phase II All respondents' data for prompt questions 1-7

#	q1e	q1p	q1a	q2e	q2p	q2a	q3e	q3p	q3a	q4e	q4p	q4a	q5e	q5p	q5a	q6e	q6p	q6a	q7e	q7p	q7a
1	1.9	0	-2	-2.1	-1.9	0.9	1.9	1	1	2	0.9	1.9	2.1	1.9	1.9	2	0	2	-2	2	-0.9
2	-0.9	-1.7	-2.6	-2.6	-2.6	-0.7	-0.4	-1.6	-0.9	-1.7	-2.5	-0.7	1.3	-0.5	-0.5	1.5	-0.5	-0.7	-2.7	-1.7	-0.7
3	1.1	1.1	-0.7	-0.7	-1.3	-1	2.2	1.5	1.8	-0.9	-0.7	-0.8	0.9	1.3	1	-1.9	-1.4	-1.4	-3.1	-2.9	-2.8
4	0	0	0	-1.8	-1.3	-4.1	2.4	2.5	0	-4.1	-4	0	4.1	-4.3	0	4.2	4.2	0	-4.1	-4.3	0
5	-0.9	1.5	3.1	0	0	2	-1.5	-1.9	-1.8	0.5	0.7	0.4	1.9	1.3	0.9	0	0	0	-2.5	-2.3	-2.4
6	-1	2	0	-1	1	0	1	1	0	1	1	0	0	0	0	0	0	0	-3	1	1
7	-3	3	1	-1.8	1.1	1.2	-1.1	1.9	1.4	-1	1	1	3	3	0	3	3.6	0	-2.9	2.9	2
8	0	0.9	0.9	-1	0	0.8	0	0	0.9	-1	0	-1	1.9	1.9	0.9	-1	-1	0	-1.1	0	1
9	0	0	0	-2	-1.9	0	2.7	1.8	0	0.5	0	0	3.4	1	0	1.8	0	0	-1.5	2.5	2.3
10	1.9	0	-1	-1	-1	1	2	2	0	-1	1	0	3	2	-1	1	1	1	-1	0	1
11	0	0	0	0	0	0	2.1	2.1	-0.9	3.1	2.2	-1.1	3.4	2.9	0	3.3	2.9	0	-2.9	-2.8	-1.1
12	2.1	2.1	0	-1	1.1	0	2.1	2.1	0	-1	-1	0	4.3	4.2	0	-0.9	0	0	-1.1	-1.9	0
13	-1	1.1	-1.9	-1.9	-2	-2.1	-0.9	-0.9	-1.1	0.9	-0.9	1.1	-3.1	-3.1	-3	-4.3	-4.3	-4.3	-4.3	-4.3	-4.3
14	1.1	1	2	-2	-2	-3.1	-1	-0.9	-1	0.9	0.9	1	2.9	2	2	1	1	-1	-4.3	2	3
15	-1.9	-0.9	0	-2.9	-1.9	0	2	1.1	0	1.1	1	0	1.9	2	0	2.1	1	0	-4.3	-2.9	0
16	0	0	0	0.9	-0.1	-1.1	0	0	0	-0.8	-0.8	-0.9	1.3	1	0	-1.1	0	-1	-1.6	-1	0.7
17	0	1	0	-1	-1	-1	0	1	0	-1	-1	-2	0.9	1	0	-1	-1	0	-1.9	1.9	0
18	0	0	0.9	-2.9	2.1	1	2	0.9	-1	-1	1.1	-1	2	1.9	0	-1.9	-2	-1.9	-2.9	2.1	0
19	1.1	1	1.9	-2.9	-2.7	-0.9	-0.8	-0.9	-1.1	-2.9	-2.9	-2	3	3.2	1	-2.9	-3	1.1	-1	3	0.3
20	0	1.8	1	0	0	1	-1.8	1.8	1.9	-1.1	1	-1.1	-1.2	1.8	1	-1.9	1.9	2	-2.1	1.8	2.1
21	-0.1	0	0	-1	-1	-1	1	-1	-1.1	-1	-1	-2	1	0.9	0	0.8	0.9	0	-3	-2	0
22	1.9	1.8	-0.7	1.9	1.7	0.6	2.2	0.7	1.1	-0.7	-0.9	-1.3	2.8	1.3	1.2	-1.6	-1.4	-1.1	-2.3	1	0.5
Average	0.10	0.71	0.09	-1.22	-0.62	-0.30	0.73	0.65	-0.04	-0.42	-0.22	-0.39	1.85	1.21	0.25	0.10	0.09	-0.24	-2.53	-0.27	0.08

Table B.2: Phase II All respondents' data for prompt questions 8-14

#	q8e	q8p	q8a	q9e	q9p	q9a	q10e	q10p	q10a	q11e	q11p	q11a	q12e	q12p	q12a	q13e	q13p	q13a	q14e	q14p	q14a
1	-1	1	1.9	-2	1.9	0	-2.1	1	1.9	2.4	1.7	1	2.2	1.4	1.8	2.8	2.5	1.7	2.1	2.2	1.8
2	-2.7	-1.6	-1.7	-2.5	0.5	-0.6	-4	-2.5	-1.6	0.3	1.3	-0.6	-0.6	-0.5	0.5	1.5	1.3	0.5	-0.6	-1.5	-0.5
3	-2.5	-2.7	-2.5	-2	-1.7	-1.6	-3	-3.1	-3	2.2	2.1	1.8	-0.8	-0.8	-1.2	1.2	1.6	1.5	-0.3	-0.3	-0.3
4	-4.3	-4.3	0	-4.3	-4.3	0	0	0	0	4.3	4.2	0	4.1	4.3	0	4.3	4.3	0	4.1	4.3	0
5	-1	-0.5	0.5	-2.8	-3	-3.1	-2.1	-1.8	-1.9	1.2	2.1	2.6	0	0.3	1.1	0	1.6	-0.7	0.1	0.5	1.6
6	-2	1	0	-2	2	1	-1	1	0	2	2	0	2	2	0	2	2	-1	2	2	-2
7	1.9	2.1	1.2	-2.1	2.2	1.6	-1.1	1	1	3	2.4	0	1.4	1.1	0	2	1.4	0	1.5	1.1	0
8	-1	0	0	-2.1	0.9	0.9	-1	0	0	0.9	0.9	0	0	0	0	0	0	0	0	0	0
9	-2.2	1.7	2	-3.4	2.4	2.5	-1.1	0	0	2.7	1.9	1.9	3	1	0.9	3.6	2.5	2.6	3.2	2.8	1.6
10	1	0.9	0	-1	-1	1	0.9	0	-1	2	2	0	2	0.9	0	2	2.1	0.9	0.9	2	0.9
11	-3	-2.2	-1	-3.9	-3.4	-1.4	-1	-0.9	0	3.9	3.4	0	3.4	3.5	0	4.3	4.3	0	3.4	3.4	0
12	-1	-0.9	0	-1	-0.9	0	-0.8	-0.9	0	4.3	4.2	0	2.1	2.1	0	4.3	4.3	0	2	2	0
13	-2.8	-2.9	-4.3	-4.3	-4.3	-4.3	-4.3	-4.3	-2	3	3.2	2	3	3.1	0	4.3	4.3	2.1	2.1	1.2	1.1
14	-4.2	2	3	-4.3	3	3	-3	-3	3	2	2	2	1	1.9	2	2.1	2	2	2	2	2
15	-2.1	-2	0	-4.2	-2.9	0	-4.2	-3	1.8	1.9	1.9	1	1	1	0.9	2	1.9	1	1.9	1.9	1
16	0	-1	-1.2	-1.4	1.1	0.9	-1.1	1.3	0	2.6	2.4	-1.5	1.1	0.8	-1	1.9	0.5	1	-1.4	-0.9	-1.1
17	-1	-1	0	-2	1.9	0	-1	0.9	0	2	2	0	0	0	0	0.9	0.9	0	0	0.9	1
18	-2.1	-1	-1.4	-2	2	0.9	-1	-1	1	1.6	1.5	1	0	0	0	2.1	1.6	0.6	2	1.7	0.5
19	-4	-2.9	1.1	2	2.1	-0.8	-3	-0.8	-1.1	4.1	3.8	1	0.9	1	-1.8	2.9	2.9	1	0.9	-1.2	-1.1
20	-1.9	2	2.1	-2.8	1.9	2.9	-3	2.9	2.9	-3	2.8	2.9	-1.2	1.2	0.9	-1.1	0.8	0.9	0	0	0
21	-1.9	-1.9	-1	-2	1	0	0	0	0	0.9	0.9	0	0	-0.1	0	0.8	0.9	1	0.9	1	0.9
22	-2.1	-2.8	-1.5	-2.3	1.1	-1.1	-2.2	-2.2	-0.9	1	1.8	1.4	1	-0.6	-1.5	1.2	2.2	1.3	-1.1	-1.4	-0.3
Average	-1.81	-0.77	-0.13	-2.38	0.11	0.08	-1.78	-0.70	0.00	2.06	2.30	0.75	1.16	1.07	0.12	2.05	2.09	0.75	1.17	1.08	0.32

Table B.3: Phase II All respondents' data for prompt questions 15-22

#	q15e	q15p	q15a	q16e	q16p	q16a	q17e	q17p	q17a	q18e	q18p	q18a	q19e	q19p	q19a	q20e	q20p	q20a	q21e	q21p	q21a	q22e	q22p	q22a
1	2.5	2.4	1.9	2.8	2.7	2.3	2.9	2.9	2.2	2.6	2.7	2.3	2.9	2.9	2.2	1.2	2	2	3.5	2.9	2	1.9	1.4	2.1
2	1.4	1.2	1.5	0.5	-1.6	0.5	2.3	1.3	1.3	0.4	-0.5	0.5	1.5	1.5	0.5	0.4	1.3	0.5	2.5	1.2	-0.6	-1.7	0.6	-1.7
3	0.7	1.2	1	-0.5	-0.3	-0.3	1.3	2	1.4	0.5	0.4	0.6	0.6	1	0.8	-0.4	-0.3	-0.2	0.8	0.9	1.2	0.5	0.5	0.4
4	4.2	4.1	0	0	0	0	1.1	1	0	1.5	1.6	0	-4.3	0	0	4.3	4.3	0	-2.4	-2.6	0	1	0	0
5	0.2	0.1	0.2	0	0.7	1.5	0	0	0.3	0	0	0	2.2	0.4	-3.9	1.3	-0.4	-2.1	0.7	-2.1	-3.3	0.4	-0.5	-0.4
6	2	2	-1	1	1	-1	2.5	2	-1.5	1.4	1	-1.4	-1	1	1	0	-1	-1	0	2	0	0	-1	-0.9
7	1.4	1.1	0	1.7	1	0.8	1.6	1.1	0	2.1	1.2	-0.6	1.1	1.5	-0.7	1	1.1	0	1.2	1.1	0	1.1	1	0
8	-1.1	1	0	0	0.9	0	-1	0.9	0.9	-1.1	0	0	-1	0	0	-1	1	0	0	-0.1	0	0	0	0.9
9	2.9	1	1.4	2.3	2.5	1.8	3.9	0.1	0	3.6	0	0	1	2.6	0	0	1.3	1.4	1.9	2.9	0	0	0	1.1
10	2	2	2	0.9	1	0	2	2	1	0	0	0	1	1.1	0.9	-1	0	-1	1	1	0	0	1	1
11	4.3	4.3	0	4.3	4.3	0	4.3	4.3	-1	4.2	4.3	-1	4.3	4.3	-1.1	3.1	3.1	-1	3.7	3.7	-1	3.2	3.2	-1
12	4.3	4.3	0	3	3.1	0	4.2	4.3	0	3.1	3.1	0	1	1.1	0	0	0	0	2.1	2	0	0	0	0
13	3.1	3.1	2.3	2	0.9	1	3.2	2.9	3	1.6	1.7	1.2	-2.9	-2	1.2	-1.9	2.1	1.1	-3	-3	-3	2	1.1	1.1
14	-2	-2	2	1	1	2.1	3.1	1.9	-1.9	-1	-1.1	1	1	0.9	2.1	-2	-1	2.2	1	1.4	1.4	-2.5	-2.2	2.3
15	2.1	2	1.9	0.9	1	0.9	2.1	2	0.9	0.9	1	-1	-1.9	-2	-1.9	0.9	0.9	-1.1	-0.9	-1.1	-1	0.9	1	1
16	2.6	2.1	0	-0.7	-1.1	-1.2	2.3	2.3	0	0	1.3	0	0	1.4	1.2	1	1.1	0	-1.1	0	-0.5	1.3	1.5	0.7
17	0.9	0.9	0	0	0	0	0.9	0.9	0	-1	-1	0	-2	1.9	0	0	0	0	0	2	0	0	-1	0
18	1.5	1.9	0.6	-1.8	-2	-1.1	-1	-1	-0.7	-1.4	-1.7	-1.2	-3	0	0	-2.1	-1	-1	-1	1.9	0	0	-1.4	0
19	1.8	2	0.7	-0.8	-3.2	-2.1	1.9	3	0.1	0.9	-0.9	-1.7	2.9	3	0.8	-1	-1	-1.1	3	2.8	0.9	0.2	-1.1	-1.1
20	-2.2	1.8	1.9	-1	1.2	0	0.8	2	1	-1	0.9	1	-3	2.8	2.9	-2.9	3	2.9	-4.3	3.9	3.5	0	0	0
21	0.9	1.9	1.9	0	-0.1	0	1	1	1	0	0	0	-1.9	1	0.9	0	0	0	0	0	0	0.9	0.9	0
22	0.9	2.1	0.3	-1.7	-1.9	-1.4	0.1	1.9	0.3	-1.6	-1.5	-0.5	0.9	2.4	1.1	-1.6	-0.7	-1.2	0.3	1.5	0.3	-2.2	-3	-1.7
Average	1.56	1.84	0.85	0.63	0.50	0.17	1.80	1.76	0.38	0.71	0.57	-0.04	-0.03	1.22	0.36	-0.03	0.72	0.02	0.41	1.01	0.00	0.32	0.09	0.17

B.2 Male respondents' data

Table B.4: Phase II Male respondents' data for prompt questions 1-7

#	q1e	q1p	q1a	q2e	q2p	q2a	q3e	q3p	q3a	q4e	q4p	q4a	q5e	q5p	q5a	q6e	q6p	q6a	q7e	q7p	q7a
1	1.1	1.1	-0.7	-0.7	-1.3	-1	2.2	1.5	1.8	-0.9	-0.7	-0.8	0.9	1.3	1	-1.9	-1.4	-1.4	-3.1	-2.9	-2.8
2	-0.9	1.5	3.1	0	0	2	-1.5	-1.9	-1.8	0.5	0.7	0.4	1.9	1.3	0.9	0	0	0	-2.5	-2.3	-2.4
3	-3	3	1	-1.8	1.1	1.2	-1.1	1.9	1.4	-1	1	1	3	3	0	3	3.6	0	-2.9	2.9	2
4	1.9	0	-1	-1	-1	1	2	2	0	-1	1	0	3	2	-1	1	1	1	-1	0	1
5	0	0	0	0	0	0	2.1	2.1	-0.9	3.1	2.2	-1.1	3.4	2.9	0	3.3	2.9	0	-2.9	-2.8	-1.1
6	-1	1.1	-1.9	-1.9	-2	-2.1	-0.9	-0.9	-1.1	0.9	-0.9	1.1	-3.1	-3.1	-3	-4.3	-4.3	-4.3	-4.3	-4.3	-4.3
7	0	0	0	0.9	-0.1	-1.1	0	0	0	-0.8	-0.8	-0.9	1.3	1	0	-1.1	0	-1	-1.6	-1	0.7
8	0	1	0	-1	-1	-1	0	1	0	-1	-1	-2	0.9	1	0	-1	-1	0	-1.9	1.9	0
9																					
Average	-0.24	0.96	0.06	-0.69	-0.54	-0.13	0.35	0.71	-0.08	-0.03	0.19	-0.29	1.41	1.18	-0.26	-0.13	0.10	-0.71	-2.53	-1.06	-0.86

Table B.5: Phase II Male respondents' data for prompt questions 8-14

#	q8e	q8p	q8a	q9e	q9p	q9a	q10e	q10p	q10a	q11e	q11p	q11a	q12e	q12p	q12a	q13e	q13p	q13a	q14e	q14p	q14a
1	-2.5	-2.7	-2.5	-2	-1.7	-1.6	-3	-3.1	-3	2.2	2.1	1.8	-0.8	-0.8	-1.2	1.2	1.6	1.5	-0.3	-0.3	-0.3
2	-1	-0.5	0.5	-2.8	-3	-3.1	-2.1	-1.8	-1.9	1.2	2.1	2.6	0	0.3	1.1	0	1.6	-0.7	0.1	0.5	1.6
3	1.9	2.1	1.2	-2.1	2.2	1.6	-1.1	1	1	3	2.4	0	1.4	1.1	0	2	1.4	0	1.5	1.1	0
4	1	0.9	0	-1	-1	1	0.9	0	-1	2	2	0	2	0.9	0	2	2.1	0.9	0.9	2	0.9
5	-3	-2.2	-1	-3.9	-3.4	-1.4	-1	-0.9	0	3.9	3.4	0	3.4	3.5	0	4.3	4.3	0	3.4	3.4	0
6	-2.8	-2.9	-4.3	-4.3	-4.3	-4.3	-4.3	-4.3	-2	3	3.2	2	3	3.1	0	4.3	4.3	2.1	2.1	1.2	1.1
7	0	-1	-1.2	-1.4	1.1	0.9	-1.1	1.3	0	2.6	2.4	-1.5	1.1	0.8	-1	1.9	0.5	1	-1.4	-0.9	-1.1
8	-1	-1	0	-2	1.9	0	-1	0.9	0	2	2	0	0	0	0	0.9	0.9	0	0	0.9	1
9																					
Average	-0.93	-0.91	-0.91	-2.44	-1.03	-0.86	-1.59	-0.86	-0.86	2.49	2.45	0.61	1.26	1.11	-0.14	2.08	2.09	0.60	0.79	0.99	0.40

Table B.6: Phase II Male respondents' data for prompt questions 15-22

#	q15e	q15p	q15a	q16e	q16p	q16a	q17e	q17p	q17a	q18e	q18p	q18a	q19e	q19p	q19a	q20e	q20p	q20a	q21e	q21p	q21a	q22e	q22p	q22a
1	0.7	1.2	1	-0.5	-0.3	-0.3	1.3	2	1.4	0.5	0.4	0.6	0.6	1	0.8	-0.4	-0.3	-0.2	0.8	0.9	1.2	0.5	0.5	0.4
2	0.2	0.1	0.2	0	0.7	1.5	0	0	0.3	0	0	0	2.2	0.4	-3.9	1.3	-0.4	-2.1	0.7	-2.1	-3.3	0.4	-0.5	-0.4
3	1.4	1.1	0	1.7	1	0.8	1.6	1.1	0	2.1	1.2	-0.6	1.1	1.5	-0.7	1	1.1	0	1.2	1.1	0	1.1	1	0
4	2	2	2	0.9	1	0	2	2	1	0	0	0	1	1.1	0.9	-1	0	-1	1	1	0	0	1	1
5	4.3	4.3	0	4.3	4.3	0	4.3	4.3	-1	4.2	4.3	-1	4.3	4.3	-1.1	3.1	3.1	-1	3.7	3.7	-1	3.2	3.2	-1
6	3.1	3.1	2.3	2	0.9	1	3.2	2.9	3	1.6	1.7	1.2	-2.9	-2	1.2	-1.9	2.1	1.1	-3	-3	-3	2	1.1	1.1
7	2.6	2.1	0	-0.7	-1.1	-1.2	2.3	2.3	0	0	1.3	0	0	1.4	1.2	1	1.1	0	-1.1	0	-0.5	1.3	1.5	0.7
8	0.9	0.9	0	0	0	0	0.9	0.9	0	-1	-1	0	-2	1.9	0	0	0	0	0	2	0	0	-1	0
9																								
Average	1.90	1.85	0.69	0.96	0.81	0.23	1.95	1.94	0.59	0.93	0.99	0.03	0.54	1.20	-0.20	0.39	0.84	-0.40	0.41	0.45	-0.83	1.06	0.85	0.23

B.3 Female respondents' data

Table B.7: Phase II Female respondents' data for prompt questions 1-7

#	q1e	q1p	q1a	q2e	q2p	q2a	q3e	q3p	q3a	q4e	q4p	q4a	q5e	q5p	q5a	q6e	q6p	q6a	q7e	q7p	q7a
1	1.9	0	-2	-2.1	-1.9	0.9	1.9	1	1	2	0.9	1.9	2.1	1.9	1.9	2	0	2	-2	2	-0.9
2	-0.9	-1.7	-2.6	-2.6	-2.6	-0.7	-0.4	-1.6	-0.9	-1.7	-2.5	-0.7	1.3	-0.5	-0.5	1.5	-0.5	-0.7	-2.7	-1.7	-0.7
3	0	0	0	-1.8	-1.3	-4.1	2.4	2.5	0	-4.1	-4	0	4.1	-4.3	0	4.2	4.2	0	-4.1	-4.3	0
4	-1	2	0	-1	1	0	1	1	0	1	1	0	0	0	0	0	0	0	-3	1	1
5	0	0.9	0.9	-1	0	0.8	0	0	0.9	-1	0	-1	1.9	1.9	0.9	-1	-1	0	-1.1	0	1
6	0	0	0	-2	-1.9	0	2.7	1.8	0	0.5	0	0	3.4	1	0	1.8	0	0	-1.5	2.5	2.3
7	2.1	2.1	0	-1	1.1	0	2.1	2.1	0	-1	-1	0	4.3	4.2	0	-0.9	0	0	-1.1	-1.9	0
8	1.1	1	2	-2	-2	-3.1	-1	-0.9	-1	0.9	0.9	1	2.9	2	2	1	1	-1	-4.3	2	3
9	-1.9	-0.9	0	-2.9	-1.9	0	2	1.1	0	1.1	1	0	1.9	2	0	2.1	1	0	-4.3	-2.9	0
10	0	0	0.9	-2.9	2.1	1	2	0.9	-1	-1	1.1	-1	2	1.9	0	-1.9	-2	-1.9	-2.9	2.1	0
11	1.1	1	1.9	-2.9	-2.7	-0.9	-0.8	-0.9	-1.1	-2.9	-2.9	-2	3	3.2	1	-2.9	-3	1.1	-1	3	0.3
12	0	1.8	1	0	0	1	-1.8	1.8	1.9	-1.1	1	-1.1	-1.2	1.8	1	-1.9	1.9	2	-2.1	1.8	2.1
13	-0.1	0	0	-1	-1	-1	1	-1	-1.1	-1	-1	-2	1	0.9	0	0.8	0.9	0	-3	-2	0
14	1.9	1.8	-0.7	1.9	1.7	0.6	2.2	0.7	1.1	-0.7	-0.9	-1.3	2.8	1.3	1.2	-1.6	-1.4	-1.1	-2.3	1	0.5
Average	0.30	0.57	0.10	-1.52	-0.67	-0.39	0.95	0.61	-0.01	-0.64	-0.46	-0.44	2.11	1.24	0.54	0.23	0.08	0.03	-2.53	0.19	0.61

Table B.8: Phase II Female respondents' data for prompt questions 8-14

#	q8e	q8p	q8a	q9e	q9p	q9a	q10e	q10p	q10a	q11e	q11p	q11a	q12e	q12p	q12a	q13e	q13p	q13a	q14e	q14p	q14a
1	-1	1	1.9	-2	1.9	0	-2.1	1	1.9	2.4	1.7	1	2.2	1.4	1.8	2.8	2.5	1.7	2.1	2.2	1.8
2	-2.7	-1.6	-1.7	-2.5	0.5	-0.6	-4	-2.5	-1.6	0.3	1.3	-0.6	-0.6	-0.5	0.5	1.5	1.3	0.5	-0.6	-1.5	-0.5
3	-4.3	-4.3	0	-4.3	-4.3	0	0	0	0	4.3	4.2	0	4.1	4.3	0	4.3	4.3	0	4.1	4.3	0
4	-2	1	0	-2	2	1	-1	1	0	2	2	0	2	2	0	2	2	-1	2	2	-2
5	-1	0	0	-2.1	0.9	0.9	-1	0	0	0.9	0.9	0	0	0	0	0	0	0	0	0	0
6	-2.2	1.7	2	-3.4	2.4	2.5	-1.1	0	0	2.7	1.9	1.9	3	1	0.9	3.6	2.5	2.6	3.2	2.8	1.6
7	-1	-0.9	0	-1	-0.9	0	-0.8	-0.9	0	4.3	4.2	0	2.1	2.1	0	4.3	4.3	0	2	2	0
8	-4.2	2	3	-4.3	3	3	-3	-3	3	2	2	2	1	1.9	2	2.1	2	2	2	2	2
9	-2.1	-2	0	-4.2	-2.9	0	-4.2	-3	1.8	1.9	1.9	1	1	1	0.9	2	1.9	1	1.9	1.9	1
10	-2.1	-1	-1.4	-2	2	0.9	-1	-1	1	1.6	1.5	1	0	0	0	2.1	1.6	0.6	2	1.7	0.5
11	-4	-2.9	1.1	2	2.1	-0.8	-3	-0.8	-1.1	4.1	3.8	1	0.9	1	-1.8	2.9	2.9	1	0.9	-1.2	-1.1
12	-1.9	2	2.1	-2.8	1.9	2.9	-3	2.9	2.9	-3	2.8	2.9	-1.2	1.2	0.9	-1.1	0.8	0.9	0	0	0
13	-1.9	-1.9	-1	-2	1	0	0	0	0	0.9	0.9	0	0	-0.1	0	0.8	0.9	1	0.9	1	0.9
14	-2.1	-2.8	-1.5	-2.3	1.1	-1.1	-2.2	-2.2	-0.9	1	1.8	1.4	1	-0.6	-1.5	1.2	2.2	1.3	-1.1	-1.4	-0.3
Average	-2.32	-0.69	0.32	-2.35	0.76	0.62	-1.89	-0.61	0.50	1.81	2.21	0.83	1.11	1.05	0.26	2.04	2.09	0.83	1.39	1.13	0.28

Table B.9: Phase II Female respondents' data for prompt questions 15-22

q15e	q15p	q15a	q16e	q16p	q16a	q17e	q17p	q17a	q18e	q18p	q18a	q19e	q19p	q19a	q20e	q20p	q20a	q21e	q21p	q21a	q22e	q22p	q22a
2.5	2.4	1.9	2.8	2.7	2.3	2.9	2.9	2.2	2.6	2.7	2.3	2.9	2.9	2.2	1.2	2	2	3.5	2.9	2	1.9	1.4	2.1
1.4	1.2	1.5	0.5	-1.6	0.5	2.3	1.3	1.3	0.4	-0.5	0.5	1.5	1.5	0.5	0.4	1.3	0.5	2.5	1.2	-0.6	-1.7	0.6	-1.7
4.2	4.1	0	0	0	0	1.1	1	0	1.5	1.6	0	-4.3	0	0	4.3	4.3	0	-2.4	-2.6	0	1	0	0
2	2	-1	1	1	-1	2.5	2	-1.5	1.4	1	-1.4	-1	1	1	0	-1	-1	0	2	0	0	-1	-0.9
-1.1	1	0	0	0.9	0	-1	0.9	0.9	-1.1	0	0	-1	0	0	-1	1	0	0	-0.1	0	0	0	0.9
2.9	1	1.4	2.3	2.5	1.8	3.9	0.1	0	3.6	0	0	1	2.6	0	0	1.3	1.4	1.9	2.9	0	0	0	1.1
4.3	4.3	0	3	3.1	0	4.2	4.3	0	3.1	3.1	0	1	1.1	0	0	0	0	2.1	2	0	0	0	0
-2	-2	2	1	1	2.1	3.1	1.9	-1.9	-1	-1.1	1	1	0.9	2.1	-2	-1	2.2	1	1.4	1.4	-2.5	-2.2	2.3
2.1	2	1.9	0.9	1	0.9	2.1	2	0.9	0.9	1	-1	-1.9	-2	-1.9	0.9	0.9	-1.1	-0.9	-1.1	-1	0.9	1	1
1.5	1.9	0.6	-1.8	-2	-1.1	-1	-1	-0.7	-1.4	-1.7	-1.2	-3	0	0	-2.1	-1	-1	-1	1.9	0	0	-1.4	0
1.8	2	0.7	-0.8	-3.2	-2.1	1.9	3	0.1	0.9	-0.9	-1.7	2.9	3	0.8	-1	-1	-1.1	3	2.8	0.9	0.2	-1.1	-1.1
-2.2	1.8	1.9	-1	1.2	0	0.8	2	1	-1	0.9	1	-3	2.8	2.9	-2.9	3	2.9	-4.3	3.9	3.5	0	0	0
0.9	1.9	1.9	0	-0.1	0	1	1	1	0	0	0	-1.9	1	0.9	0	0	0	0	0	0	0.9	0.9	0
0.9	2.1	0.3	-1.7	-1.9	-1.4	0.1	1.9	0.3	-1.6	-1.5	-0.5	0.9	2.4	1.1	-1.6	-0.7	-1.2	0.3	1.5	0.3	-2.2	-3	-1.7
1.37	1.84	0.94	0.44	0.33	0.14	1.71	1.66	0.26	0.59	0.33	-0.07	-0.35	1.23	0.69	-0.27	0.65	0.26	0.41	1.34	0.46	-0.11	-0.34	0.14

B.4 Respondents in age group 65-69 years data

Table B.10: Phase II age group 65-69 yrs. respondents' data for prompt questions 1-7

#	q1e	q1p	q1a	q2e	q2p	q2a	q3e	q3p	q3a	q4e	q4p	q4a	q5e	q5p	q5a	q6e	q6p	q6a	q7e	q7p	q7a
1	1.9	0	-2	-2.1	-1.9	0.9	1.9	1	1	2	0.9	1.9	2.1	1.9	1.9	2	0	2	-2	2	-0.9
2	-0.9	1.5	3.1	0	0	2	-1.5	-1.9	-1.8	0.5	0.7	0.4	1.9	1.3	0.9	0	0	0	-2.5	-2.3	-2.4
3	-1	2	0	-1	1	0	1	1	0	1	1	0	0	0	0	0	0	0	-3	1	1
4	0	0.9	0.9	-1	0	0.8	0	0	0.9	-1	0	-1	1.9	1.9	0.9	-1	-1	0	-1.1	0	1
5	0	0	0	-2	-1.9	0	2.7	1.8	0	0.5	0	0	3.4	1	0	1.8	0	0	-1.5	2.5	2.3
6	0	0	0	0	0	0	2.1	2.1	-0.9	3.1	2.2	-1.1	3.4	2.9	0	3.3	2.9	0	-2.9	-2.8	-1.1
7	0	0	0	0.9	-0.1	-1.1	0	0	0	-0.8	-0.8	-0.9	1.3	1	0	-1.1	0	-1	-1.6	-1	0.7
Average	0.00	0.63	0.29	-0.74	-0.41	0.37	0.89	0.57	-0.11	0.76	0.57	-0.10	2.00	1.43	0.53	0.71	0.27	0.14	-2.09	-0.09	0.09

Table B.11: Phase II age group 65-69 yrs. respondents' data for prompt questions 8-14

#	q8e	q8p	q8a	q9e	q9p	q9a	q10e	q10p	q10a	q11e	q11p	q11a	q12e	q12p	q12a	q13e	q13p	q13a	q14e	q14p	q14a
1	-1	1	1.9	-2	1.9	0	-2.1	1	1.9	2.4	1.7	1	2.2	1.4	1.8	2.8	2.5	1.7	2.1	2.2	1.8
2	-1	-0.5	0.5	-2.8	-3	-3.1	-2.1	-1.8	-1.9	1.2	2.1	2.6	0	0.3	1.1	0	1.6	-0.7	0.1	0.5	1.6
3	-2	1	0	-2	2	1	-1	1	0	2	2	0	2	2	0	2	2	-1	2	2	-2
4	-1	0	0	-2.1	0.9	0.9	-1	0	0	0.9	0.9	0	0	0	0	0	0	0	0	0	0
5	-2.2	1.7	2	-3.4	2.4	2.5	-1.1	0	0	2.7	1.9	1.9	3	1	0.9	3.6	2.5	2.6	3.2	2.8	1.6
6	-3	-2.2	-1	-3.9	-3.4	-1.4	-1	-0.9	0	3.9	3.4	0	3.4	3.5	0	4.3	4.3	0	3.4	3.4	0
7	0	-1	-1.2	-1.4	1.1	0.9	-1.1	1.3	0	2.6	2.4	-1.5	1.1	0.8	-1	1.9	0.5	1	-1.4	-0.9	-1.1
Average	-1.46	0.00	0.31	-2.51	0.27	0.11	-1.34	0.09	0.00	2.24	2.06	0.57	1.67	1.29	0.40	2.09	1.91	0.51	1.34	1.43	0.27

Table B.12: Phase II age group 65-69 yrs. respondents' data for prompt questions 15-22

#	q15e	q15p	q15a	q16e	q16p	q16a	q17e	q17p	q17a	q18e	q18p	q18a	q19e	q19p	q19a	q20e	q20p	q20a	q21e	q21p	q21a	q22e	q22p	q22a
1	2.5	2.4	1.9	2.8	2.7	2.3	2.9	2.9	2.2	2.6	2.7	2.3	2.9	2.9	2.2	1.2	2	2	3.5	2.9	2	1.9	1.4	2.1
2	0.2	0.1	0.2	0	0.7	1.5	0	0	0.3	0	0	0	2.2	0.4	-3.9	1.3	-0.4	-2.1	0.7	-2.1	-3.3	0.4	-0.5	-0.4
3	2	2	-1	1	1	-1	2.5	2	-1.5	1.4	1	-1.4	-1	1	1	0	-1	-1	0	2	0	0	-1	-0.9
4	-1.1	1	0	0	0.9	0	-1	0.9	0.9	-1.1	0	0	-1	0	0	-1	1	0	0	-0.1	0	0	0	0.9
5	2.9	1	1.4	2.3	2.5	1.8	3.9	0.1	0	3.6	0	0	1	2.6	0	0	1.3	1.4	1.9	2.9	0	0	0	1.1
6	4.3	4.3	0	4.3	4.3	0	4.3	4.3	-1	4.2	4.3	-1	4.3	4.3	-1.1	3.1	3.1	-1	3.7	3.7	-1	3.2	3.2	-1
7	2.6	2.1	0	-0.7	-1.1	-1.2	2.3	2.3	0	0	1.3	0	0	1.4	1.2	1	1.1	0	-1.1	0	-0.5	1.3	1.5	0.7
Average	1.91	1.84	0.36	1.39	1.57	0.49	2.13	1.79	0.13	1.53	1.33	-0.01	1.20	1.80	-0.09	0.80	1.01	-0.10	1.24	1.33	-0.40	0.97	0.66	0.36

B.5 Respondents in age group 70 yrs. and older data

Table B.13: Phase II age group 70 yrs. and older respondents' data for prompt questions 1-7

#	q1e	q1p	q1a	q2e	q2p	q2a	q3e	q3p	q3a	q4e	q4p	q4a	q5e	q5p	q5a	q6e	q6p	q6a	q7e	q7p	q7a
1	-0.9	-1.7	-2.6	-2.6	-2.6	-0.7	-0.4	-1.6	-0.9	-1.7	-2.5	-0.7	1.3	-0.5	-0.5	1.5	-0.5	-0.7	-2.7	-1.7	-0.7
2	1.1	1.1	-0.7	-0.7	-1.3	-1	2.2	1.5	1.8	-0.9	-0.7	-0.8	0.9	1.3	1	-1.9	-1.4	-1.4	-3.1	-2.9	-2.8
3	0	0	0	-1.8	-1.3	-4.1	2.4	2.5	0	-4.1	-4	0	4.1	-4.3	0	4.2	4.2	0	-4.1	-4.3	0
4	-3	3	1	-1.8	1.1	1.2	-1.1	1.9	1.4	-1	1	1	3	3	0	3	3.6	0	-2.9	2.9	2
5	1.9	0	-1	-1	-1	1	2	2	0	-1	1	0	3	2	-1	1	1	1	-1	0	1
6	2.1	2.1	0	-1	1.1	0	2.1	2.1	0	-1	-1	0	4.3	4.2	0	-0.9	0	0	-1.1	-1.9	0
7	-1	1.1	-1.9	-1.9	-2	-2.1	-0.9	-0.9	-1.1	0.9	-0.9	1.1	-3.1	-3.1	-3	-4.3	-4.3	-4.3	-4.3	-4.3	-4.3
8	1.1	1	2	-2	-2	-3.1	-1	-0.9	-1	0.9	0.9	1	2.9	2	2	1	1	-1	-4.3	2	3
9	-1.9	-0.9	0	-2.9	-1.9	0	2	1.1	0	1.1	1	0	1.9	2	0	2.1	1	0	-4.3	-2.9	0
10	0	1	0	-1	-1	-1	0	1	0	-1	-1	-2	0.9	1	0	-1	-1	0	-1.9	1.9	0
11	0	0	0.9	-2.9	2.1	1	2	0.9	-1	-1	1.1	-1	2	1.9	0	-1.9	-2	-1.9	-2.9	2.1	0
12	1.1	1	1.9	-2.9	-2.7	-0.9	-0.8	-0.9	-1.1	-2.9	-2.9	-2	3	3.2	1	-2.9	-3	1.1	-1	3	0.3
13	0	1.8	1	0	0	1	-1.8	1.8	1.9	-1.1	1	-1.1	-1.2	1.8	1	-1.9	1.9	2	-2.1	1.8	2.1
14	-0.1	0	0	-1	-1	-1	1	-1	-1.1	-1	-1	-2	1	0.9	0	0.8	0.9	0	-3	-2	0
15	1.9	1.8	-0.7	1.9	1.7	0.6	2.2	0.7	1.1	-0.7	-0.9	-1.3	2.8	1.3	1.2	-1.6	-1.4	-1.1	-2.3	1	0.5
Average	0.15	0.75	-0.01	-1.44	-0.72	-0.61	0.66	0.68	0.00	-0.97	-0.59	-0.52	1.79	1.11	0.11	-0.19	0.00	-0.42	-2.73	-0.35	0.07

Table B.14: Phase II age group 70 yrs. and older respondents' data for prompt questions 8-14

#	q8e	q8p	q8a	q9e	q9p	q9a	q10e	q10p	q10a	q11e	q11p	q11a	q12e	q12p	q12a	q13e	q13p	q13a	q14e	q14p	q14a
1	-2.7	-1.6	-1.7	-2.5	0.5	-0.6	-4	-2.5	-1.6	0.3	1.3	-0.6	-0.6	-0.5	0.5	1.5	1.3	0.5	-0.6	-1.5	-0.5
2	-2.5	-2.7	-2.5	-2	-1.7	-1.6	-3	-3.1	-3	2.2	2.1	1.8	-0.8	-0.8	-1.2	1.2	1.6	1.5	-0.3	-0.3	-0.3
3	-4.3	-4.3	0	-4.3	-4.3	0	0	0	0	4.3	4.2	0	4.1	4.3	0	4.3	4.3	0	4.1	4.3	0
4	1.9	2.1	1.2	-2.1	2.2	1.6	-1.1	1	1	3	2.4	0	1.4	1.1	0	2	1.4	0	1.5	1.1	0
5	1	0.9	0	-1	-1	1	0.9	0	-1	2	2	0	2	0.9	0	2	2.1	0.9	0.9	2	0.9
6	-1	-0.9	0	-1	-0.9	0	-0.8	-0.9	0	4.3	4.2	0	2.1	2.1	0	4.3	4.3	0	2	2	0
7	-2.8	-2.9	-4.3	-4.3	-4.3	-4.3	-4.3	-4.3	-2	3	3.2	2	3	3.1	0	4.3	4.3	2.1	2.1	1.2	1.1
8	-4.2	2	3	-4.3	3	3	-3	-3	3	2	2	2	1	1.9	2	2.1	2	2	2	2	2
9	-2.1	-2	0	-4.2	-2.9	0	-4.2	-3	1.8	1.9	1.9	1	1	1	0.9	2	1.9	1	1.9	1.9	1
10	-1	-1	0	-2	1.9	0	-1	0.9	0	2	2	0	0	0	0	0.9	0.9	0	0	0.9	1
11	-2.1	-1	-1.4	-2	2	0.9	-1	-1	1	1.6	1.5	1	0	0	0	2.1	1.6	0.6	2	1.7	0.5
12	-4	-2.9	1.1	2	2.1	-0.8	-3	-0.8	-1.1	4.1	3.8	1	0.9	1	-1.8	2.9	2.9	1	0.9	-1.2	-1.1
13	-1.9	2	2.1	-2.8	1.9	2.9	-3	2.9	2.9	-3	2.8	2.9	-1.2	1.2	0.9	-1.1	0.8	0.9	0	0	0
14	-1.9	-1.9	-1	-2	1	0	0	0	0	0.9	0.9	0	0	-0.1	0	0.8	0.9	1	0.9	1	0.9
15	-2.1	-2.8	-1.5	-2.3	1.1	-1.1	-2.2	-2.2	-0.9	1	1.8	1.4	1	-0.6	-1.5	1.2	2.2	1.3	-1.1	-1.4	-0.3
Average	-1.98	-1.13	-0.33	-2.32	0.04	0.07	-1.98	-1.07	0.01	1.97	2.41	0.83	0.93	0.97	-0.01	2.03	2.17	0.85	1.09	0.91	0.35

Table B.15: Phase II age group 70 yrs. and older respondents' data for prompt questions 15-22

#	q15e	q15p	q15a	q16e	q16p	q16a	q17e	q17p	q17a	q18e	q18p	q18a	q19e	q19p	q19a	q20e	q20p	q20a	q21e	q21p	q21a	q22e	q22p	q22a
1	1.4	1.2	1.5	0.5	-1.6	0.5	2.3	1.3	1.3	0.4	-0.5	0.5	1.5	1.5	0.5	0.4	1.3	0.5	2.5	1.2	-0.6	-1.7	0.6	-1.7
2	0.7	1.2	1	-0.5	-0.3	-0.3	1.3	2	1.4	0.5	0.4	0.6	0.6	1	0.8	-0.4	-0.3	-0.2	0.8	0.9	1.2	0.5	0.5	0.4
3	4.2	4.1	0	0	0	0	1.1	1	0	1.5	1.6	0	-4.3	0	0	4.3	4.3	0	-2.4	-2.6	0	1	0	0
4	1.4	1.1	0	1.7	1	0.8	1.6	1.1	0	2.1	1.2	-0.6	1.1	1.5	-0.7	1	1.1	0	1.2	1.1	0	1.1	1	0
5	2	2	2	0.9	1	0	2	2	1	0	0	0	1	1.1	0.9	-1	0	-1	1	1	0	0	1	1
6	4.3	4.3	0	3	3.1	0	4.2	4.3	0	3.1	3.1	0	1	1.1	0	0	0	0	2.1	2	0	0	0	0
7	3.1	3.1	2.3	2	0.9	1	3.2	2.9	3	1.6	1.7	1.2	-2.9	-2	1.2	-1.9	2.1	1.1	-3	-3	-3	2	1.1	1.1
8	-2	-2	2	1	1	2.1	3.1	1.9	-1.9	-1	-1.1	1	1	0.9	2.1	-2	-1	2.2	1	1.4	1.4	-2.5	-2.2	2.3
9	2.1	2	1.9	0.9	1	0.9	2.1	2	0.9	0.9	1	-1	-1.9	-2	-1.9	0.9	0.9	-1.1	-0.9	-1.1	-1	0.9	1	1
10	0.9	0.9	0	0	0	0	0.9	0.9	0	-1	-1	0	-2	1.9	0	0	0	0	0	2	0	0	-1	0
11	1.5	1.9	0.6	-1.8	-2	-1.1	-1	-1	-0.7	-1.4	-1.7	-1.2	-3	0	0	-2.1	-1	-1	-1	1.9	0	0	-1.4	0
12	1.8	2	0.7	-0.8	-3.2	-2.1	1.9	3	0.1	0.9	-0.9	-1.7	2.9	3	0.8	-1	-1	-1.1	3	2.8	0.9	0.2	-1.1	-1.1
13	-2.2	1.8	1.9	-1	1.2	0	0.8	2	1	-1	0.9	1	-3	2.8	2.9	-2.9	3	2.9	-4.3	3.9	3.5	0	0	0
14	0.9	1.9	1.9	0	-0.1	0	1	1	1	0	0	0	-1.9	1	0.9	0	0	0	0	0	0	0.9	0.9	0
15	0.9	2.1	0.3	-1.7	-1.9	-1.4	0.1	1.9	0.3	-1.6	-1.5	-0.5	0.9	2.4	1.1	-1.6	-0.7	-1.2	0.3	1.5	0.3	-2.2	-3	-1.7
Average	1.40	1.84	1.07	0.28	0.01	0.03	1.64	1.75	0.49	0.33	0.21	-0.05	-0.60	0.95	0.57	-0.42	0.58	0.07	0.02	0.87	0.18	0.01	-0.17	0.09

Appendix C

Phase II Eigen Analysis

Below tables show the eigen values and eigen ratios for EPA for all data and various sub-datasets considered in phase II data analysis. Note that the eigen ratio is the ratio of first to second largest eigen values. Dark green background color is used for ratio values greater than or equal to 2.0 (indicating more consensus), light green background color is used for ratio values greater than or equal to 1.8 (indicating close to consensus)

Table C.1: Phase II Eigen values and ratios for all data subsets excluding age group subset

#	All Data			Male Character Data			Female Character Data			Male Respondents' Data			Female Respondents' Data		
	E	P	A	E	P	A	E	P	A	E	P	A	E	P	A
1	51.1	28.6	9.3	36.8	22.3	8.4	70.5	38.9	13.7	18.2	15.2	7.7	35.3	15.5	3.9
2	8.1	13.4	5.3	9.4	7.7	6.0	12.0	6.9	7.3	4.3	2.8	4.0	7.4	11.9	3.0
3	6.1	4.8	3.7	5.1	5.7	2.5	6.0	4.5	3.9	2.0	2.0	1.2	4.2	3.4	2.1
4	5.9	3.8	3.1	3.7	5.0	2.1	3.9	4.1	2.3	1.8	1.4	0.6	2.9	3.3	1.6
5	3.4	3.6	1.6	3.5	3.5	1.9	2.8	1.8	1.2	0.9	0.8	0.4	1.8	2.5	1.0
6	2.2	2.6	1.3	2.0	2.0	1.1	1.6	1.8	1.0	0.4	0.4	0.3	1.3	1.2	0.7
7	1.7	1.8	0.9	1.5	1.5	0.8	1.0	1.2	0.7	0.2	0.4	0.2	1.1	1.1	0.6
8	1.5	1.2	0.7	0.7	1.1	0.3	0.6	0.8	0.3	0.2	0.2	0.1	0.8	0.7	0.5
9	1.2	1.1	0.6	0.5	0.7	0.2	0.5	0.6	0.2				0.5	0.6	0.4
10	0.9	0.8	0.5	0.3	0.2	0.1	0.3	0.5	0.1				0.3	0.4	0.3
11	0.6	0.7	0.5										0.3	0.3	0.2
12	0.5	0.6	0.4										0.3	0.2	0.1
13	0.4	0.4	0.3										0.1	0.2	0.0
14	0.3	0.4	0.2										0.0	0.1	0.0
15	0.2	0.3	0.1												
16	0.2	0.2	0.1												
17	0.1	0.1	0.1												
18	0.1	0.1	0.0												
19	0.1	0.0	0.0												
20	0.0	0.0	0.0												
21	0.0	0.0	0.0												
Eigen ratio	6.3	2.1	1.8	3.9	2.9	1.4	5.9	5.6	1.9	4.3	5.5	1.9	4.7	1.3	1.3

Table C.2: Phase II Eigen values and ratios for age group data subsets

#	Age group 65-69 yrs. Data			Age group 70 yrs and older Data		
	E	P	A	E	P	A
1	17.4	7.4	4.4	35.7	23.1	8.4
2	1.5	2.7	1.6	7.6	12.4	3.5
3	1.5	1.3	1.0	5.6	4.1	3.2
4	0.7	1.1	0.5	4.1	2.7	1.5
5	0.4	0.7	0.2	3.3	2.2	1.2
6	0.2	0.2	0.2	1.4	2.2	0.9
7	0.1	0.2	0.1	1.4	1.1	0.6
8				1.0	0.9	0.5
9				0.7	0.7	0.4
10				0.6	0.6	0.3
11				0.4	0.4	0.2
12				0.2	0.2	0.1
13				0.2	0.2	0.1
14				0.1	0.1	0.0
15				0.1	0.1	0.0
Eigen ratio	11.3	2.7	2.7	4.7	1.9	2.4

Appendix D

Phase II Pearson's r-correlation analysis

Below is the r-correlation analysis data for EPA for all data and subsets considered for phase II analysis. Wherever value is greater than or equal to 0.9, it is highlighted with dark green background color to indicate high correlation

All Respondents' dataset – E dimension

1.00																				
0.85	1.00																			
0.74	0.66	1.00																		
0.47	0.45	0.45	1.00																	
0.68	0.65	0.55	0.34	1.00																
0.74	0.58	0.63	0.70	0.44	1.00															
0.61	0.64	0.33	0.56	0.66	0.57	1.00														
0.47	0.33	0.55	0.51	0.48	0.36	0.42	1.00													
0.85	0.77	0.68	0.70	0.52	0.87	0.66	0.54	1.00												
0.54	0.52	0.56	0.54	0.28	0.49	0.49	0.65	0.67	1.00											
0.90	0.80	0.68	0.59	0.78	0.82	0.67	0.43	0.86	0.43	1.00										
0.71	0.71	0.78	0.60	0.42	0.73	0.52	0.59	0.84	0.76	0.67	1.00									
0.59	0.35	0.57	0.50	0.31	0.86	0.39	0.28	0.65	0.34	0.63	0.66	1.00								
0.78	0.71	0.62	0.46	0.63	0.67	0.50	0.61	0.78	0.61	0.75	0.67	0.46	1.00							
0.80	0.68	0.64	0.75	0.57	0.86	0.70	0.49	0.85	0.50	0.83	0.65	0.68	0.66	1.00						
0.37	0.40	0.62	0.53	0.48	0.55	0.43	0.34	0.44	0.48	0.47	0.62	0.62	0.30	0.52	1.00					
0.57	0.51	0.70	0.73	0.43	0.73	0.52	0.69	0.67	0.68	0.58	0.80	0.66	0.58	0.72	0.74	1.00				
0.46	0.29	0.61	0.69	0.18	0.63	0.32	0.67	0.63	0.69	0.41	0.68	0.54	0.46	0.63	0.44	0.76	1.00			
0.55	0.61	0.67	0.29	0.39	0.39	0.31	0.43	0.52	0.48	0.44	0.74	0.36	0.50	0.29	0.43	0.49	0.47	1.00		
0.11	-0.06	0.18	0.19	0.00	0.30	-0.05	0.13	0.22	0.09	0.14	0.17	0.48	0.28	0.29	0.23	0.18	0.18	-0.13	1.00	
0.62	0.52	0.63	0.85	0.38	0.78	0.55	0.56	0.74	0.62	0.69	0.65	0.55	0.59	0.80	0.51	0.80	0.74	0.30	0.27	1.00
0.38	0.41	0.70	0.32	0.41	0.33	0.05	0.56	0.44	0.61	0.36	0.56	0.23	0.55	0.32	0.51	0.49	0.51	0.45	0.15	0.36	1.00

All Respondents' dataset – P dimension

1.00																				
0.61	1.00																			
0.37	0.59	1.00																		
0.10	0.35	0.40	1.00																	
-0.04	0.11	0.52	0.39	1.00																
0.19	0.05	0.19	0.08	0.07	1.00															
-0.28	-0.09	-0.09	-0.19	0.05	-0.08	1.00														
0.27	0.25	0.39	-0.14	0.26	0.05	0.06	1.00													
0.68	0.36	0.11	0.00	-0.17	0.29	0.05	0.09	1.00												
0.43	0.35	0.63	0.40	0.46	0.17	-0.03	0.13	0.34	1.00											
0.45	0.50	0.73	0.61	0.55	-0.03	-0.39	0.06	0.06	0.64	1.00										
0.36	0.43	0.82	0.47	0.60	0.39	-0.12	0.46	0.08	0.63	0.70	1.00									
0.30	0.41	0.63	0.68	0.61	0.24	-0.42	0.26	-0.01	0.45	0.65	0.67	1.00								
0.30	0.18	0.07	-0.21	0.15	0.43	0.42	0.15	0.57	0.23	-0.10	0.11	-0.04	1.00							
0.27	0.32	0.68	0.60	0.62	-0.04	-0.14	0.24	-0.03	0.74	0.79	0.70	0.72	0.05	1.00						
0.28	0.68	0.49	0.35	0.13	0.02	-0.14	0.37	-0.19	0.18	0.34	0.43	0.38	-0.25	0.26	1.00					
0.46	0.39	0.28	-0.05	-0.19	0.50	0.20	0.35	0.64	0.19	-0.08	0.22	-0.08	0.39	-0.19	0.25	1.00				
-0.03	0.04	0.14	-0.22	-0.08	0.45	0.10	0.21	0.28	0.09	-0.21	0.12	-0.09	0.27	-0.09	-0.06	0.55	1.00			
0.51	0.63	0.48	0.00	0.04	0.42	0.19	0.42	0.41	0.28	0.11	0.42	0.16	0.39	0.03	0.54	0.82	0.51	1.00		
0.31	0.38	0.05	-0.09	-0.27	0.07	0.19	0.17	0.34	0.01	-0.06	-0.05	-0.27	0.12	-0.28	0.27	0.55	-0.02	0.42	1.00	
0.38	0.67	0.55	0.48	0.32	0.13	-0.07	0.31	0.08	0.40	0.55	0.55	0.38	0.01	0.48	0.67	0.27	0.01	0.40	0.03	1.00
0.11	0.42	0.54	0.02	0.15	0.49	0.19	0.35	0.16	0.15	0.10	0.46	0.14	0.27	0.01	0.33	0.66	0.65	0.75	0.27	0.27	1.00

All Respondents' dataset – A dimension

1.00													
0.51	1.00												
0.30	0.44	1.00											
0.11	0.07	0.12	1.00										
-0.13	-0.14	0.06	-0.26	1.00									
-0.46	-0.37	-0.38	-0.08	-0.40	1.00								
-0.63	-0.50	-0.59	-0.23	-0.04	0.48	1.00							
-0.53	-0.24	0.03	-0.22	-0.03	0.19	0.34	1.00						
-0.17	0.12	-0.16	0.20	-0.03	-0.03	0.24	0.00	1.00					
0.09	0.40	0.12	-0.19	-0.13	-0.08	-0.07	0.09	0.30	1.00				
-0.01	0.00	0.03	-0.22	0.65	-0.26	-0.17	-0.10	-0.02	-0.10	1.00			
NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN		
0.42	0.59	0.62	0.14	0.22	-0.65	-0.58	-0.33	0.02	0.17	0.11	NaN	1.00	
-0.12	-0.17	-0.28	0.61	-0.22	0.17	0.03	-0.19	0.55	-0.24	-0.08	NaN	-0.08	1.00
0.04	0.02	-0.08	0.06	0.44	-0.36	0.14	0.02	0.30	0.21	0.57	NaN	0.25	0.09	1.00
-0.19	0.10	0.13	0.24	-0.65	0.22	-0.03	0.40	0.10	0.19	-0.43	NaN	0.03	0.27	-0.21	1.00
0.00	0.08	0.12	0.39	-0.08	-0.29	-0.28	0.30	0.31	0.06	0.19	NaN	-0.01	0.32	0.14	0.15	1.00
-0.44	-0.16	0.02	-0.28	0.09	0.17	0.11	0.27	0.20	0.09	0.35	NaN	0.05	0.23	0.36	0.22	0.13	1.00
-0.32	-0.18	0.17	0.12	0.02	0.27	-0.11	0.22	0.03	0.07	0.16	NaN	-0.27	0.08	-0.11	0.17	0.25	0.20	1.00
-0.12	-0.01	-0.05	0.10	-0.58	0.47	0.01	0.11	0.07	-0.09	-0.20	NaN	-0.36	0.19	-0.30	0.22	0.32	0.17	0.43	1.00
0.13	0.55	0.33	0.28	-0.10	-0.36	-0.53	0.10	0.24	0.43	0.26	NaN	0.40	0.21	0.28	0.38	0.65	0.32	0.34	0.20	1.00
-0.11	0.25	0.59	-0.17	-0.09	0.13	-0.15	0.25	-0.07	0.17	0.15	NaN	0.15	-0.25	-0.10	0.24	0.11	0.36	0.47	0.27	0.29	1.00

All Respondents' dataset for Male Character only – E dimension

1.00																				
0.80	1.00																			
0.63	0.46	1.00																		
0.46	0.63	0.30	1.00																	
0.61	0.64	0.75	0.33	1.00																
0.81	0.57	0.61	0.52	0.45	1.00															
0.62	0.73	0.16	0.49	0.19	0.28	1.00														
0.49	0.17	0.41	0.35	0.18	0.55	0.26	1.00													
0.85	0.73	0.51	0.62	0.32	0.92	0.57	0.46	1.00												
0.16	0.09	-0.36	0.32	-0.50	0.20	0.53	0.48	0.38	1.00											
0.90	0.79	0.74	0.58	0.68	0.85	0.37	0.44	0.83	-0.05	1.00										
0.65	0.52	0.57	0.43	0.19	0.76	0.46	0.56	0.83	0.36	0.63	1.00									
0.69	0.27	0.77	0.16	0.44	0.79	0.16	0.72	0.64	0.10	0.64	0.74	1.00								
0.71	0.62	0.32	0.44	0.39	0.84	0.26	0.45	0.79	0.23	0.75	0.49	0.50	1.00							
0.94	0.84	0.60	0.53	0.73	0.74	0.63	0.41	0.76	0.07	0.86	0.46	0.55	0.73	1.00						
-0.07	-0.06	0.43	0.06	0.41	-0.13	-0.10	0.11	-0.24	-0.26	0.00	-0.02	0.23	-0.41	-0.06	1.00					
0.51	0.35	0.52	0.56	0.48	0.51	0.28	0.83	0.40	0.21	0.52	0.52	0.62	0.32	0.49	0.32	1.00				
0.41	0.01	0.27	0.40	0.02	0.63	0.16	0.67	0.53	0.39	0.34	0.38	0.57	0.46	0.40	-0.23	0.51	1.00			
0.67	0.46	0.77	0.64	0.41	0.80	0.37	0.66	0.78	0.21	0.72	0.83	0.81	0.44	0.58	0.25	0.70	0.63	1.00		
0.27	0.04	0.64	-0.08	0.31	0.38	-0.05	0.52	0.25	-0.10	0.31	0.30	0.65	0.34	0.29	0.16	0.23	0.38	0.42	1.00	
0.53	0.49	0.39	0.81	0.23	0.53	0.38	0.50	0.60	0.24	0.67	0.38	0.25	0.46	0.55	-0.13	0.52	0.56	0.63	0.16	1.00
-0.18	-0.09	0.16	-0.01	0.21	0.19	-0.44	0.05	-0.01	-0.13	0.02	0.00	0.20	0.26	-0.10	0.37	-0.03	-0.10	0.05	0.42	-0.24	1.00

All Respondents' dataset for Male Character only – P dimension

1.00																				
0.40	1.00																			
0.45	0.55	1.00																		
0.28	0.58	0.35	1.00																	
0.15	-0.04	0.58	0.08	1.00																
0.03	-0.66	-0.24	-0.05	0.32	1.00															
-0.31	0.11	-0.31	0.16	-0.02	-0.18	1.00														
0.48	0.20	0.27	-0.04	0.08	-0.14	-0.68	1.00													
0.74	0.18	0.12	0.25	0.28	0.24	-0.07	0.42	1.00												
0.49	0.10	0.20	0.17	0.41	0.22	0.18	-0.16	0.72	1.00											
0.56	0.52	0.87	0.61	0.60	-0.10	-0.13	0.19	0.27	0.33	1.00										
0.42	0.10	0.57	0.43	0.53	0.41	-0.26	0.25	0.28	0.06	0.66	1.00									
0.60	0.54	0.79	0.41	0.48	0.04	-0.57	0.55	0.37	0.19	0.72	0.62	1.00								
0.24	-0.06	0.02	0.10	0.66	0.49	0.33	-0.11	0.65	0.71	0.18	0.20	0.18	1.00							
0.53	0.52	0.84	0.52	0.71	-0.08	0.00	0.08	0.40	0.58	0.91	0.47	0.68	0.44	1.00						
0.09	0.55	0.18	0.37	-0.59	-0.45	-0.19	-0.01	-0.43	-0.43	0.16	-0.04	0.21	-0.70	-0.06	1.00					
0.38	-0.10	-0.19	0.44	-0.23	0.35	-0.37	0.33	0.53	0.24	0.06	0.16	0.14	0.02	-0.03	0.03	1.00				
-0.45	-0.49	-0.04	-0.14	0.30	0.47	-0.37	-0.05	-0.19	-0.06	-0.21	-0.04	0.06	0.11	-0.07	-0.33	0.13	1.00			
0.33	0.41	0.19	0.56	-0.26	0.14	-0.40	0.09	0.06	0.00	0.26	0.23	0.56	-0.15	0.15	0.69	0.44	0.02	1.00		
0.14	0.16	-0.55	0.09	-0.55	-0.26	0.26	0.18	0.14	-0.20	-0.31	-0.44	-0.32	-0.09	-0.35	0.21	0.26	-0.49	0.06	1.00	
0.31	0.48	0.48	0.76	0.01	-0.24	0.10	-0.19	0.16	0.38	0.65	0.29	0.25	-0.13	0.57	0.38	0.36	-0.23	0.35	-0.17	1.00
-0.58	-0.24	0.07	0.14	0.32	0.22	-0.13	0.03	-0.48	-0.55	0.02	0.21	0.08	-0.09	-0.05	-0.08	-0.10	0.65	-0.02	-0.23	-0.20	1.00

All Respondents' dataset for Male Character only – A dimension

1.00																				
0.22	1.00																			
0.28	0.52	1.00																		
0.89	0.07	0.04	1.00																	
-0.39	0.17	0.17	-0.43	1.00																
-0.39	-0.37	-0.70	-0.26	-0.07	1.00															
-0.48	-0.48	-0.65	-0.41	0.19	0.59	1.00														
-0.34	-0.23	0.18	-0.50	0.10	-0.12	-0.11	1.00													
0.27	0.06	0.09	0.32	0.16	-0.40	0.03	0.11	1.00												
-0.32	-0.22	0.32	-0.37	0.66	-0.12	-0.13	0.43	-0.06	1.00											
-0.35	0.12	-0.32	-0.29	0.39	0.10	0.13	0.20	-0.10	0.22	1.00										
NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN									
0.33	0.51	0.76	0.23	0.00	-0.66	-0.43	-0.13	0.14	-0.14	-0.26	NaN	1.00								
0.65	-0.10	-0.12	0.79	-0.43	-0.26	-0.10	-0.26	0.58	-0.56	-0.29	NaN	0.28	1.00							
-0.04	-0.43	-0.40	0.12	0.13	0.11	0.30	0.15	0.11	0.09	0.57	NaN	-0.05	0.33	1.00						
0.35	-0.18	0.32	0.24	-0.72	-0.24	-0.43	0.33	-0.19	-0.25	-0.47	NaN	0.36	0.31	-0.04	1.00					
0.32	0.09	0.06	0.36	-0.07	-0.58	-0.50	0.36	0.52	0.04	0.32	NaN	-0.01	0.41	0.24	0.11	1.00				
-0.60	-0.26	-0.17	-0.48	0.11	-0.02	0.24	0.43	-0.16	0.06	0.44	NaN	0.14	-0.07	0.58	0.15	0.08	1.00			
-0.13	-0.52	-0.49	-0.02	-0.10	0.33	0.14	0.18	0.09	0.26	0.01	NaN	-0.87	-0.15	-0.14	-0.20	0.22	-0.33	1.00		
-0.04	-0.10	-0.53	0.02	-0.63	0.26	0.00	0.18	-0.03	-0.50	0.09	NaN	-0.55	0.11	-0.16	0.20	0.34	-0.03	0.52	1.00	
0.32	0.25	0.24	0.31	-0.11	-0.65	-0.64	0.37	0.30	0.06	0.43	NaN	0.20	0.28	0.27	0.23	0.92	0.18	-0.02	0.24	1.00
-0.69	0.08	0.06	-0.77	0.36	-0.16	0.10	0.28	-0.41	0.30	0.37	NaN	-0.08	-0.69	-0.16	-0.21	-0.05	0.49	-0.04	0.03	0.04	1.00

All Respondents' dataset for Female Character only – E dimension

1.00																					
0.92	1.00																				
0.87	0.67	1.00																			
0.52	0.42	0.70	1.00																		
0.79	0.80	0.60	0.36	1.00																	
0.73	0.70	0.80	0.81	0.44	1.00																
0.69	0.80	0.59	0.61	0.83	0.72	1.00															
0.48	0.35	0.58	0.63	0.57	0.32	0.53	1.00														
0.84	0.82	0.81	0.79	0.66	0.87	0.79	0.59	1.00													
0.81	0.68	0.88	0.84	0.66	0.75	0.65	0.73	0.88	1.00												
0.94	0.93	0.80	0.60	0.84	0.80	0.85	0.46	0.91	0.80	1.00											
0.78	0.74	0.80	0.90	0.64	0.90	0.79	0.60	0.92	0.91	0.84	1.00										
0.55	0.49	0.61	0.75	0.26	0.90	0.52	0.14	0.70	0.59	0.63	0.79	1.00									
0.82	0.77	0.77	0.52	0.77	0.61	0.70	0.67	0.77	0.81	0.78	0.77	0.47	1.00								
0.73	0.68	0.83	0.91	0.52	0.93	0.75	0.56	0.95	0.89	0.82	0.94	0.76	0.65	1.00							
0.60	0.58	0.66	0.85	0.53	0.88	0.73	0.36	0.79	0.76	0.73	0.91	0.88	0.60	0.86	1.00						
0.64	0.55	0.75	0.91	0.45	0.86	0.67	0.65	0.81	0.82	0.67	0.93	0.77	0.66	0.88	0.84	1.00					
0.45	0.31	0.69	0.95	0.25	0.70	0.48	0.66	0.68	0.78	0.48	0.78	0.59	0.42	0.83	0.66	0.83	1.00				
0.52	0.59	0.40	0.27	0.73	0.40	0.77	0.35	0.34	0.36	0.55	0.51	0.31	0.60	0.32	0.47	0.43	0.20	1.00			
0.08	0.03	0.19	0.35	-0.12	0.27	-0.10	0.08	0.28	0.40	0.05	0.34	0.39	0.35	0.30	0.39	0.29	0.22	-0.25	1.00		
0.72	0.63	0.86	0.89	0.43	0.89	0.62	0.60	0.86	0.90	0.71	0.92	0.71	0.67	0.94	0.77	0.92	0.87	0.33	0.34	1.00	
0.75	0.54	0.85	0.69	0.63	0.53	0.47	0.76	0.73	0.93	0.68	0.72	0.34	0.71	0.72	0.52	0.61	0.73	0.25	0.27	0.75	1.00

All Respondents' dataset for Female Character only – P dimension

1.00																					
0.77	1.00																				
0.03	0.40	1.00																			
-0.02	0.37	0.69	1.00																		
-0.14	0.24	0.69	0.54	1.00																	
0.06	0.44	0.14	0.44	0.01	1.00																
-0.70	-0.73	-0.39	-0.46	0.12	-0.46	1.00															
-0.22	-0.03	0.20	-0.15	0.40	-0.20	0.39	1.00														
0.42	0.23	-0.40	-0.18	-0.44	-0.06	-0.18	-0.65	1.00													
0.28	0.35	0.79	0.66	0.54	-0.15	-0.41	0.10	-0.20	1.00												
0.45	0.62	0.87	0.63	0.57	0.06	-0.63	-0.01	-0.13	0.87	1.00											
0.12	0.44	0.90	0.66	0.74	0.13	-0.34	0.41	-0.47	0.85	0.83	1.00										
0.00	0.40	0.70	0.90	0.69	0.53	-0.38	0.09	-0.43	0.62	0.61	0.77	1.00									
0.13	0.09	-0.32	-0.51	-0.01	0.00	0.35	0.11	0.23	-0.40	-0.38	-0.27	-0.29	1.00								
0.05	0.27	0.80	0.66	0.62	0.02	-0.26	0.40	-0.47	0.90	0.72	0.94	0.74	-0.32	1.00							
0.35	0.71	0.55	0.46	0.45	0.27	-0.39	0.50	-0.33	0.45	0.52	0.61	0.54	-0.08	0.53	1.00						
0.24	0.18	-0.48	-0.40	-0.39	0.06	0.11	-0.34	0.70	-0.50	-0.34	-0.61	-0.54	0.42	-0.67	-0.12	1.00					
0.06	-0.07	-0.45	-0.25	-0.29	-0.14	0.21	0.02	0.56	-0.15	-0.31	-0.22	-0.35	0.06	-0.13	-0.29	0.32	1.00				
0.61	0.58	-0.04	-0.15	0.33	0.03	-0.04	0.19	0.21	0.09	0.20	0.14	0.05	0.57	0.03	0.37	0.40	0.15	1.00			
0.30	0.32	0.09	-0.21	-0.21	0.10	-0.23	-0.20	0.31	-0.08	0.20	-0.11	-0.32	0.04	-0.27	0.10	0.68	-0.01	0.25	1.00		
0.36	0.76	0.52	0.37	0.48	0.30	-0.43	0.50	-0.24	0.32	0.53	0.62	0.48	-0.08	0.45	0.84	-0.23	-0.12	0.34	-0.01	1.00	
0.40	0.69	0.49	0.52	0.66	0.37	-0.46	0.00	-0.14	0.32	0.64	0.50	0.62	-0.10	0.27	0.54	-0.14	-0.38	0.46	0.03	0.67	1.00

All Respondents’ dataset for Female Character only – A dimension

1.00																					
0.78	1.00																				
0.74	0.38	1.00																			
NaN	NaN	NaN	NaN																		
-0.26	-0.24	0.23	NaN	1.00																	
-0.43	-0.50	-0.62	NaN	-0.48	1.00																
-0.76	-0.53	-0.73	NaN	-0.12	0.43	1.00															
-0.54	-0.42	-0.52	NaN	0.10	0.20	0.71	1.00														
-0.23	0.13	-0.40	NaN	-0.07	0.13	0.34	-0.14	1.00													
0.30	0.77	-0.11	NaN	-0.43	-0.16	-0.04	-0.32	0.49	1.00												
0.00	-0.06	0.39	NaN	0.81	-0.49	-0.36	-0.30	0.04	-0.31	1.00											
NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN										
0.53	0.65	0.69	NaN	0.33	-0.69	-0.67	-0.55	-0.04	0.38	0.39	NaN	1.00									
-0.37	-0.26	-0.56	NaN	-0.10	0.59	0.14	-0.22	0.56	0.04	0.16	NaN	-0.42	1.00								
0.01	0.34	0.18	NaN	0.60	-0.69	0.05	-0.03	0.44	0.32	0.55	NaN	0.45	-0.14	1.00							
-0.05	0.19	-0.44	NaN	-0.59	0.29	0.17	0.16	0.21	0.39	-0.40	NaN	-0.17	0.24	-0.32	1.00						
NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN					
-0.38	-0.23	-0.27	NaN	0.36	0.15	-0.03	-0.34	0.56	0.01	0.45	NaN	-0.03	0.76	0.25	-0.09	NaN	1.00				
-0.10	-0.18	0.09	NaN	0.53	-0.18	-0.49	-0.39	-0.15	-0.35	0.67	NaN	0.19	0.36	0.00	-0.22	NaN	0.50	1.00			
0.12	-0.04	-0.08	NaN	-0.56	0.57	-0.02	-0.42	0.11	0.19	-0.51	NaN	-0.24	0.30	-0.46	-0.17	NaN	0.14	-0.22	1.00		
0.42	0.76	0.14	NaN	0.06	-0.49	-0.57	-0.51	0.18	0.66	0.26	NaN	0.63	0.11	0.38	0.24	NaN	0.26	0.35	-0.18	1.00	
0.56	0.31	0.61	NaN	0.05	-0.18	-0.48	-0.41	-0.07	-0.07	0.33	NaN	0.44	-0.18	0.02	-0.19	NaN	-0.32	0.11	-0.08	0.00	1.00

Male Respondents’ dataset – E dimension

1.00							
0.55	1.00						
0.33	0.66	1.00					
0.56	0.28	0.49	1.00				
0.68	0.78	0.67	0.43	1.00			
0.57	0.31	0.39	0.34	0.63	1.00		
0.62	0.48	0.43	0.48	0.47	0.62	1.00	
0.70	0.43	0.52	0.68	0.58	0.66	0.74	1.00

Male Respondents’ dataset – P dimension

1.00							
0.52	1.00						
-0.09	0.05	1.00					
0.63	0.46	-0.03	1.00				
0.73	0.55	-0.39	0.64	1.00			
0.63	0.61	-0.42	0.45	0.65	1.00		
0.49	0.13	-0.14	0.18	0.34	0.38	1.00	
0.28	-0.19	0.20	0.19	-0.08	-0.08	0.25	1.00

Male Respondents’ dataset – A dimension

1.00							
0.06	1.00						
-0.59	-0.04	1.00					
0.12	-0.13	-0.07	1.00				
0.03	0.65	-0.17	-0.10	1.00			
0.62	0.22	-0.58	0.17	0.11	1.00		
0.13	-0.65	-0.03	0.19	-0.43	0.03	1.00	
0.12	-0.08	-0.28	0.06	0.19	-0.01	0.15	1.00

Female Respondents' dataset – E dimension

1.00													
0.85	1.00												
0.47	0.45	1.00											
0.74	0.58	0.70	1.00										
0.47	0.33	0.51	0.36	1.00									
0.85	0.77	0.70	0.87	0.54	1.00								
0.71	0.71	0.60	0.73	0.59	0.84	1.00							
0.78	0.71	0.46	0.67	0.61	0.78	0.67	1.00						
0.80	0.68	0.75	0.86	0.49	0.85	0.65	0.66	1.00					
0.46	0.29	0.69	0.63	0.67	0.63	0.68	0.46	0.63	1.00				
0.55	0.61	0.29	0.39	0.43	0.52	0.74	0.50	0.29	0.47	1.00			
0.11	-0.06	0.19	0.30	0.13	0.22	0.17	0.28	0.29	0.18	-0.13	1.00		
0.62	0.52	0.85	0.78	0.56	0.74	0.65	0.59	0.80	0.74	0.30	0.27	1.00	
0.38	0.41	0.32	0.33	0.56	0.44	0.56	0.55	0.32	0.51	0.45	0.15	0.36	1.00

Female Respondents' dataset – P dimension

1.00														
0.61	1.00													
0.10	0.35	1.00												
0.19	0.05	0.08	1.00											
0.27	0.25	-0.14	0.05	1.00										
0.68	0.36	0.00	0.29	0.09	1.00									
0.36	0.43	0.47	0.39	0.46	0.08	1.00								
0.30	0.18	-0.21	0.43	0.15	0.57	0.11	1.00							
0.27	0.32	0.60	-0.04	0.24	-0.03	0.70	0.05	1.00						
-0.03	0.04	-0.22	0.45	0.21	0.28	0.12	0.27	-0.09	1.00					
0.51	0.63	0.00	0.42	0.42	0.41	0.42	0.39	0.03	0.51	1.00				
0.31	0.38	-0.09	0.07	0.17	0.34	-0.05	0.12	-0.28	-0.02	0.42	1.00			
0.38	0.67	0.48	0.13	0.31	0.08	0.55	0.01	0.48	0.01	0.40	0.03	1.00		
0.11	0.42	0.02	0.49	0.35	0.16	0.46	0.27	0.01	0.65	0.75	0.27	0.27	1.00	

Female Respondents' dataset – A dimension

1.00														
0.51	1.00													
0.11	0.07	1.00												
-0.46	-0.37	-0.08	1.00											
-0.53	-0.24	-0.22	0.19	1.00										
-0.17	0.12	0.20	-0.03	0.00	1.00									
NaN	NaN	NaN	NaN	NaN	NaN	NaN								
-0.12	-0.17	0.61	0.17	-0.19	0.55	NaN	1.00							
0.04	0.02	0.06	-0.36	0.02	0.30	NaN	0.09	1.00						
-0.44	-0.16	-0.28	0.17	0.27	0.20	NaN	0.23	0.36	1.00					
-0.32	-0.18	0.12	0.27	0.22	0.03	NaN	0.08	-0.11	0.20	1.00				
-0.12	-0.01	0.10	0.47	0.11	0.07	NaN	0.19	-0.30	0.17	0.43	1.00			
0.13	0.55	0.28	-0.36	0.10	0.24	NaN	0.21	0.28	0.32	0.34	0.20	1.00		
-0.11	0.25	-0.17	0.13	0.25	-0.07	NaN	-0.25	-0.10	0.36	0.47	0.27	0.29	1.00	

Respondents' Age group 65-69 yrs. dataset – E dimension

1.00						
0.68	1.00					
0.74	0.44	1.00				
0.47	0.48	0.36	1.00			
0.85	0.52	0.87	0.54	1.00		
0.90	0.78	0.82	0.43	0.86	1.00	
0.37	0.48	0.55	0.34	0.44	0.47	1.00

Respondents' Age group 65-69 yrs. dataset – P dimension

1.00						
-0.04	1.00					
0.19	0.07	1.00				
0.27	0.26	0.05	1.00			
0.68	-0.17	0.29	0.09	1.00		
0.45	0.55	-0.03	0.06	0.06	1.00	
0.28	0.13	0.02	0.37	-0.19	0.34	1.00

Respondents' Age group 65-69 yrs. dataset – A dimension

1.00						
-0.13	1.00					
-0.46	-0.40	1.00				
-0.53	-0.03	0.19	1.00			
-0.17	-0.03	-0.03	0.00	1.00		
-0.01	0.65	-0.26	-0.10	-0.02	1.00	
-0.19	-0.65	0.22	0.40	0.10	-0.43	1.00

Respondents' Age group 70 yrs. and older dataset – E dimension

1.00														
0.66	1.00													
0.45	0.45	1.00												
0.64	0.33	0.56	1.00											
0.52	0.56	0.54	0.49	1.00										
0.71	0.78	0.60	0.52	0.76	1.00									
0.35	0.57	0.50	0.39	0.34	0.66	1.00								
0.71	0.62	0.46	0.50	0.61	0.67	0.46	1.00							
0.68	0.64	0.75	0.70	0.50	0.65	0.68	0.66	1.00						
0.51	0.70	0.73	0.52	0.68	0.80	0.66	0.58	0.72	1.00					
0.29	0.61	0.69	0.32	0.69	0.68	0.54	0.46	0.63	0.76	1.00				
0.61	0.67	0.29	0.31	0.48	0.74	0.36	0.50	0.29	0.49	0.47	1.00			
-0.06	0.18	0.19	-0.05	0.09	0.17	0.48	0.28	0.29	0.18	0.18	-0.13	1.00		
0.52	0.63	0.85	0.55	0.62	0.65	0.55	0.59	0.80	0.80	0.74	0.30	0.27	1.00	
0.41	0.70	0.32	0.05	0.61	0.56	0.23	0.55	0.32	0.49	0.51	0.45	0.15	0.36	1.00

Respondents' Age group 70 yrs. and older dataset – P dimension

1.00														
0.59	1.00													
0.35	0.40	1.00												
-0.09	-0.09	-0.19	1.00											
0.35	0.63	0.40	-0.03	1.00										
0.43	0.82	0.47	-0.12	0.63	1.00									
0.41	0.63	0.68	-0.42	0.45	0.67	1.00								
0.18	0.07	-0.21	0.42	0.23	0.11	-0.04	1.00							
0.32	0.68	0.60	-0.14	0.74	0.70	0.72	0.05	1.00						
0.39	0.28	-0.05	0.20	0.19	0.22	-0.08	0.39	-0.19	1.00					
0.04	0.14	-0.22	0.10	0.09	0.12	-0.09	0.27	-0.09	0.55	1.00				
0.63	0.48	0.00	0.19	0.28	0.42	0.16	0.39	0.03	0.82	0.51	1.00			
0.38	0.05	-0.09	0.19	0.01	-0.05	-0.27	0.12	-0.28	0.55	-0.02	0.42	1.00		
0.67	0.55	0.48	-0.07	0.40	0.55	0.38	0.01	0.48	0.27	0.01	0.40	0.03	1.00	
0.42	0.54	0.02	0.19	0.15	0.46	0.14	0.27	0.01	0.66	0.65	0.75	0.27	0.27	1.00

Respondents' Age group 70 yrs. and older dataset – A dimension

1.00														
0.44	1.00													
0.07	0.12	1.00												
-0.50	-0.59	-0.23	1.00											
0.40	0.12	-0.19	-0.07	1.00										
NaN	NaN	NaN	NaN	NaN	NaN									
0.59	0.62	0.14	-0.58	0.17	NaN	1.00								
-0.17	-0.28	0.61	0.03	-0.24	NaN	-0.08	1.00							
0.02	-0.08	0.06	0.14	0.21	NaN	0.25	0.09	1.00						
0.08	0.12	0.39	-0.28	0.06	NaN	-0.01	0.32	0.14	1.00					
-0.16	0.02	-0.28	0.11	0.09	NaN	0.05	0.23	0.36	0.13	1.00				
-0.18	0.17	0.12	-0.11	0.07	NaN	-0.27	0.08	-0.11	0.25	0.20	1.00			
-0.01	-0.05	0.10	0.01	-0.09	NaN	-0.36	0.19	-0.30	0.32	0.17	0.43	1.00		
0.55	0.33	0.28	-0.53	0.43	NaN	0.40	0.21	0.28	0.65	0.32	0.34	0.20	1.00	
0.25	0.59	-0.17	-0.15	0.17	NaN	0.15	-0.25	-0.10	0.11	0.36	0.47	0.27	0.29	1.00

Appendix E

Phase I Raw Data

This Appendix is organized as follows:

Section E.1 reports Raw Data for All Respondents for each of the Behavior/Identities category under consideration. Section E.2 reports Raw Data for Male/Female Respondents for each of the Behavior/Identities category under consideration. Section E.3 reports Raw Data for Canadian Respondents for each of the Behavior/Identities category under consideration. Note: The missing entries in data for each question (E, P, or A) were imputed with the average values across each question. These are shaded and in bold font in the Raw Data tables

E.1 All respondents' data for five expected EPA categories

Table E.1: Phase I All respondents' data for expected EPA + + + category

	1_EPA+++ Turn on water			1_EPA+++ Put on some soap			1_EPA+++ Rinse hands			1_EPA+++ Turn off water			1_EPA+++ Dry up hands			1_EPA+++ Goodbye		
Respondent #	7 - Q1E	8 - Q1P	9 - Q1A	10 - Q2E	11 - Q2P	12 - Q2A	13 - Q3E	14 - Q3P	15 - Q3A	16 - Q4E	17 - Q4P	18 - Q4A	19 - Q5E	20 - Q5P	21 - Q5A	22 - Q6E	23 - Q6P	24 - Q6A
1	4	3	3	1	1	2	0	1	2	2	1	2	2	2	2	3	1	1
2	3	2	2	1	0	1	1	1	2	1	1	1	3	1	2	2	1	2
3	1	2	-1	0	-2	0	3	0	0	0	1	0	2	1	0	2	0	-2
4	-4	1	-1	2	2	**1.04**	0	0	0	0	0	0	3	3	3	1	-1	-1
5	1	1	1	1	-1	-1	-1	-2	-1	1	1	1	1	0	0	1	0	0
6	2	1	0	0	-1	1	1	1	1	0	2	1	1	1	0	-1	1	1
7	2	1	2	1	1	1	1	1	1	0	1	1	0	1	1	1	0	1
8	2	3	3	0	0	0	0	1	3	-1	3	3	2	3	4	1	1	0
9	**2.31**	1	1	1	1	-1	1	0	0	2	1	0	2	1	1	1	0	-1
10	3	1	3	1	0	1	1	1	2	-1	-1	2	3	1	3	3	0	2
11	2	1	1	1	1	1	-1	0	0	-1	1	-1	1	1	0	2	1	-1
12	0	1	1	1	2	2	1	1	1	1	2	2	2	2	2	2	0	0
13	2	1	2	-1	-2	1	-1	1	1	-2	-2	1	-1	2	1	2	1	1
14	3	2	1	3	0	-1	2	-1	-2	2	0	1	3	1	0	2	0	0
15	4	4	4	1	3	2	-3	3	3	-3	1	1	3	3	3	4	2	0
16	4	0	-1	-2	2	2	-1	2	2	1	1	1	3	2	1	2	0	-1
17	1	0	1	0	1	1	1	0	2	-1	1	1	1	1	2	1	-2	-2
18	3	2	0	1	1	1	2	2	2	1	-3	-2	3	3	1	3	3	2
19	4	4	2	4	4	1	-3	-3	3	3	3	0	0	1	3	2	3	3
20	3	1	0	3	1	0	-2	-4	0	3	1	0	3	-3	0	3	0	0
21	2	1	1	2	1	2	2	2	2	2	2	2	2	1	1	3	0	0
22	4	1	1	1	2	3	3	0	1	1	2	2	4	2	1	2	-1	-2
23	3	1	1	1	1	1	0	1	1	1	0	0	3	1	1	3	0	0
24	3	1	2	4	2	1	3	1	1	1	2	1	4	1	1	-1	0	1
25	1	2	1	1	1	1	-1	1	1	0	1	1	-3	-1	-1	-1	-1	-2
26	4	1	2	3	-1	3	0	0	2	2	1	2	3	0	2	4	0	0
27	3	3	2	1	1	2	1	-1	2	2	1	2	1	2	2	2	1	1
Total	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Mean	2.31	1.56	1.26	1.19	0.78	1.04	0.37	0.33	1.19	0.63	0.89	0.93	1.89	1.22	1.33	1.81	0.37	0.11

Table E.2: Phase I All respondents' data for expected EPA + - - category

	2_EPA+-- Turn on water			2_EPA+-- Put on some soap			2_EPA+-- Rinse hands			2_EPA+-- Turn off water			2_EPA+-- Dry up hands			2_EPA+-- Goodbye		
Respondent #	25 - Q7E	26 - Q7P	27 - Q7A	28 - Q8E	29 - Q8P	30 - Q8A	31 - Q9E	32 - Q9P	33 - Q9A	34 - Q10E	35 - Q10P	36 - Q10A	37 - Q11E	38 - Q11P	39 - Q11A	40 - Q12E	41 - Q12P	42 - Q12A
1	0	0	1	-1	0	-1	0	0	0	1	1	0	3	2	2	-3	-1	-1
2	3	2	2	0	2	1	2	1	1	2	2	2	3	2	1	1	2	3
3	4	2	-1	2	0	-1	2	2	0	2	-1	-1	3	1	-1	3	-1	-2
4	1	1	2	-2	0	1	4	4	4	4	4	4	4	4	4	2	3	2
5	1	0	1	0	2	1	1	1	0	0	-1	1	1	1	1	1	-1	-1
6	2	1	0	0	1	0	1	0	0	0	2	1	2	1	0	2	-3	-1
7	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	2
8	2	1	2	1	1	2	0	1	1	0	2	3	3	3	3	0	2	3
9	1	0	0	2	1	-2	2	1	1	3	0	-1	2	0	-1	3	1	1
10	1	0	1	0	0	0	2	-1	2	3	1	1	2	0	1	1	0	1
11	2	1	1	-2	-1	-1	2	1	1	2	1	1	2	1	1	-2	-2	-2
12	3	2	2	3	2	2	1	1	1	3	2	2	2	1	1	1	1	1
13	1	0	1	2	2	1	3	2	2	3	2	2	3	2	1	1	1	2
14	3	1	1	2	0	-2	2	1	1	2	1	-1	3	1	1	2	0	-1
15	3	3	3	4	4	3	4	4	4	4	4	2	4	3	3	4	3	3
16	4	1	-1	0	0	0	2	0	0	2	-1	-1	4	0	-1	3	0	0
17	2	0	0	0	-1	-1	0	0	0	2	0	-2	2	0	1	1	-1	1
18	2	2	1	2	2	2	2	3	2	3	3	1	1	-1	-3	-2	-3	1
19	3	3	3	1	1	3	4	4	1	2	1	1	4	4	0	1	1	1
20	2	2	0	2	1	0	2	1	0	3	2	0	3	2	0	3	-1	1
21	4	1	2	2	2	2	2	2	1	3	1	1	3	2	1	1	-1	-1
22	4	-1	-2	4	1	2	2	-1	0	2	0	2	4	1	-2	3	-1	-2
23	3	1	0	0	0	-2	2	0	0	2	1	1	3	1	1	2	0	0
24	3	0	1	3	1	1	4	0	1	4	1	1	2	1	1	3	-3	-3
25	1	1	0	-3	-1	-1	1	1	1	1	-1	0	-1	1	-3	-1	0	0
26	3	0	3	2	0	2	3	-1	1	3	0	2	4	1	2	4	-2	0
27	-1	-2	1	1	1	1	2	2	2	2	2	1	3	2	2	0	1	0
Total	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Mean	2.15	0.85	0.93	0.93	0.81	0.52	1.96	1.11	1.03	2.19	1.11	0.89	2.59	1.37	0.63	1.30	-0.15	0.30

Table E.3: Phase I All respondents' data for expected EPA - + + category

	3_EPA-++ Turn on water			3_EPA-++ Put on some soap			3_EPA-++ Rinse hands			3_EPA-++ Turn off water			3_EPA-++ Dry up hands			3_EPA-++ Goodbye		
Respondent #	43 - Q13E	44 - Q13P	45 - Q13A	46 - Q14E	47 - Q14P	48 - Q14A	49 - Q15E	50 - Q15P	51 - Q15A	52 - Q16E	53 - Q16P	54 - Q16A	55 - Q17E	56 - Q17P	57 - Q17A	58 - Q18E	59 - Q18P	60 - Q18A
1	-2	1	-1	-3	0	3	-4	1	1	-4	0	-1	0	2	2	-4	1	1
2	-1	2	2	-1	2	2	-2	2	2	-1	2	1	-2	2	2	-3	3	2
3	0	2	0	-2	3	1	-2	2	1	0	0	1	-1	2	1	-2	3	1
4	0	3	1	-3	0	0	-4	4	4	-4	2	2	-4	2	1	-3	4	1
5	1	1	1	0	1	1	0	1	1	1	2	1	1	1	1	0	0	1
6	-2	1	-1	-2	2	1	-2	1	1	-2	0	0	-2	2	0	-2	1	1
7	0	1	1	0	1	2	0	2	2	1	0	1	0	1	1	-1	2	1
8	3	2	3	-1	3	3	-1	2	3	-2	3	3	-1	2	3	-1	4	4
9	-1	1	1	-1	2	2	-1	2	2	-2	3	3	-2	2	1	-2	2	2
10	-2	-1	0	-1	1	2	-3	1	1	-2	0	1	-2	1	1	-3	1	1
11	-1	-1	1	-2	1	0	-1	1	1	-1	1	1	-3	1	1	-3	1	1
12	-2	3	2	-2	2	2	-2	2	2	-3	3	3	-2	2	1	-4	3	2
13	-2	-2	-1	0	-3	-1	-4	-4	0	-4	2	1.58	-4	-4	4	-2	3	1
14	-1	2	2	-1	2	-1	-1	1	1	-2	2	1	-2	1	1	-2	2	1
15	0	3	3	-4	4	4	-4	4	4	-4	4	4	-4	4	4	-4	4	4
16	2	2	1	-2	4	2	-3	4	3	-3	4	3	-3	4	2	-3	4	3
17	-2	2	2	-2	1	2	-2	1	2	-2	2	1	-1	1	1	-3	1	2
18	-2	-2	-2	2	-4	2	2	-2	1	1	-1	2	-2	-2	-1	-3	-3	-1
19	2	1	3	3	3	2	1	1	3	2	3	3	2	3	2	1	1	3
20	0	0	0	-3	0	0	-3	-1	0	-2	0	1	-2	-2	0	-4	0	0
21	-1	3	2	-2	3	3	-3	3	3	-3	3	3	-2	3	2	-4	4	3
22	-2	3	0	-3	3	2	-3	4	3	-3	3	3	-3	3	3	-3	3	3
23	2	0	-1	-1	1	0	-1	1	1	1	0	1	-1	1	1	-2	2	1
24	4	0	3	1	4	2	1	4	1	-2	3	2	4	4	3	-2	3	-1
25	-3	1	1	-2	3	1	-2	3	2	-2	2	1	-1	1	0	-1	2	2
26	1	2	2	-1	3	2	0	2	2	-2	2	2	0	2	2	-2	2	2
27	-2	-2	1	-3	-3	-1	-3	-2	2	-4	-4	-2	-3	-3	-3	-3	-3	-1
Total	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Mean	-0.41	1.04	0.96	-1.33	1.44	1.41	-1.74	1.48	1.81	-1.78	1.52	1.58	-1.48	1.33	1.33	-2.41	1.85	1.48

Table E.4: Phase I All respondents' data for expected EPA - - - category

	4_EPA--- Turn on water			4_EPA--- Put on some soap			4_EPA--- Rinse hands			4_EPA--- Turn off water			4_EPA--- Dry up hands			4_EPA--- Goodbye		
Respondent #	61 - Q19E	62 - Q19P	63 - Q19A	64 - Q20E	65 - Q20P	66 - Q20A	67 - Q21E	68 - Q21P	69 - Q21A	70 - Q22E	71 - Q22P	72 - Q22A	73 - Q23E	74 - Q23P	75 - Q23A	76 - Q24E	77 - Q24P	78 - Q24A
1	-4	-2	-2	-1	-1	-1	-3	-2	0	-1	1	1	-4	-3	-2	-4	-4	-4
2	1	-1	-1	2	1	-1	0	-1	-1	0	3	2	0	1	1	-2	0	-2
3	-2	2	1	-2	-2	-1	-1	-3	-2	-2	0	-2	-1	-3	0	-3	-3	3
4	-3	0	-2	-4	2	1	-4	0	0	2	1	2	-4	-2	-3	-4	-4	-4
5	-1	-1	-1	1	-1	-1	1	-1	-1	1	1	1	0	-1	-1	0	-2	-2
6	0	0	0	-1	0	-1	-2	1	-1	-1	1	0	1	0	1	-2	-1	0
7	-1	0	0	0	0	1	0	0	0	0	1	1	-1	0	1	-2	0	0
8	-2	3	0	0	1	1	0	0	0	-0.27	1.08	0.62	-1	0	1	-2	1	-1
9	-2	1	1	-1	1	-1	1	1	1	-1	1	1	0	0	0	0	0	-2
10	-2	0	-1	0	0	2	-2	-2	-2	-1	1	1	-1.12	0	-1	-3	-1	-1
11	-1	-1	-1	-1	1	1	-1	-3	-1	0	1	-1	1	-2	-1	-2	-2	-2
12	-3	1	1	0	-1	-1	-2	1	1	-1	1	1	-1	-2	1	-4	3	2
13	-4	-4	3	-3	-2	1	2	1	1	-2	-1	0	-3	-3	3	-3	2	3
14	-3	2	1	1	-1	-1	-3	-2	1	-1	1	-2	-2	-2	-2	0	1	1
15	0	0	0	-2	0	0	-4	0	0	-4	4	4	0	0	0	-3	0	2
16	-4	3	3	-4	3	3	-3	0	-1	0	1	1	-2	1	2	-4	3	4
17	-1	0	0	0	-1	-2	-1	-1	-1	0	0	0	-1	-1	-1	-1	0	1
18	-4	-4	-3	-3	-3	-2	-3	-2	-2	2	2	0	1	-4	-1	0	-1	1
19	-4	-3	4	-2	-2	3	-2	-1	4	3	3	1	1	1	3	-4	-3	4
20	1	-2	0	-2	-4	1	0	-4	0	0	0	0	0	-3	0	-3	-2	0
21	-2	-2	-1	-2	-1	-2	-1	-3	-2	-1	2	2	-1	-3	-2	-2	-2	-1
22	-3	1	-4	-2	-3	-3	0	-2	-2	0	-1	-1	-2	-2	-2	-3	2	2
23	1	-2	0	2	1	0	0	-3	0	-1	1	1	-1	-2	0	-2	-2	0
24	-3	2	2	4	1	2	4	0	3	4	4	1	-3	-3	-2	-2	1	-3
25	-4	1	0	-1	-1	0	-2	-2	1	-1	0	-1	-3	0	1	-4	-2	1
26	-2	2	1	0	0	1	1	0	2	0	2	2	0	0	1	0	2	0
27	-3	-2	1	-1	-1	1	-4	-4	-4	-2	-2	1	-3	-3	-3	-4	-4	-2
Total	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Mean	-2.04	-0.22	0.07	-0.81	-0.48	0.04	-1.07	-1.19	-0.22	-0.27	1.08	0.62	-1.12	-1.33	-0.22	-2.33	-0.67	0

Table E.5: Phase I All respondents' data for expected EPA + - + category

	5_EPA+-+ Turn on water			5_EPA+-+ Put on some soap			5_EPA+-+ Rinse hands			5_EPA+-+ Turn off water			5_EPA+-+ Dry up hands			5_EPA+-+ Goodbye		
Respondent #	79 - Q25E	80 - Q25P	81 - Q25A	82 - Q26E	83 - Q26P	84 - Q26A	85 - Q27E	86 - Q27P	87 - Q27A	88 - Q28E	89 - Q28P	90 - Q28A	91 - Q29E	92 - Q29P	93 - Q29A	94 - Q30E	95 - Q30P	96 - Q30A
1	-3	-1	-1	-1	1	1	0	0	0	0.4	1.48	1.2	2	0	1	0.96	0.07	0.31
2	1	1	2	0	2	1	1	-1	2	0	2	2	2	2	1	2	-1	0
3	1	-1	0	2	0	1	3	1	0	1	1	0	3	2	1	2	-2	1
4	-4	2	2	-1	3	2	0	-1	1	0	4	3	1	1	1	-2	-1	-1
5	1	1	1	1	1	1	1	-1	-1	1	2	1	1	-1	0	0	-1	-1
6	1	1	1	1	1	1	1.12	-1	-1	1	1	0	2	-2	1	1	-1	-1
7	1	0.92	1	0	2	1	1	0	1	0	1	1	0	0	0	0	0	1
8	-1	2	2	-1	3	3	0	1	1	-1	3	3	0	1	3	1	2	0
9	3	1	1	1	1	1	2	1	1	3	3	3	2	1	1	2	1	1
10	2	1	1	0	0	0	2	1	2	0.4	1.48	1.2	2	0	1	2	0	1
11	-2	1	1	-1	1	1	1	-1	1	-1	1	-2	1	-1	1	1	-1	-1
12	2	3	2	2	3	2	2	1	1	-2	2	2	2	1	1	2	1	1
13	0	-1	4	-1	0	1	0	1	0	3	1	1	2	2	2	0	0	0
14	1	1	1	1	-1	0	2	-1	-1	1	2	1	2	-1	-2	2	0	0
15	-4	4	3	-4	4	4	4	4	4	-3	4	3	-3	3	3	-3	3	3
16	0	0	1	-2	3	2	2	0	1	2	1	1	2	1	1	3	0	0
17	1	1	1	-1	1	1	0	0	2	0	0	1	0	0	1	0	0	0
18	-3	-2	-2	0	1	0	-2	2	2	1	-2	1	2	2	2	0	1	1
19	2	2	2	2	2	3	0	0	2	1	0	1	3	2	1	2	2	3
20	-2	0	0	-1	1	0	2	2	0	-1	0	0	1	1	0	1	1	1
21	0	2	2	1	2	2	1	1	1	0	2	1	2	2	2	1	-2	0
22	1	-2	-1	2	2	3	2	2	3	2	2	3	1	2	2	2	2	-2
23	-1	2	0	0	1	1	0	1	2	0	2	0	0	1	1	0	-2	0
24	1	3	1	1	3	1	4	0	1	2	3	1	3	1	2	1	-2	0
25	0	-1	1	1	2	1	-1	1	1	-2	-2	0	-1	1	1	1	3	1
26	1	2	2	3	2	2	3	-1	1	1	2	2	3	-2	2	3	-2	0
27	3	2	1	1	1	1	-1	-1	-1	1	2	1	1	1	1	1	1	0
Total	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Mean	0.07	0.92	1.07	0.22	1.56	1.37	1.12	0.41	0.96	0.4	1.48	1.2	1.33	0.74	1.19	0.96	0.08	0.31

E.2 Respondents' gender based data for expected EPA category

Table E.6: Phase I Male respondents' data for expected EPA + + + category

	1_EPA+++ Turn on water			1_EPA+++ Put on some soap			1_EPA+++ Rinse hands			1_EPA+++ Turn off water			1_EPA+++ Dry up hands			1_EPA+++ Goodbye		
Respondent #	7 - Q1E	8 - Q1P	9 - Q1A	10 - Q2E	11 - Q2P	12 - Q2A	13 - Q3E	14 - Q3P	15 - Q3A	16 - Q4E	17 - Q4P	18 - Q4A	19 - Q5E	20 - Q5P	21 - Q5A	22 - Q6E	23 - Q6P	24 - Q6A
1	3	2	2	1	0	1	1	1	2	1	1	1	3	1	2	2	1	2
2	1	2	-1	0	-2	0	3	0	0	0	1	0	2	1	0	2	0	-2
3	-4	1	-1	2	2	1.07	0	0	0	0	0	0	3	3	3	1	-1	-1
4	2	1	2	1	1	1	1	1	1	0	1	1	0	1	1	1	0	1
5	2.27	1	1	1	1	-1	1	0	0	2	1	0	2	1	1	1	0	-1
6	3	1	3	1	0	1	1	1	2	-1	-1	2	3	1	3	3	0	2
7	4	4	4	1	3	2	-3	3	3	-3	1	1	3	3	3	4	2	0
8	4	0	-1	-2	2	2	-1	2	2	1	1	1	3	2	1	2	0	-1
9	1	0	1	0	1	1	1	0	2	-1	1	1	1	1	2	1	-2	-2
10	3	2	0	1	1	1	2	2	2	1	-3	-2	3	3	1	3	3	2
11	4	4	2	4	4	1	-3	-3	3	3	3	0	0	1	3	2	3	3
12	3	1	0	3	1	0	-2	-4	0	3	1	0	3	-3	0	3	0	0
13	2	1	1	2	1	2	2	2	2	2	2	2	2	1	1	3	0	0
14	4	1	1	1	2	3	3	0	1	1	2	2	4	2	1	2	-1	-2
15	3	1	2	4	2	1	3	1	1	1	2	1	4	1	1	-1	0	1
16	1	2	1	1	1	1	-1	1	1	0	1	1	-3	-1	-1	-1	-1	-2
Total	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Mean	2.27	1.5	1.06	1.31	1.25	1.07	0.5	0.44	1.38	0.63	0.88	0.69	2.06	1.13	1.38	1.75	0.25	0

Table E.7: Phase I Female respondents' data for expected EPA + + + category

	1_EPA+++ Turn on water			1_EPA+++ Put on some soap			1_EPA+++ Rinse hands			1_EPA+++ Turn off water			1_EPA+++ Dry up hands			1_EPA+++ Goodbye		
Respondent #	7 - Q1E	8 - Q1P	9 - Q1A	10 - Q2E	11 - Q2P	12 - Q2A	13 - Q3E	14 - Q3P	15 - Q3A	16 - Q4E	17 - Q4P	18 - Q4A	19 - Q5E	20 - Q5P	21 - Q5A	22 - Q6E	23 - Q6P	24 - Q6A
1	1	1	1	1	-1	-1	-1	-2	-1	1	1	1	1	0	0	1	0	0
2	2	1	0	0	-1	1	1	1	1	0	2	1	1	1	0	-1	1	1
3	2	1	1	1	1	1	-1	0	0	-1	1	-1	1	1	0	2	1	-1
4	0	1	1	1	2	2	1	1	1	1	2	2	2	2	2	2	0	0
5	2	1	2	-1	-2	1	-1	1	1	-2	-2	1	-1	2	1	2	1	1
6	3	2	1	3	0	-1	2	-1	-2	2	0	1	3	1	0	2	0	0
7	3	1	1	1	1	1	0	1	1	1	0	0	3	1	1	3	0	0
8	4	1	2	3	-1	3	0	0	2	2	1	2	3	0	2	4	0	0
9	3	3	2	1	1	2	1	-1	2	2	1	2	1	2	2	2	1	1
Total	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Mean	2.22	1.33	1.22	1.11	0	1	0.22	0	0.56	0.67	0.67	1	1.56	1.11	0.89	1.89	0.44	0.22

Table E.8: Phase I Male respondents' data for expected EPA + - - category

	2_EPA+-- Turn on water			2_EPA+-- Put on some soap			2_EPA+-- Rinse hands			2_EPA+-- Turn off water			2_EPA+-- Dry up hands			2_EPA+-- Goodbye		
Respondent #	25 - Q7E	26 - Q7P	27 - Q7A	28 - Q8E	29 - Q8P	30 - Q8A	31 - Q9E	32 - Q9P	33 - Q9A	34 - Q10E	35 - Q10P	36 - Q10A	37 - Q11E	38 - Q11P	39 - Q11A	40 - Q12E	41 - Q12P	42 - Q12A
1	3	2	2	0	2	1	2	1	1	2	2	2	3	2	1	1	2	3
2	4	2	-1	2	0	-1	2	2	0	2	-1	-1	3	1	-1	3	-1	-2
3	1	1	2	-2	0	1	4	4	4	4	4	4	4	4	4	2	3	2
4	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	2
5	1	0	0	2	1	-2	2	1	1	3	0	-1	2	0	-1	3	1	1
6	1	0	1	0	0	0	2	-1	2	3	1	1	2	0	1	1	0	1
7	3	3	3	4	4	3	4	4	4	4	4	2	4	3	3	4	3	3
8	4	1	-1	0	0	0	2	0	0	2	-1	-1	4	0	-1	3	0	0
9	2	0	0	0	-1	-1	0	0	0	2	0	-2	2	0	1	1	-1	1
10	2	2	1	2	2	2	2	3	2	3	3	1	1	-1	-3	-2	-3	1
11	3	3	3	1	1	3	4	4	1	2	1	1	4	4	0	1	1	1
12	2	2	0	2	1	0	2	1	0	3	2	0	3	2	0	3	-1	1
13	4	1	2	2	2	2	2	2	1	3	1	1	3	2	1	1	-1	-1
14	4	-1	-2	4	1	2	2	-1	0	2	0	2	4	1	-2	3	-1	-2
15	3	0	1	3	1	1	4	0	1	4	1	1	2	1	1	3	-3	-3
16	1	1	0	-3	-1	-1	1	1	1	1	-1	0	-1	1	-3	-1	0	0
Total	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Mean	2.44	1.13	0.75	1.06	0.88	0.69	2.25	1.38	1.19	2.56	1.06	0.69	2.56	1.31	0.125	1.69	0	0.5

Table E.9: Phase I Female respondents' data for expected EPA + - - category

	2_EPA+-- Turn on water			2_EPA+-- Put on some soap			2_EPA+-- Rinse hands			2_EPA+-- Turn off water			2_EPA+-- Dry up hands			2_EPA+-- Goodbye		
Respondent #	25 - Q7E	26 - Q7P	27 - Q7A	28 - Q8E	29 - Q8P	30 - Q8A	31 - Q9E	32 - Q9P	33 - Q9A	34 - Q10E	35 - Q10P	36 - Q10A	37 - Q11E	38 - Q11P	39 - Q11A	40 - Q12E	41 - Q12P	42 - Q12A
1	1	0	1	0	2	1	1	1	0	0	-1	1	1	1	1	1	-1	-1
2	2	1	0	0	1	0	1	0	0	0	2	1	2	1	0	2	-3	-1
3	2	1	1	-2	-1	-1	2	1	1	2	1	1	2	1	1	-2	-2	-2
4	3	2	2	3	2	2	1	1	1	3	2	2	2	1	1	1	1	1
5	1	0	1	2	2	1	3	2	2	3	2	2	3	2	1	1	1	2
6	3	1	1	2	0	-2	2	1	1	2	1	-1	3	1	1	2	0	-1
7	3	1	0	0	0	-2	2	0	0	2	1	1	3	1	1	2	0	0
8	3	0	3	2	0	2	3	-1	1	3	0	2	4	1	2	4	-2	0
9	-1	-2	1	1	1	1	2	2	2	2	2	1	3	2	2	0	1	0
Total	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Mean	1.89	0.44	1.11	0.89	0.78	0.22	1.89	0.78	0.89	1.89	1.11	1.11	2.56	1.22	1.11	1.22	-0.56	-0.22

Table E.10: Phase I Male respondents' data for expected EPA - + + category

	3_EPA-++ Turn on water			3_EPA-++ Put on some soap			3_EPA-++ Rinse hands			3_EPA-++ Turn off water			3_EPA-++ Dry up hands			3_EPA-++ Goodbye		
Respondent #	43 - Q13E	44 - Q13P	45 - Q13A	46 - Q14E	47 - Q14P	48 - Q14A	49 - Q15E	50 - Q15P	51 - Q15A	52 - Q16E	53 - Q16P	54 - Q16A	55 - Q17E	56 - Q17P	57 - Q17A	58 - Q18E	59 - Q18P	60 - Q18A
1	-1	2	2	-1	2	2	-2	2	2	-1	2	1	-2	2	2	-3	3	2
2	0	2	0	-2	3	1	-2	2	1	0	0	1	-1	2	1	-2	3	1
3	0	3	1	-3	0	0	-4	4	4	-4	2	2	-4	2	1	-3	4	1
4	0	1	1	0	1	2	0	2	2	1	0	1	0	1	1	-1	2	1
5	-1	1	1	-1	2	2	-1	2	2	-2	3	3	-2	2	1	-2	2	2
6	-2	-1	0	-1	1	2	-3	1	1	-2	0	1	-2	1	1	-3	1	1
7	0	3	3	-4	4	4	-4	4	4	-4	4	4	-4	4	4	-4	4	4
8	2	2	1	-2	4	2	-3	4	3	-3	4	3	-3	4	2	-3	4	3
9	-2	2	2	-2	1	2	-2	1	2	-2	2	1	-1	1	1	-3	1	2
10	-2	-2	-2	2	-4	2	2	-2	1	1	-1	2	-2	-2	-1	-3	-3	-1
11	2	1	3	3	3	2	1	1	3	2	3	3	2	3	2	1	1	3
12	0	0	0	-3	0	0	-3	-1	0	-2	0	1	-2	-2	0	-4	0	0
13	-1	3	2	-2	3	3	-3	3	3	-3	3	3	-2	3	2	-4	4	3
14	-2	3	0	-3	3	2	-3	4	3	-3	3	3	-3	3	3	-3	3	3
15	4	0	3	1	4	2	1	4	1	-2	3	2	4	4	3	-2	3	-1
16	-3	1	1	-2	3	1	-2	3	2	-2	2	1	-1	1	0	-1	2	2
Total	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Mean	-0.38	1.31	1.12	-1.25	1.88	1.81	-1.75	2.13	2.13	-1.63	1.88	2	-1.44	1.81	1.44	-2.5	2.13	1.63

Table E.11: Phase I Female respondents' data for expected EPA - + + category

	3_EPA-++ Turn on water			3_EPA-++ Put on some soap			3_EPA-++ Rinse hands			3_EPA-++ Turn off water			3_EPA-++ Dry up hands			3_EPA-++ Goodbye		
Respondent #	43 - Q13E	44 - Q13P	45 - Q13A	46 - Q14E	47 - Q14P	48 - Q14A	49 - Q15E	50 - Q15P	51 - Q15A	52 - Q16E	53 - Q16P	54 - Q16A	55 - Q17E	56 - Q17P	57 - Q17A	58 - Q18E	59 - Q18P	60 - Q18A
1	1	1	1	0	1	1	0	1	1	1	2	1	1	1	1	0	0	1
2	-2	1	-1	-2	2	1	-2	1	1	-2	0	0	-2	2	0	-2	1	1
3	-1	-1	1	-2	1	0	-1	1	1	-1	1	1	-3	1	1	-3	1	1
4	-2	3	2	-2	2	2	-2	2	2	-3	3	3	-2	2	1	-4	3	2
5	-2	-2	-1	0	-3	-1	-4	-4	0	-4	2	0.88	-4	-4	4	-2	3	1
6	-1	2	2	-1	2	-1	-1	1	1	-2	2	1	-2	1	1	-2	2	1
7	2	0	-1	-1	1	0	-1	1	1	1	0	1	-1	1	1	-2	2	1
8	1	2	2	-1	3	2	0	2	2	-2	2	2	0	2	2	-2	2	2
9	-2	-2	1	-3	-3	-1	-3	-2	2	-4	-4	-2	-3	-3	-3	-3	-3	-1
Total	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Mean	-0.67	0.44	0.67	-1.33	0.67	0.33	-1.56	0.33	1.22	-1.78	0.89	0.88	-1.78	0.33	0.89	-2.22	1.22	1

Table E.12: Phase I Male respondents' data for expected EPA - - - category

	4_EPA--- Turn on water			4_EPA--- Put on some soap			4_EPA--- Rinse hands			4_EPA--- Turn off water			4_EPA--- Dry up hands			4_EPA--- Goodbye		
Respondent #	61 - Q19E	62 - Q19P	63 - Q19A	64 - Q20E	65 - Q20P	66 - Q20A	67 - Q21E	68 - Q21P	69 - Q21A	70 - Q22E	71 - Q22P	72 - Q22A	73 - Q23E	74 - Q23P	75 - Q23A	76 - Q24E	77 - Q24P	78 - Q24A
1	1	-1	-1	2	1	-1	0	-1	-1	0	3	2	0	1	1	-2	0	-2
2	-2	2	1	-2	-2	-1	-1	-3	-2	-2	0	-2	-1	-3	0	-3	-3	3
3	-3	0	-2	-4	2	1	-4	0	0	2	1	2	-4	-2	-3	-4	-4	-4
4	-1	0	0	0	0	1	0	0	0	0	1	1	-1	0	1	-2	0	0
5	-2	1	1	-1	1	-1	1	1	1	-1	1	1	0	0	0	0	0	-2
6	-2	0	-1	0	0	2	-2	-2	-2	-1	1	1	-1.07	0	-1	-3	-1	-1
7	0	0	0	-2	0	0	-4	0	0	-4	4	4	0	0	0	-3	0	2
8	-4	3	3	-4	3	3	-3	0	-1	0	1	1	-2	1	2	-4	3	4
9	-1	0	0	0	-1	-2	-1	-1	-1	0	0	0	-1	-1	-1	-1	0	1
10	-4	-4	-3	-3	-3	-2	-3	-2	-2	2	2	0	1	-4	-1	0	-1	1
11	-4	-3	4	-2	-2	3	-2	-1	4	3	3	1	1	1	3	-4	-3	4
12	1	-2	0	-2	-4	1	0	-4	0	0	0	0	0	-3	0	-3	-2	0
13	-2	-2	-1	-2	-1	-2	-1	-3	-2	-1	2	2	-1	-3	-2	-2	-2	-1
14	-3	1	-4	-2	-3	-3	0	-2	-2	0	-1	-1	-2	-2	-2	-3	2	2
15	-3	2	2	4	1	2	4	0	3	4	4	1	-3	-3	-2	-2	1	-3
16	-4	1	0	-1	-1	0	-2	-2	1	-1	0	-1	-3	0	1	-4	-2	1
Total	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Mean	-2.06	-0.13	-0.06	-1.19	-0.56	0.06	-1.13	-1.25	-0.25	0.06	1.38	0.75	-1.07	-1.13	-0.25	-2.5	-0.75	0.31

Table E.13: Phase I Female respondents' data for expected EPA + + + category

	4_EPA--- Turn on water			4_EPA--- Put on some soap			4_EPA--- Rinse hands			4_EPA--- Turn off water			4_EPA--- Dry up hands			4_EPA--- Goodbye		
Respondent #	61 - Q19E	62 - Q19P	63 - Q19A	64 - Q20E	65 - Q20P	66 - Q20A	67 - Q21E	68 - Q21P	69 - Q21A	70 - Q22E	71 - Q22P	72 - Q22A	73 - Q23E	74 - Q23P	75 - Q23A	76 - Q24E	77 - Q24P	78 - Q24A
1	-1	-1	-1	1	-1	-1	1	-1	-1	1	1	1	0	-1	-1	0	-2	-2
2	0	0	0	-1	0	-1	-2	1	-1	-1	1	0	1	0	1	-2	-1	0
3	-1	-1	-1	-1	1	1	-1	-3	-1	0	1	-1	1	-2	-1	-2	-2	-2
4	-3	1	1	0	-1	-1	-2	1	1	-1	1	1	-1	-2	1	-4	3	2
5	-4	-4	3	-3	-2	1	2	1	1	-2	-1	0	-3	-3	3	-3	2	3
6	-3	2	1	1	-1	-1	-3	-2	1	-1	1	-2	-2	-2	-2	0	1	1
7	1	-2	0	2	1	0	0	-3	0	-1	1	1	-1	-2	0	-2	-2	0
8	-2	2	1	0	0	1	1	0	2	0	2	2	0	0	1	0	2	0
9	-3	-2	1	-1	-1	1	-4	-4	-4	-2	-2	1	-3	-3	-3	-4	-4	-2
Total	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Mean	-1.78	-0.56	0.56	-0.22	-0.44	0	-0.89	-1.11	-0.22	-0.78	0.56	0.33	-0.89	-1.67	-0.11	-1.89	-0.33	0

Table E.14: Phase I Male respondents' data for expected EPA + - + category

	5_EPA+-+ Turn on water			5_EPA+-+ Put on some soap			5_EPA+-+ Rinse hands			5_EPA+-+ Turn off water			5_EPA+-+ Dry up hands			5_EPA+-+ Goodbye		
Respondent #	79 - Q25E	80 - Q25P	81 - Q25A	82 - Q26E	83 - Q26P	84 - Q26A	85 - Q27E	86 - Q27P	87 - Q27A	88 - Q28E	89 - Q28P	90 - Q28A	91 - Q29E	92 - Q29P	93 - Q29A	94 - Q30E	95 - Q30P	96 - Q30A
1	1	1	2	0	2	1	1	-1	2	0	2	2	2	2	1	2	-1	0
2	1	-1	0	2	0	1	3	1	0	1	1	0	3	2	1	2	-2	1
3	-4	2	2	-1	3	2	0	-1	1	0	4	3	1	1	1	-2	-1	-1
4	1	0.73	1	0	2	1	1	0	1	0	1	1	0	0	0	0	0	1
5	3	1	1	1	1	1	2	1	1	3	3	3	2	1	1	2	1	1
6	2	1	1	0	0	0	2	1	2	0.4	1.27	1.4	2	0	1	2	0	1
7	-4	4	3	-4	4	4	4	4	4	-3	4	3	-3	3	3	-3	3	3
8	0	0	1	-2	3	2	2	0	1	2	1	1	2	1	1	3	0	0
9	1	1	1	-1	1	1	0	0	2	0	0	1	0	0	1	0	0	0
10	-3	-2	-2	0	1	0	-2	2	2	1	-2	1	2	2	2	0	1	1
11	2	2	2	2	2	3	0	0	2	1	0	1	3	2	1	2	2	3
12	-2	0	0	-1	1	0	2	2	0	-1	0	0	1	1	0	1	1	1
13	0	2	2	1	2	2	1	1	1	0	2	1	2	2	2	1	-2	0
14	1	-2	-1	2	2	3	2	2	3	2	2	3	1	2	2	2	2	-2
15	1	3	1	1	3	1	4	0	1	2	3	1	3	1	2	1	-2	0
16	0	-1	1	1	2	1	-1	1	1	-2	-2	0	-1	1	1	1	3	1
Total	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Mean	0	0.73	0.94	0.06	1.81	1.44	1.31	0.81	1.5	0.4	1.27	1.4	1.25	1.31	1.25	0.88	0.31	0.63

Table E.15: Phase I Female respondents' data for expected EPA + - + category

	5_EPA+-+ Turn on water			5_EPA+-+ Put on some soap			5_EPA+-+ Rinse hands			5_EPA+-+ Turn off water			5_EPA+-+ Dry up hands			5_EPA+-+ Goodbye		
Respondent #	79 - Q25E	80 - Q25P	81 - Q25A	82 - Q26E	83 - Q26P	84 - Q26A	85 - Q27E	86 - Q27P	87 - Q27A	88 - Q28E	89 - Q28P	90 - Q28A	91 - Q29E	92 - Q29P	93 - Q29A	94 - Q30E	95 - Q30P	96 - Q30A
1	1	1	1	1	1	1	1	-1	-1	1	2	1	1	-1	0	0	-1	-1
2	1	1	1	1	1	1	1	-1	-1	1	1	0	2	-2	1	1	-1	-1
3	-2	1	1	-1	1	1	1	-1	1	-1	1	-2	1	-1	1	1	-1	-1
4	2	3	2	2	3	2	2	1	1	-2	2	2	2	1	1	2	1	1
5	0	-1	4	-1	0	1	0	1	0	3	1	1	2	2	2	0	0	0
6	1	1	1	1	-1	0	2	-1	-1	1	2	1	2	-1	-2	2	0	0
7	-1	2	0	0	1	1	0	1	2	0	2	0	0	1	1	0	-2	0
8	1	2	2	3	2	2	3	-1	1	1	2	2	3	-2	2	3	-2	0
9	3	2	1	1	1	1	-1	-1	-1	1	2	1	1	1	1	1	1	0
Total	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Mean	0.67	1.33	1.44	0.78	1	1.11	1	-0.33	0.11	0.56	1.67	0.67	1.56	-0.22	0.78	1.11	-0.56	-0.22

E.3 Canadian respondents' data for five expected EPA categories

Table E.16: Phase I Canadian respondents' data for expected EPA + + + category

	1_EPA+++ Turn on water			1_EPA+++ Put on some soap			1_EPA+++ Rinse hands			1_EPA+++ Turn off water			1_EPA+++ Dry up hands			1_EPA+++ Goodbye		
Respondent #	7 - Q1E	8 - Q1P	9 - Q1A	10 - Q2E	11 - Q2P	12 - Q2A	13 - Q3E	14 - Q3P	15 - Q3A	16 - Q4E	17 - Q4P	18 - Q4A	19 - Q5E	20 - Q5P	21 - Q5A	22 - Q6E	23 - Q6P	24 - Q6A
1	4	3	3	1	1	2	0	1	2	2	1	2	2	2	2	3	1	1
2	3	2	2	1	0	1	1	1	2	1	1	1	3	1	2	2	1	2
3	1	2	-1	0	-2	0	3	0	0	0	1	0	2	1	0	2	0	-2
4	-4	1	-1	2	2	1.36	0	0	0	0	0	0	3	3	3	1	-1	-1
5	0	1	1	1	2	2	1	1	1	1	2	2	2	2	2	2	0	0
6	3	2	1	3	0	-1	2	-1	-2	2	0	1	3	1	0	2	0	0
7	4	4	4	1	3	2	-3	3	3	-3	1	1	3	3	3	4	2	0
8	4	0	-1	-2	2	2	-1	2	2	1	1	1	3	2	1	2	0	-1
9	3	2	0	1	1	1	2	2	2	1	-3	-2	3	3	1	3	3	2
10	4	4	2	4	4	1	-3	-3	3	3	3	0	0	1	3	2	3	3
11	3	1	0	3	1	0	-2	-4	0	3	1	0	3	-3	0	3	0	0
12	2	1	1	2	1	2	2	2	2	2	2	2	2	1	1	3	0	0
13	4	1	1	1	2	3	3	0	1	1	2	2	4	2	1	2	-1	-2
14	3	1	1	1	1	1	0	1	1	1	0	0	3	1	1	3	0	0
15	3	1	2	4	2	1	3	1	1	1	2	1	4	1	1	-1	0	1
16	1	2	1	1	1	1	-1	1	1	0	1	1	-3	-1	-1	-1	-1	-2
17	4	1	2	3	-1	3	0	0	2	2	1	2	3	0	2	4	0	0
18	3	3	2	1	1	2	1	-1	2	2	1	2	1	2	2	2	1	1
Total	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Mean	2.5	1.78	1.11	1.56	1.17	1.35	0.44	0.33	1.28	1.11	0.94	0.89	2.28	1.22	1.33	2.11	0.44	0.11

Table E.17: Phase I Canadian respondents' data for expected EPA + - - category

	2_EPA+-- Turn on water			2_EPA+-- Put on some soap			2_EPA+-- Rinse hands			2_EPA+-- Turn off water			2_EPA+-- Dry up hands			2_EPA+-- Goodbye		
Respondent #	25 - Q7E	26 - Q7P	27 - Q7A	28 - Q8E	29 - Q8P	30 - Q8A	31 - Q9E	32 - Q9P	33 - Q9A	34 - Q10E	35 - Q10P	36 - Q10A	37 - Q11E	38 - Q11P	39 - Q11A	40 - Q12E	41 - Q12P	42 - Q12A
1	0	0	1	-1	0	-1	0	0	0	1	1	0	3	2	2	-3	-1	-1
2	3	2	2	0	2	1	2	1	1	2	2	2	3	2	1	1	2	3
3	4	2	-1	2	0	-1	2	2	0	2	-1	-1	3	1	-1	3	-1	-2
4	1	1	2	-2	0	1	4	4	4	4	4	4	4	4	4	2	3	2
5	3	2	2	3	2	2	1	1	1	3	2	2	2	1	1	1	1	1
6	3	1	1	2	0	-2	2	1	1	2	1	-1	3	1	1	2	0	-1
7	3	3	3	4	4	3	4	4	4	4	4	2	4	3	3	4	3	3
8	4	1	-1	0	0	0	2	0	0	2	-1	-1	4	0	-1	3	0	0
9	2	2	1	2	2	2	2	3	2	3	3	1	1	-1	-3	-2	-3	1
10	3	3	3	1	1	3	4	4	1	2	1	1	4	4	0	1	1	1
11	2	2	0	2	1	0	2	1	0	3	2	0	3	2	0	3	-1	1
12	4	1	2	2	2	2	2	2	1	3	1	1	3	2	1	1	-1	-1
13	4	-1	-2	4	1	2	2	-1	0	2	0	2	4	1	-2	3	-1	-2
14	3	1	0	0	0	-2	2	0	0	2	1	1	3	1	1	2	0	0
15	3	0	1	3	1	1	4	0	1	4	1	1	2	1	1	3	-3	-3
16	1	1	0	-3	-1	-1	1	1	1	1	-1	0	-1	1	-3	-1	0	0
17	3	0	3	2	0	2	3	-1	1	3	0	2	4	1	2	4	-2	0
18	-1	-2	1	1	1	1	2	2	2	2	2	1	3	2	2	0	1	0
Total	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Mean	2.5	1.06	1	1.22	0.89	0.72	2.28	1.33	1.11	2.5	1.22	0.94	2.89	1.56	0.5	1.5	-0.11	0.11

Table E.18: Phase I Canadian respondents' data for expected EPA - + + category

	3_EPA-++ Turn on water			3_EPA-++ Put on some soap			3_EPA-++ Rinse hands			3_EPA-++ Turn off water			3_EPA-++ Dry up hands			3_EPA-++ Goodbye		
Respondent #	43 - Q13E	44 - Q13P	45 - Q13A	46 - Q14E	47 - Q14P	48 - Q14A	49 - Q15E	50 - Q15P	51 - Q15A	52 - Q16E	53 - Q16P	54 - Q16A	55 - Q17E	56 - Q17P	57 - Q17A	58 - Q18E	59 - Q18P	60 - Q18A
1	-2	1	-1	-3	0	3	-4	1	1	-4	0	-1	0	2	2	-4	1	1
2	-1	2	2	-1	2	2	-2	2	2	-1	2	1	-2	2	2	-3	3	2
3	0	2	0	-2	3	1	-2	2	1	0	0	1	-1	2	1	-2	3	1
4	0	3	1	-3	0	0	-4	4	4	-4	2	2	-4	2	1	-3	4	1
5	-2	3	2	-2	2	2	-2	2	2	-3	3	3	-2	2	1	-4	3	2
6	-1	2	2	-1	2	-1	-1	1	1	-2	2	1	-2	1	1	-2	2	1
7	0	3	3	-4	4	4	-4	4	4	-4	4	4	-4	4	4	-4	4	4
8	2	2	1	-2	4	2	-3	4	3	-3	4	3	-3	4	2	-3	4	3
9	-2	-2	-2	2	-4	2	2	-2	1	1	-1	2	-2	-2	-1	-3	-3	-1
10	2	1	3	3	3	2	1	1	3	2	3	3	2	3	2	1	1	3
11	0	0	0	-3	0	0	-3	-1	0	-2	0	1	-2	-2	0	-4	0	0
12	-1	3	2	-2	3	3	-3	3	3	-3	3	3	-2	3	2	-4	4	3
13	-2	3	0	-3	3	2	-3	4	3	-3	3	3	-3	3	3	-3	3	3
14	2	0	-1	-1	1	0	-1	1	1	1	0	1	-1	1	1	-2	2	1
15	4	0	3	1	4	2	1	4	1	-2	3	2	4	4	3	-2	3	-1
16	-3	1	1	-2	3	1	-2	3	2	-2	2	1	-1	1	0	-1	2	2
17	1	2	2	-1	3	2	0	2	2	-2	2	2	0	2	2	-2	2	2
18	-2	-2	1	-3	-3	-1	-3	-2	2	-4	-4	-2	-3	-3	-3	-3	-3	-1
Total	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Mean	-0.28	1.33	1.06	-1.5	1.67	1.44	-1.83	1.83	2	-1.94	1.56	1.67	-1.44	1.61	1.28	-2.67	1.94	1.44

Table E.19: Phase I Canadian respondents' data for expected EPA - - - category

	4_EPA--- Turn on water			4_EPA--- Put on some soap			4_EPA--- Rinse hands			4_EPA--- Turn off water			4_EPA--- Dry up hands			4_EPA--- Goodbye		
Respondent #	61 - Q19E	62 - Q19P	63 - Q19A	64 - Q20E	65 - Q20P	66 - Q20A	67 - Q21E	68 - Q21P	69 - Q21A	70 - Q22E	71 - Q22P	72 - Q22A	73 - Q23E	74 - Q23P	75 - Q23A	76 - Q24E	77 - Q24P	78 - Q24A
1	-4	-2	-2	-1	-1	-1	-3	-2	0	-1	1	1	-4	-3	-2	-4	-4	-4
2	1	-1	-1	2	1	-1	0	-1	-1	0	3	2	0	1	1	-2	0	-2
3	-2	2	1	-2	-2	-1	-1	-3	-2	-2	0	-2	-1	-3	0	-3	-3	3
4	-3	0	-2	-4	2	1	-4	0	0	2	1	2	-4	-2	-3	-4	-4	-4
5	-3	1	1	0	-1	-1	-2	1	1	-1	1	1	-1	-2	1	-4	3	2
6	-3	2	1	1	-1	-1	-3	-2	1	-1	1	-2	-2	-2	-2	0	1	1
7	0	0	0	-2	0	0	-4	0	0	-4	4	4	0	0	0	-3	0	2
8	-4	3	3	-4	3	3	-3	0	-1	0	1	1	-2	1	2	-4	3	4
9	-4	-4	-3	-3	-3	-2	-3	-2	-2	2	2	0	1	-4	-1	0	-1	1
10	-4	-3	4	-2	-2	3	-2	-1	4	3	3	1	1	1	3	-4	-3	4
11	1	-2	0	-2	-4	1	0	-4	0	0	0	0	0	-3	0	-3	-2	0
12	-2	-2	-1	-2	-1	-2	-1	-3	-2	-1	2	2	-1	-3	-2	-2	-2	-1
13	-3	1	-4	-2	-3	-3	0	-2	-2	0	-1	-1	-2	-2	-2	-3	2	2
14	1	-2	0	2	1	0	0	-3	0	-1	1	1	-1	-2	0	-2	-2	0
15	-3	2	2	4	1	2	4	0	3	4	4	1	-3	-3	-2	-2	1	-3
16	-4	1	0	-1	-1	0	-2	-2	1	-1	0	-1	-3	0	1	-4	-2	1
17	-2	2	1	0	0	1	1	0	2	0	2	2	0	0	1	0	2	0
18	-3	-2	1	-1	-1	1	-4	-4	-4	-2	-2	1	-3	-3	-3	-4	-4	-2
Total	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Mean	-2.28	-0.22	0.06	-0.94	-0.67	0	-1.5	-1.56	-0.11	-0.17	1.28	0.72	-1.39	-1.61	-0.44	-2.67	-0.83	0.22

Table E.20: Phase I Canadian respondents' data for expected EPA + - + category

	5_EPA+-+ Turn on water			5_EPA+-+ Put on some soap			5_EPA+-+ Rinse hands			5_EPA+-+ Turn off water			5_EPA+-+ Dry up hands			5_EPA+-+ Goodbye		
Respondent #	79 - Q25E	80 - Q25P	81 - Q25A	82 - Q26E	83 - Q26P	84 - Q26A	85 - Q27E	86 - Q27P	87 - Q27A	88 - Q28E	89 - Q28P	90 - Q28A	91 - Q29E	92 - Q29P	93 - Q29A	94 - Q30E	95 - Q30P	96 - Q30A
1	-3	-1	-1	-1	1	1	0	0	0	**0.24**	**1.47**	**1.29**	2	0	1	**1.06**	**0.12**	**0.47**
2	1	1	2	0	2	1	1	-1	2	0	2	2	2	2	1	2	-1	0
3	1	-1	0	2	0	1	3	1	0	1	1	0	3	2	1	2	-2	1
4	-4	2	2	-1	3	2	0	-1	1	0	4	3	1	1	1	-2	-1	-1
5	2	3	2	2	3	2	2	1	1	-2	2	2	2	1	1	2	1	1
6	1	1	1	1	-1	0	2	-1	-1	1	2	1	2	-1	-2	2	0	0
7	-4	4	3	-4	4	4	4	4	4	-3	4	3	-3	3	3	-3	3	3
8	0	0	1	-2	3	2	2	0	1	2	1	1	2	1	1	3	0	0
9	-3	-2	-2	0	1	0	-2	2	2	1	-2	1	2	2	2	0	1	1
10	2	2	2	2	2	3	0	0	2	1	0	1	3	2	1	2	2	3
11	-2	0	0	-1	1	0	2	2	0	-1	0	0	1	1	0	1	1	1
12	0	2	2	1	2	2	1	1	1	0	2	1	2	2	2	1	-2	0
13	1	-2	-1	2	2	3	2	2	3	2	2	3	1	2	2	2	2	-2
14	-1	2	0	0	1	1	0	1	2	0	2	0	0	1	1	0	-2	0
15	1	3	1	1	3	1	4	0	1	2	3	1	3	1	2	1	-2	0
16	0	-1	1	1	2	1	-1	1	1	-2	-2	0	-1	1	1	1	3	1
17	1	2	2	3	2	2	3	-1	1	1	2	2	3	-2	2	3	-2	0
18	3	2	1	1	1	1	-1	-1	-1	1	2	1	1	1	1	1	1	0
Total	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Mean	-0.22	0.94	0.89	0.39	1.78	1.5	1.22	0.56	1.11	0.24	1.47	1.29	1.44	1.11	1.17	1.06	0.12	0.47

Appendix F

Phase I Eigen analysis

Below tables show the eigen values and eigen ratios for EPA for all data and various sub-datasets considered in phase I data analysis.

Note that the eigen ratio is the ratio of first to second largest eigen values. Dark green background color is used for ratio values greater than or equal to 2.0 (indicating more consensus), light green background color is used for ratio values greater than or equal to 1.8 (indicating close to consensus)

Table F.1: Phase I Eigen values and ratios for all data subsets excluding expected EPA category

#	All Data			Male Respondents' Data			Female Respondents' Data			Canadian Respondents' Data		
	E	P	A	E	P	A	E	P	A	E	P	A
1	72.0	22.6	14.8	46.9	16.4	11.1	21.8	7.0	3.5	58.8	19.5	11.5
2	8.4	14.9	7.7	7.3	9.5	6.3	2.7	5.9	2.1	8.2	12.8	7.1
3	6.2	5.0	4.3	5.2	4.1	3.3	2.3	3.5	1.5	5.2	4.6	3.6
4	5.1	4.9	2.7	4.5	3.8	2.1	1.2	1.2	1.4	4.7	3.9	2.5
5	3.7	3.6	2.6	3.4	2.1	1.8	1.0	1.1	0.9	3.5	2.6	2.1
6	3.7	2.9	2.3	2.6	1.6	1.5	0.8	0.6	0.5	3.0	2.4	1.6
7	2.9	2.5	2.0	2.0	1.5	1.0	0.7	0.6	0.3	2.4	1.7	1.4
8	2.4	1.9	1.5	1.4	0.9	1.0	0.5	0.4	0.2	2.2	1.6	1.2
9	2.2	1.5	1.3	1.3	0.9	0.7	0.2	0.2	0.2	1.4	1.2	0.9
10	1.8	1.2	1.2	0.8	0.7	0.5				1.2	0.9	0.7
11	1.5	1.1	1.0	0.5	0.5	0.5				0.9	0.7	0.6
12	1.1	0.9	0.8	0.4	0.3	0.4				0.7	0.6	0.4
13	0.9	0.9	0.8	0.3	0.2	0.3				0.7	0.5	0.4
14	0.9	0.7	0.6	0.2	0.2	0.2				0.5	0.4	0.3
15	0.7	0.6	0.6	0.2	0.1	0.1				0.3	0.3	0.2
16	0.6	0.5	0.4	0.1	0.1	0.1				0.3	0.2	0.1
17	0.5	0.3	0.3							0.2	0.2	0.1
18	0.4	0.2	0.3							0.2	0.1	0.0
19	0.4	0.2	0.2									
20	0.3	0.2	0.1									
21	0.2	0.1	0.1									
22	0.2	0.1	0.1									
23	0.1	0.0	0.1									
24	0.1	0.0	0.0									
25	0.0	0.0	0.0									
26	0.0	0.0	0.0									
27	0.0	0.0	0.0									
Eigen ratio	8.5	1.5	1.9	6.4	1.7	1.8	8.2	1.2	1.7	7.1	1.5	1.6

Table F.2: Phase I Eigen values and ratios for expected EPA category subset

#	Expected EPA + + +			Expected EPA + - -			Expected EPA - + +			Expected EPA - - -			Expected EPA + - +		
	E	P	A	E	P	A	E	P	A	E	P	A	E	P	A
1	31.7	17.1	12.6	19.6	15.4	10.9	22.5	11.9	8.3	31.2	29.3	26.2	19.4	28.0	10.3
2	14.2	9.9	6.2	7.9	6.7	10.2	7.5	6.2	6.9	16.4	17.1	13.1	11.0	8.0	8.0
3	9.3	7.1	5.7	7.2	6.0	5.0	6.9	4.7	4.7	10.9	13.9	8.8	7.4	5.4	4.2
4	5.7	6.4	3.1	4.4	3.8	3.8	4.4	3.0	3.2	7.9	6.2	4.9	4.6	4.0	2.4
5	4.4	2.3	1.5	1.8	3.4	1.9	2.4	1.4	2.0	4.7	4.1	3.9	2.0	2.4	1.8
Eigen ratio	2.2	1.7	2.0	2.5	2.3	1.1	3.0	1.9	1.2	1.9	1.7	2.0	1.8	3.5	1.3

Appendix G

Phase I Pearson's r-correlation analysis

Below is the r-correlation analysis data for EPA for all data and subsets considered for phase I analysis. Wherever value is greater than or equal to 0.9, it is highlighted with dark green background color to indicate high correlation

All Respondents' dataset – E dimension

1.00																										
0.71	1.00																									
0.59	0.67	1.00																								
0.56	0.55	0.61	1.00																							
0.39	0.26	0.25	0.27	1.00																						
0.52	0.76	0.78	0.47	0.15	1.00																					
0.55	0.58	0.65	0.40	0.42	0.45	1.00																				
0.61	0.58	0.55	0.48	0.32	0.38	0.46	1.00																			
0.55	0.63	0.73	0.50	0.27	0.74	0.48	0.36	1.00																		
0.76	0.86	0.78	0.59	0.29	0.74	0.69	0.53	0.77	1.00																	
0.65	0.78	0.53	0.58	0.23	0.55	0.49	0.55	0.44	0.71	1.00																
0.64	0.76	0.83	0.58	0.25	0.70	0.58	0.52	0.73	0.83	0.57	1.00															
0.56	0.57	0.66	0.55	0.28	0.54	0.52	0.49	0.78	0.70	0.50	0.58	1.00														
0.76	0.74	0.75	0.62	0.29	0.71	0.58	0.56	0.77	0.83	0.57	0.82	0.59	1.00													
0.46	0.62	0.57	0.57	0.15	0.50	0.48	0.60	0.48	0.63	0.63	0.56	0.53	0.59	1.00												
0.70	0.69	0.78	0.66	0.39	0.69	0.58	0.73	0.72	0.76	0.64	0.66	0.70	0.73	0.63	1.00											
0.64	0.83	0.71	0.58	0.20	0.71	0.60	0.52	0.71	0.83	0.61	0.77	0.62	0.76	0.63	0.68	1.00										
0.52	0.34	0.35	0.44	0.03	0.25	0.33	0.28	0.32	0.43	0.56	0.39	0.37	0.50	0.30	0.44	0.36	1.00									
0.47	0.24	0.34	0.40	0.55	0.27	0.53	0.36	0.26	0.37	0.41	0.38	0.38	0.38	0.22	0.53	0.17	0.46	1.00								
0.67	0.76	0.61	0.67	0.31	0.60	0.50	0.57	0.62	0.68	0.70	0.67	0.55	0.64	0.80	0.71	0.65	0.35	0.37	1.00							
0.78	0.81	0.84	0.71	0.25	0.73	0.59	0.60	0.78	0.83	0.70	0.88	0.71	0.86	0.67	0.77	0.83	0.53	0.39	0.81	1.00						
0.71	0.76	0.86	0.62	0.27	0.79	0.62	0.62	0.84	0.82	0.55	0.83	0.75	0.84	0.62	0.80	0.81	0.45	0.31	0.72	0.90	1.00					
0.60	0.77	0.54	0.54	0.38	0.43	0.61	0.69	0.36	0.61	0.64	0.50	0.42	0.57	0.73	0.62	0.61	0.29	0.27	0.74	0.64	0.57	1.00				
0.48	0.37	0.39	0.47	0.45	0.22	0.51	0.52	0.39	0.42	0.23	0.47	0.42	0.45	0.28	0.42	0.43	0.14	0.27	0.36	0.44	0.48	0.34	1.00			
0.52	0.45	0.47	0.35	0.35	0.42	0.64	0.21	0.43	0.55	0.43	0.56	0.40	0.55	0.15	0.41	0.42	0.23	0.61	0.32	0.52	0.47	0.29	0.39	1.00		
0.75	0.71	0.76	0.62	0.48	0.67	0.57	0.64	0.80	0.80	0.66	0.80	0.70	0.83	0.67	0.79	0.71	0.39	0.47	0.80	0.86	0.83	0.61	0.49	0.55	1.00	
0.77	0.72	0.69	0.56	0.27	0.70	0.61	0.47	0.80	0.84	0.50	0.78	0.66	0.84	0.47	0.69	0.71	0.40	0.46	0.61	0.80	0.80	0.51	0.35	0.59	0.75	1.00

All Respondents' dataset – P dimension

1.00																										
0.49	1.00																									
0.57	0.46	1.00																								
0.58	0.54	0.42	1.00																							
0.50	0.57	0.49	0.45	1.00																						
0.44	0.33	0.33	0.21	0.50	1.00																					
0.56	0.62	0.46	0.66	0.45	0.43	1.00																				
0.45	0.38	0.57	0.45	0.47	0.33	0.45	1.00																			
0.24	0.25	0.37	0.39	0.57	0.09	0.22	0.48	1.00																		
0.49	0.39	0.36	0.29	0.19	0.23	0.36	0.37	0.30	1.00																	
0.69	0.50	0.47	0.54	0.53	0.53	0.52	0.45	0.27	0.52	1.00																
0.23	0.25	0.31	0.30	0.38	0.24	0.50	0.48	0.38	0.07	0.26	1.00															
0.10	0.12	-0.07	0.11	-0.05	-0.20	-0.04	0.07	-0.14	-0.06	-0.06	0.18	1.00														
0.34	0.39	0.59	0.38	0.51	0.31	0.34	0.66	0.44	0.33	0.47	0.56	-0.01	1.00													
0.68	0.55	0.52	0.55	0.56	0.19	0.60	0.35	0.41	0.60	0.53	0.48	0.24	0.42	1.00												
-0.03	0.19	0.29	0.07	0.10	0.15	0.23	0.33	0.50	0.15	0.23	0.32	-0.41	0.30	-0.03	1.00											
0.33	0.24	0.42	0.38	0.39	0.26	0.44	0.52	0.50	0.17	0.39	0.73	-0.20	0.52	0.42	0.55	1.00										
0.40	0.02	0.03	0.02	-0.05	-0.03	0.02	-0.27	-0.36	0.12	0.22	0.03	0.54	-0.11	0.41	-0.47	-0.17	1.00									
0.55	0.42	0.32	0.32	0.57	0.18	0.30	0.15	0.14	0.08	0.52	0.11	0.02	0.24	0.54	-0.19	0.25	0.27	1.00								
0.40	0.25	0.36	0.23	0.39	0.01	0.26	0.23	0.01	0.12	0.34	0.34	0.26	0.30	0.58	-0.37	0.20	0.39	0.65	1.00							
0.68	0.69	0.71	0.57	0.65	0.43	0.67	0.47	0.47	0.44	0.67	0.58	0.07	0.49	0.78	0.31	0.64	0.13	0.45	0.43	1.00						
0.39	0.16	0.51	0.15	0.30	0.10	0.34	0.53	0.52	0.22	0.18	0.61	-0.07	0.46	0.40	0.53	0.69	-0.07	0.14	0.29	0.54	1.00					
0.67	0.64	0.52	0.61	0.40	0.27	0.60	0.36	0.29	0.70	0.76	0.31	0.11	0.33	0.71	0.12	0.35	0.21	0.35	0.36	0.79	0.20	1.00				
0.37	0.38	0.44	0.31	0.51	0.54	0.46	0.43	0.56	0.42	0.62	0.54	-0.24	0.48	0.39	0.58	0.56	-0.12	0.13	0.07	0.66	0.45	0.53	1.00			
0.35	0.16	0.52	0.15	0.18	0.01	0.33	0.38	0.27	0.19	0.28	0.15	-0.28	0.23	0.40	0.39	0.50	-0.07	0.40	0.34	0.41	0.54	0.16	0.19	1.00		
0.09	0.36	0.33	0.12	0.51	0.63	0.36	0.52	0.40	0.23	0.36	0.47	-0.34	0.58	0.11	0.59	0.50	-0.45	-0.05	-0.10	0.41	0.35	0.20	0.74	0.10	1.00	
0.49	0.08	0.07	0.36	0.18	-0.05	0.21	0.17	-0.18	0.21	0.33	-0.05	0.32	0.01	0.34	-0.62	-0.16	0.48	0.36	0.46	0.12	-0.13	0.38	-0.16	-0.10	-0.40	1.00

All Respondents' dataset – A dimension

1.00																										
0.53	1.00																									
-0.20	-0.32	1.00																								
0.36	0.50	-0.28	1.00																							
0.47	0.57	-0.11	0.56	1.00																						
0.31	0.26	0.25	0.02	0.32	1.00																					
0.45	0.68	-0.22	0.33	0.40	0.09	1.00																				
0.49	0.65	0.04	0.54	0.67	0.26	0.47	1.00																			
0.25	0.35	0.21	0.27	0.33	-0.05	0.26	0.42	1.00																		
0.64	0.55	-0.15	0.36	0.28	0.12	0.57	0.43	0.14	1.00																	
0.34	0.25	0.11	0.47	0.40	0.19	0.18	0.39	0.12	0.34	1.00																
0.02	0.23	0.41	0.22	0.44	0.32	0.08	0.39	0.30	-0.13	0.09	1.00															
-0.36	-0.20	0.17	-0.22	-0.17	0.19	-0.32	-0.12	-0.17	-0.23	-0.05	-0.07	1.00														
-0.03	-0.12	0.24	0.10	0.28	-0.18	-0.05	0.10	0.31	-0.09	0.15	0.29	0.10	1.00													
0.38	0.55	0.26	0.48	0.51	0.03	0.46	0.53	0.47	0.39	0.41	0.45	-0.22	0.08	1.00												
-0.31	-0.32	0.72	-0.28	-0.23	0.20	-0.13	-0.03	0.19	-0.18	0.02	0.17	0.12	0.00	0.03	1.00											
0.33	0.36	0.50	0.14	0.17	0.09	0.26	0.50	0.50	0.25	0.22	0.49	-0.22	0.25	0.65	0.36	1.00										
0.14	0.31	0.10	0.11	-0.06	0.16	0.24	0.03	0.06	0.36	-0.04	0.20	-0.23	-0.42	0.41	-0.06	0.09	1.00									
-0.45	-0.44	0.27	-0.50	-0.35	-0.18	-0.29	-0.31	-0.01	-0.44	-0.12	-0.02	0.02	0.15	-0.26	0.35	-0.11	-0.03	1.00								
-0.27	-0.17	-0.06	0.00	-0.27	-0.50	0.19	-0.07	0.14	0.10	-0.11	-0.22	-0.06	-0.08	-0.05	0.11	-0.18	0.07	0.08	1.00							
0.53	0.57	0.25	0.46	0.72	0.46	0.34	0.59	0.35	0.39	0.50	0.62	-0.30	0.09	0.74	0.10	0.57	0.31	-0.29	-0.28	1.00						
0.31	0.29	0.47	0.23	0.35	0.38	0.18	0.45	0.24	0.23	0.28	0.60	-0.12	0.00	0.58	0.32	0.52	0.45	-0.19	-0.27	0.66	1.00					
0.42	0.24	0.15	0.25	0.00	0.21	0.09	0.22	0.29	0.36	0.45	-0.01	0.03	-0.07	0.35	0.15	0.37	0.12	-0.24	-0.08	0.24	0.35	1.00				
0.43	0.03	-0.14	0.27	0.41	-0.08	-0.09	0.17	0.24	0.16	0.48	-0.06	-0.22	0.21	0.05	-0.17	-0.02	-0.18	-0.01	-0.18	0.31	0.06	0.05	1.00			
-0.11	-0.08	0.53	-0.20	-0.13	0.15	0.06	0.06	0.42	-0.13	0.20	0.32	-0.01	0.13	0.20	0.46	0.38	0.11	0.24	0.04	0.19	0.40	0.13	-0.07	1.00		
0.53	0.31	-0.06	0.45	0.60	0.35	0.08	0.48	0.17	0.10	0.53	0.48	-0.15	0.07	0.31	-0.06	0.28	-0.10	-0.23	-0.44	0.63	0.40	0.19	0.52	0.09	1.00	
0.37	0.28	-0.19	0.43	0.27	0.23	0.27	0.24	-0.16	0.55	0.22	-0.02	-0.24	-0.03	0.15	-0.22	0.11	0.08	-0.40	-0.14	0.32	-0.02	0.02	0.13	-0.25	0.23	1.00

Male Respondents' dataset – E dimension

1.00															
0.67	1.00														
0.55	0.61	1.00													
0.58	0.65	0.40	1.00												
0.63	0.73	0.50	0.48	1.00											
0.86	0.78	0.59	0.68	0.77	1.00										
0.62	0.57	0.57	0.48	0.48	0.63	1.00									
0.69	0.78	0.66	0.58	0.72	0.76	0.63	1.00								
0.83	0.71	0.58	0.60	0.71	0.83	0.63	0.68	1.00							
0.34	0.35	0.44	0.33	0.32	0.43	0.30	0.44	0.36	1.00						
0.24	0.34	0.40	0.53	0.26	0.37	0.22	0.53	0.17	0.46	1.00					
0.76	0.61	0.67	0.50	0.62	0.68	0.80	0.71	0.65	0.35	0.37	1.00				
0.81	0.84	0.71	0.59	0.78	0.83	0.67	0.77	0.83	0.53	0.39	0.81	1.00			
0.76	0.86	0.62	0.62	0.84	0.82	0.62	0.80	0.81	0.45	0.31	0.72	0.90	1.00		
0.37	0.39	0.47	0.51	0.39	0.42	0.28	0.42	0.43	0.14	0.27	0.36	0.44	0.48	1.00	
0.45	0.47	0.35	0.64	0.42	0.54	0.15	0.41	0.42	0.23	0.61	0.32	0.52	0.47	0.39	1.00

Male Respondents' dataset – P dimension

1.00															
0.46	1.00														
0.54	0.42	1.00													
0.63	0.47	0.65	1.00												
0.25	0.37	0.39	0.22	1.00											
0.39	0.36	0.28	0.36	0.28	1.00										
0.55	0.52	0.55	0.59	0.41	0.60	1.00									
0.19	0.29	0.07	0.24	0.50	0.16	-0.03	1.00								
0.24	0.42	0.38	0.43	0.50	0.17	0.42	0.55	1.00							
0.02	0.03	0.02	0.02	-0.36	0.13	0.41	-0.47	-0.17	1.00						
0.42	0.32	0.32	0.30	0.14	0.09	0.54	-0.19	0.25	0.27	1.00					
0.25	0.36	0.23	0.25	0.01	0.12	0.58	-0.37	0.20	0.39	0.65	1.00				
0.69	0.71	0.57	0.66	0.47	0.44	0.78	0.31	0.64	0.13	0.45	0.43	1.00			
0.16	0.51	0.15	0.35	0.52	0.22	0.40	0.53	0.69	-0.07	0.14	0.29	0.54	1.00		
0.38	0.44	0.31	0.45	0.56	0.42	0.39	0.58	0.56	-0.12	0.13	0.07	0.66	0.45	1.00	
0.16	0.52	0.15	0.34	0.27	0.20	0.40	0.39	0.50	-0.07	0.40	0.34	0.41	0.54	0.19	1.00

Male Respondents' dataset – A dimension

1.00															
-0.32	1.00														
0.50	-0.28	1.00													
0.68	-0.22	0.33	1.00												
0.35	0.21	0.27	0.26	1.00											
0.55	-0.15	0.37	0.57	0.15	1.00										
0.55	0.26	0.48	0.46	0.47	0.39	1.00									
-0.32	0.72	-0.28	-0.13	0.19	-0.18	0.03	1.00								
0.36	0.50	0.14	0.26	0.50	0.25	0.65	0.36	1.00							
0.31	0.10	0.11	0.24	0.06	0.36	0.41	-0.06	0.09	1.00						
-0.44	0.27	-0.50	-0.29	-0.01	-0.45	-0.26	0.35	-0.11	-0.03	1.00					
-0.17	-0.06	0.00	0.19	0.14	0.09	-0.05	0.11	-0.18	0.07	0.08	1.00				
0.57	0.25	0.46	0.34	0.35	0.39	0.74	0.10	0.57	0.31	-0.29	-0.28	1.00			
0.29	0.47	0.23	0.18	0.24	0.23	0.58	0.32	0.52	0.45	-0.19	-0.27	0.66	1.00		
0.03	-0.14	0.27	-0.09	0.24	0.16	0.05	-0.17	-0.02	-0.18	-0.01	-0.18	0.31	0.06	1.00	
-0.08	0.53	-0.20	0.06	0.42	-0.13	0.20	0.46	0.38	0.11	0.24	0.04	0.19	0.40	-0.07	1.00

Female Respondents' dataset – E dimension

1.00								
0.15	1.00							
0.23	0.55	1.00						
0.25	0.70	0.57	1.00					
0.28	0.54	0.50	0.58	1.00				
0.29	0.71	0.57	0.82	0.59	1.00			
0.38	0.43	0.64	0.50	0.42	0.57	1.00		
0.48	0.67	0.66	0.80	0.70	0.83	0.61	1.00	
0.27	0.70	0.50	0.78	0.66	0.84	0.51	0.75	1.00

Female Respondents' dataset – P dimension

1.00								
0.50	1.00							
0.53	0.53	1.00						
0.38	0.24	0.26	1.00					
-0.05	-0.20	-0.06	0.18	1.00				
0.51	0.31	0.47	0.56	-0.01	1.00			
0.40	0.27	0.76	0.31	0.11	0.33	1.00		
0.51	0.63	0.36	0.47	-0.34	0.58	0.20	1.00	
0.18	-0.05	0.33	-0.05	0.32	0.01	0.38	-0.40	1.00

Female Respondents' dataset – A dimension

1.00								
0.32	1.00							
0.40	0.19	1.00						
0.44	0.32	0.09	1.00					
-0.19	0.19	-0.07	-0.11	1.00				
0.28	-0.18	0.15	0.29	0.09	1.00			
0.00	0.21	0.45	-0.01	0.01	-0.07	1.00		
0.60	0.35	0.53	0.48	-0.16	0.07	0.19	1.00	
0.27	0.23	0.22	-0.02	-0.21	-0.03	0.02	0.23	1.00

Canadian Respondents' dataset – E dimension

1.00																
0.72	1.00															
0.59	0.67	1.00														
0.56	0.55	0.61	1.00													
0.65	0.76	0.83	0.58	1.00												
0.76	0.74	0.75	0.62	0.82	1.00											
0.46	0.62	0.57	0.57	0.56	0.59	1.00										
0.70	0.69	0.78	0.66	0.66	0.73	0.63	1.00									
0.52	0.34	0.35	0.44	0.39	0.50	0.30	0.44	1.00								
0.47	0.24	0.34	0.40	0.38	0.38	0.22	0.53	0.46	1.00							
0.68	0.76	0.61	0.67	0.67	0.64	0.80	0.71	0.35	0.37	1.00						
0.78	0.81	0.84	0.71	0.88	0.86	0.67	0.77	0.53	0.39	0.81	1.00					
0.71	0.76	0.86	0.62	0.83	0.84	0.62	0.80	0.45	0.31	0.72	0.90	1.00				
0.60	0.77	0.54	0.54	0.50	0.57	0.73	0.62	0.29	0.27	0.74	0.64	0.57	1.00			
0.48	0.37	0.39	0.47	0.47	0.45	0.28	0.42	0.14	0.27	0.36	0.44	0.48	0.34	1.00		
0.52	0.45	0.47	0.35	0.56	0.55	0.15	0.41	0.23	0.61	0.32	0.52	0.47	0.29	0.39	1.00	
0.75	0.71	0.76	0.62	0.80	0.83	0.67	0.79	0.39	0.47	0.80	0.86	0.83	0.61	0.49	0.55	1.00
0.77	0.72	0.69	0.56	0.78	0.84	0.47	0.69	0.40	0.46	0.61	0.80	0.80	0.51	0.35	0.59	0.75	1.00

Canadian Respondents' dataset – P dimension

1.00																
0.48	1.00															
0.57	0.46	1.00														
0.58	0.54	0.42	1.00													
0.23	0.25	0.31	0.30	1.00												
0.34	0.39	0.59	0.38	0.56	1.00											
0.68	0.55	0.52	0.55	0.48	0.42	1.00										
-0.03	0.19	0.29	0.07	0.32	0.30	-0.03	1.00									
0.40	0.02	0.03	0.02	0.03	-0.11	0.41	-0.47	1.00								
0.55	0.42	0.32	0.32	0.11	0.24	0.54	-0.19	0.27	1.00							
0.40	0.25	0.36	0.23	0.34	0.30	0.58	-0.37	0.39	0.65	1.00						
0.68	0.69	0.71	0.57	0.58	0.49	0.78	0.31	0.13	0.45	0.43	1.00					
0.39	0.16	0.51	0.15	0.61	0.46	0.40	0.53	-0.07	0.14	0.29	0.54	1.00				
0.67	0.64	0.52	0.61	0.31	0.33	0.71	0.12	0.21	0.35	0.36	0.79	0.20	1.00			
0.37	0.38	0.44	0.31	0.54	0.48	0.39	0.58	-0.12	0.13	0.07	0.66	0.45	0.53	1.00		
0.35	0.16	0.52	0.15	0.15	0.23	0.40	0.39	-0.07	0.40	0.34	0.41	0.54	0.16	0.19	1.00	
0.09	0.36	0.33	0.12	0.47	0.58	0.11	0.59	-0.45	-0.05	-0.10	0.41	0.35	0.20	0.74	0.10	1.00
0.49	0.08	0.07	0.36	-0.05	0.01	0.34	-0.62	0.48	0.36	0.46	0.12	-0.13	0.38	-0.16	-0.10	-0.40	1.00

Canadian Respondents' dataset – A dimension

1.00																
0.53	1.00															
-0.19	-0.32	1.00														
0.37	0.50	-0.28	1.00													
0.02	0.23	0.41	0.23	1.00												
-0.03	-0.12	0.24	0.09	0.29	1.00											
0.38	0.55	0.26	0.48	0.45	0.08	1.00										
-0.32	-0.32	0.72	-0.28	0.17	0.00	0.03	1.00									
0.14	0.31	0.10	0.12	0.20	-0.42	0.41	-0.06	1.00								
-0.45	-0.44	0.27	-0.50	-0.02	0.15	-0.26	0.35	-0.03	1.00							
-0.26	-0.17	-0.06	0.00	-0.22	-0.08	-0.05	0.11	0.07	0.08	1.00						
0.53	0.57	0.25	0.47	0.62	0.09	0.74	0.10	0.31	-0.29	-0.28	1.00					
0.31	0.29	0.47	0.24	0.60	0.00	0.58	0.32	0.45	-0.19	-0.27	0.66	1.00				
0.41	0.24	0.15	0.25	-0.01	-0.07	0.35	0.15	0.12	-0.24	-0.08	0.24	0.35	1.00			
0.42	0.03	-0.14	0.27	-0.06	0.21	0.05	-0.17	-0.18	-0.01	-0.18	0.31	0.06	0.05	1.00		
-0.11	-0.08	0.53	-0.20	0.32	0.13	0.20	0.46	0.11	0.24	0.04	0.19	0.40	0.13	-0.07	1.00	
0.52	0.31	-0.06	0.46	0.48	0.07	0.31	-0.06	-0.10	-0.23	-0.44	0.63	0.40	0.19	0.52	0.09	1.00
0.37	0.28	-0.19	0.44	-0.02	-0.03	0.15	-0.22	0.08	-0.40	-0.14	0.32	-0.02	0.02	0.13	-0.25	0.23	1.00

Expected EPA sign + + + category based dataset – E dimension

1.00																												
0.72	1.00																											
-0.23	0.22	1.00																										
-0.53	-0.22	0.09	1.00																									
0.69	0.42	-0.67	0.07	1.00																								
0.13	0.48	0.16	-0.55	-0.23	1.00																							
0.38	0.23	0.07	-0.73	-0.11	0.38	1.00																						
0.58	0.95	0.36	-0.16	0.27	0.47	0.37	1.00																					
0.60	0.62	-0.30	-0.45	0.44	0.61	-0.06	0.38	1.00																				
0.52	0.83	0.47	-0.07	0.20	0.23	0.43	0.94	0.08	1.00																			
0.72	0.69	-0.04	-0.14	0.60	0.00	0.52	0.77	0.10	0.84	1.00																		
-0.19	0.05	0.37	0.84	0.11	-0.63	-0.65	0.07	-0.37	0.22	0.06	1.00																	
0.74	0.57	0.22	-0.51	0.24	0.06	0.75	0.64	0.03	0.76	0.82	-0.13	1.00																
0.26	0.56	-0.30	0.00	0.45	0.52	0.24	0.60	0.39	0.45	0.53	-0.24	0.11	1.00															
0.73	0.80	0.05	-0.08	0.60	0.06	0.40	0.85	0.19	0.89	0.98	0.16	0.78	0.56	1.00														
0.85	0.89	0.12	-0.40	0.46	0.37	0.13	0.74	0.75	0.60	0.53	-0.02	0.56	0.24	0.63	1.00													
0.17	0.61	0.79	-0.10	-0.29	0.34	0.48	0.79	-0.13	0.88	0.52	0.16	0.62	0.22	0.58	0.36	1.00												
0.58	0.86	0.62	-0.20	0.08	0.29	0.32	0.90	0.25	0.91	0.65	0.23	0.73	0.19	0.74	0.78	0.85	1.00											
0.62	0.12	-0.87	-0.28	0.84	-0.14	0.26	0.02	0.32	-0.03	0.50	-0.36	0.28	0.40	0.40	0.20	-0.44	-0.20	1.00										
0.69	0.42	-0.67	0.07	1.00	-0.23	-0.11	0.27	0.44	0.20	0.60	0.11	0.24	0.45	0.60	0.46	-0.29	0.08	0.84	1.00									
0.35	0.08	0.27	0.13	0.20	-0.70	0.11	0.13	-0.44	0.40	0.48	0.54	0.62	-0.45	0.45	0.18	0.29	0.42	0.06	0.20	1.00								
0.31	0.81	0.60	-0.30	-0.18	0.76	0.29	0.84	0.46	0.71	0.32	-0.10	0.38	0.40	0.44	0.66	0.78	0.81	-0.37	-0.18	-0.18	1.00							
0.85	0.89	0.04	-0.10	0.68	0.07	0.17	0.83	0.46	0.80	0.84	0.23	0.68	0.41	0.92	0.86	0.45	0.79	0.37	0.68	0.43	0.49	1.00						
-0.36	0.14	-0.06	0.10	-0.17	0.68	0.05	0.22	0.20	0.04	-0.10	-0.32	-0.39	0.74	-0.06	-0.19	0.12	-0.14	-0.12	-0.17	-0.83	0.37	-0.20	1.00					
0.19	-0.34	-0.65	-0.60	0.16	0.06	0.61	-0.33	-0.01	-0.32	0.10	-0.79	0.19	0.12	-0.08	-0.26	-0.39	-0.47	0.68	0.16	-0.16	-0.43	-0.25	0.00	1.00				
0.85	0.63	-0.37	-0.13	0.87	-0.13	0.29	0.59	0.30	0.60	0.91	0.06	0.67	0.49	0.89	0.59	0.16	0.45	0.75	0.87	0.43	0.10	0.87	-0.23	0.18	1.00			
0.87	0.42	-0.27	-0.84	0.40	0.23	0.54	0.27	0.56	0.20	0.42	-0.54	0.66	0.00	0.37	0.67	0.00	0.33	0.57	0.40	0.20	0.18	0.49	-0.42	0.48	0.54	1.00		

Expected EPA sign + + + category based dataset – P dimension

1.00																												
0.76	1.00																											
0.70	0.93	1.00																										
0.41	-0.21	-0.07	1.00																									
0.51	0.54	0.67	-0.02	1.00																								
0.12	0.64	0.79	-0.44	0.49	1.00																							
0.29	0.00	0.12	0.61	-0.07	-0.08	1.00																						
0.63	0.71	0.92	0.19	0.75	0.74	0.31	1.00																					
0.46	0.00	0.19	0.70	0.55	-0.13	0.63	0.49	1.00																				
0.59	0.39	0.24	0.39	-0.35	-0.17	0.20	0.06	-0.16	1.00																			
0.29	0.00	0.12	0.28	0.77	-0.08	-0.20	0.31	0.63	-0.40	1.00																		
0.00	-0.39	-0.12	0.72	0.07	-0.17	0.80	0.25	0.79	-0.20	0.20	1.00																	
0.49	0.55	0.48	0.09	-0.08	0.26	-0.24	0.28	-0.37	0.81	-0.24	-0.47	1.00																
0.93	0.61	0.61	0.44	0.72	0.07	0.16	0.63	0.63	0.32	0.63	0.08	0.30	1.00															
0.69	0.31	0.09	0.48	-0.22	-0.46	0.32	-0.05	0.13	0.87	-0.16	-0.08	0.49	0.50	1.00														
-0.36	-0.64	-0.50	0.58	-0.67	-0.38	0.58	-0.28	0.13	0.17	-0.42	0.66	-0.14	-0.46	0.07	1.00													
0.10	-0.27	-0.04	0.72	0.02	-0.15	0.91	0.28	0.77	-0.07	0.07	0.98	-0.41	0.11	0.06	0.67	1.00												
0.32	0.14	-0.04	0.20	-0.35	-0.33	-0.36	-0.25	-0.40	0.80	-0.15	-0.51	0.81	0.20	0.66	-0.03	-0.48	1.00											
0.27	0.00	0.00	0.10	0.70	-0.23	-0.18	0.11	0.58	-0.46	0.91	0.09	-0.43	0.58	-0.07	-0.53	0.00	-0.23	1.00										
0.11	0.00	-0.04	-0.16	0.63	-0.15	-0.15	0.02	0.46	-0.62	0.73	0.04	-0.64	0.37	-0.20	-0.57	-0.03	-0.46	0.93	1.00									
-0.16	0.00	0.13	0.03	-0.19	0.32	0.76	0.23	0.17	-0.11	-0.54	0.54	-0.33	-0.34	-0.17	0.50	0.64	-0.63	-0.50	-0.28	1.00								
0.19	-0.25	0.00	0.75	0.27	-0.16	0.77	0.36	0.92	-0.19	0.39	0.97	-0.46	0.31	0.00	0.48	0.95	-0.49	0.29	0.21	0.42	1.00							
0.46	0.00	-0.09	0.70	-0.44	-0.53	0.63	-0.10	0.25	0.79	-0.32	0.32	0.30	0.25	0.88	0.53	0.44	0.46	-0.29	-0.40	0.17	0.31	1.00						
-0.16	-0.42	-0.26	0.39	0.04	-0.23	0.76	0.03	0.69	-0.43	0.11	0.87	-0.80	-0.09	-0.17	0.50	0.87	-0.75	0.20	0.31	0.65	0.84	0.17	1.00					
0.29	0.26	0.12	-0.06	0.07	-0.08	0.60	0.06	0.32	0.00	-0.20	0.20	-0.43	0.16	0.32	-0.08	0.35	-0.44	0.12	0.36	0.54	0.26	0.32	0.54	1.00				
0.48	0.84	0.91	-0.33	0.72	0.86	0.11	0.83	0.17	-0.11	0.11	-0.11	0.13	0.43	-0.17	-0.59	-0.04	-0.39	0.10	0.20	0.29	0.00	-0.34	-0.06	0.33	1.00			
0.81	0.48	0.51	0.43	0.79	0.03	0.06	0.58	0.68	0.12	0.80	0.12	0.16	0.97	0.34	-0.48	0.11	0.11	0.73	0.51	-0.43	0.36	0.10	-0.03	0.06	0.37	1.00		

Expected EPA sign + + + category based dataset – A dimension

1.00																								
0.00	1.00																							
0.38	-0.46	1.00																						
0.00	-0.09	0.64	1.00																					
0.35	0.00	-0.27	-0.30	1.00																				
-0.61	-0.50	0.00	-0.34	-0.43	1.00																			
0.77	0.32	-0.29	-0.43	0.55	-0.63	1.00																		
0.55	0.30	0.49	0.35	0.39	-0.60	0.24	1.00																	
0.71	0.43	0.27	0.29	0.50	-0.87	0.55	0.91	1.00																
0.42	0.69	-0.16	0.11	0.59	-0.86	0.54	0.75	0.89	1.00															
0.71	0.00	0.27	0.15	-0.25	-0.43	0.55	0.00	0.25	0.00	1.00														
0.39	-0.63	0.88	0.71	0.00	-0.16	-0.20	0.38	0.27	-0.11	0.27	1.00													
0.77	0.32	-0.29	-0.43	0.55	-0.63	1.00	0.24	0.55	0.54	0.55	-0.20	1.00												
0.27	-0.11	-0.31	-0.19	0.96	-0.44	0.49	0.22	0.38	0.49	-0.19	0.07	0.49	1.00											
0.86	0.35	0.41	0.24	0.00	-0.70	0.61	0.62	0.76	0.51	0.76	0.28	0.61	-0.10	1.00										
0.00	-0.47	0.87	0.55	-0.65	0.38	-0.60	0.11	-0.16	-0.52	0.16	0.66	-0.60	-0.67	0.13	1.00									
0.64	-0.09	0.89	0.57	-0.15	-0.35	0.06	0.72	0.61	0.21	0.46	0.72	0.06	-0.25	0.75	0.66	1.00								
-0.42	0.60	-0.32	0.06	-0.74	0.09	-0.22	-0.36	-0.30	-0.12	0.15	-0.54	-0.22	-0.72	0.03	0.03	-0.21	1.00							
-0.25	0.92	-0.38	0.10	-0.35	-0.31	0.00	0.09	0.18	0.42	0.00	-0.58	0.00	-0.41	0.21	-0.23	-0.11	0.84	1.00						
NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN					
0.39	-0.63	0.88	0.22	-0.27	0.32	-0.20	0.24	0.00	-0.43	0.27	0.70	-0.20	-0.35	0.28	0.84	0.72	-0.38	-0.58	NaN	1.00				
0.57	-0.69	0.86	0.40	-0.13	0.00	0.00	0.21	0.13	-0.32	0.53	0.88	0.00	-0.10	0.41	0.70	0.73	-0.48	-0.66	NaN	0.88	1.00			
0.61	0.25	0.46	0.43	-0.43	-0.50	0.32	0.30	0.43	0.17	0.87	0.32	0.32	-0.44	0.88	0.38	0.70	0.34	0.31	NaN	0.32	0.46	1.00		
0.77	0.32	-0.29	-0.43	0.55	-0.63	1.00	0.24	0.55	0.54	0.55	-0.20	1.00	0.49	0.61	-0.60	0.06	-0.22	0.00	NaN	-0.20	0.00	0.32	1.00	
0.71	-0.49	0.63	-0.13	0.00	0.10	0.31	0.25	0.17	-0.23	0.50	0.49	0.31	-0.11	0.49	0.48	0.63	-0.47	-0.59	NaN	0.86	0.81	0.39	0.31	1.00
0.64	-0.53	0.85	0.46	-0.23	-0.13	0.08	0.26	0.23	-0.23	0.68	0.83	0.08	-0.20	0.58	0.69	0.81	-0.32	-0.48	NaN	0.83	0.97	0.66	0.08	0.79	1.00
0.77	-0.32	0.88	0.43	0.00	-0.32	0.20	0.62	0.55	0.11	0.55	0.80	0.20	-0.07	0.72	0.60	0.94	-0.43	-0.39	NaN	0.80	0.88	0.63	0.20	0.80	0.91	1.00

Expected EPA sign + - - category based dataset – E dimension

1.00																								
0.68	1.00																							
0.00	0.56	1.00																						
0.50	0.65	-0.07	1.00																					
0.00	0.55	0.63	0.38	1.00																				
0.00	0.55	0.83	0.24	0.92	1.00																			
0.24	0.77	0.40	0.85	0.63	0.58	1.00																		
0.63	0.54	0.58	-0.07	0.31	0.48	0.00	1.00																	
-0.27	-0.42	-0.54	0.31	-0.34	-0.32	0.11	-0.63	1.00																
0.57	0.57	-0.23	0.91	0.00	-0.10	0.70	-0.15	0.38	1.00															
0.77	0.88	0.16	0.70	0.25	0.13	0.63	0.31	-0.34	0.74	1.00														
0.31	0.03	0.08	-0.44	-0.66	-0.45	-0.42	0.32	-0.32	-0.10	0.13	1.00													
0.71	0.20	-0.66	0.58	-0.26	-0.45	0.08	0.00	0.23	0.68	0.53	-0.03	1.00												
0.58	0.77	0.79	0.11	0.50	0.66	0.32	0.92	-0.69	0.00	0.50	0.26	-0.13	1.00											
0.00	-0.49	-0.80	0.24	-0.32	-0.42	-0.20	-0.39	0.76	0.23	-0.32	-0.42	0.58	-0.63	1.00										
0.33	0.85	0.81	0.52	0.77	0.87	0.81	0.52	-0.26	0.31	0.51	-0.20	-0.20	0.77	-0.48	1.00									
0.51	0.73	0.58	0.41	0.13	0.38	0.58	0.48	-0.05	0.48	0.53	0.38	-0.03	0.66	-0.42	0.74	1.00								
0.57	0.23	-0.33	0.03	-0.52	-0.62	-0.19	0.09	-0.35	0.33	0.59	0.66	0.54	0.07	-0.19	-0.30	0.08	1.00							
0.73	0.81	0.18	0.63	0.56	0.37	0.53	0.46	-0.48	0.48	0.84	-0.22	0.52	0.56	-0.18	0.53	0.22	0.33	1.00						
0.18	0.16	0.00	0.53	0.00	0.19	0.45	0.00	0.73	0.52	0.00	-0.19	0.19	0.00	0.45	0.36	0.56	-0.42	-0.13	1.00					
0.67	0.73	0.47	0.12	0.00	0.10	0.23	0.60	-0.63	0.27	0.74	0.68	0.10	0.74	-0.70	0.44	0.68	0.65	0.48	-0.17	1.00				
0.10	0.03	0.58	-0.61	0.13	0.38	-0.42	0.80	-0.59	-0.68	-0.26	0.38	-0.45	0.66	-0.42	0.20	0.17	-0.15	-0.07	-0.19	0.29	1.00			
0.46	0.94	0.67	0.68	0.71	0.74	0.89	0.43	-0.24	0.52	0.71	-0.19	0.00	0.71	-0.45	0.96	0.74	-0.10	0.66	0.33	0.52	0.00	1.00		
-0.27	-0.19	-0.54	0.20	-0.34	-0.59	0.11	-0.84	0.29	0.38	0.17	-0.05	0.23	-0.69	0.11	-0.44	-0.32	0.40	-0.10	-0.24	-0.13	-0.86	-0.24	1.00	
0.24	0.70	0.20	0.68	0.32	0.17	0.80	-0.19	-0.11	0.70	0.79	-0.08	0.17	0.16	-0.40	0.48	0.42	0.33	0.53	0.00	0.47	-0.58	0.67	0.54	1.00
0.13	0.49	0.43	0.65	0.69	0.77	0.76	0.21	0.29	0.38	0.17	-0.59	-0.05	0.34	0.11	0.79	0.50	-0.66	0.29	0.73	-0.13	-0.05	0.73	-0.41	0.22	1.00
0.68	0.14	-0.61	0.56	-0.18	-0.30	0.06	0.11	0.33	0.58	0.35	-0.16	0.94	-0.09	0.72	-0.13	-0.02	0.28	0.44	0.37	-0.06	-0.30	0.00	-0.03	-0.06	0.15	1.00

Expected EPA sign + - - category based dataset – P dimension

1.00																													
0.16	1.00																												
0.14	-0.53	1.00																											
0.41	-0.37	-0.08	1.00																										
0.21	-0.27	0.48	-0.41	1.00																									
0.70	0.09	0.25	-0.09	0.31	1.00																								
NaN	NaN	NaN	NaN	NaN	NaN	NaN																							
0.63	0.40	-0.36	0.61	-0.27	-0.05	NaN	1.00																						
-0.71	-0.45	-0.13	-0.21	0.30	-0.63	NaN	-0.45	1.00																					
0.31	0.77	-0.69	0.00	-0.52	0.36	NaN	0.39	-0.58	1.00																				
0.68	-0.31	0.60	0.37	0.08	0.74	NaN	0.06	-0.69	0.00	1.00																			
0.00	0.45	-0.13	-0.63	0.00	0.63	NaN	-0.45	-0.33	0.58	0.14	1.00																		
0.46	-0.29	-0.26	0.41	0.39	0.27	NaN	0.29	0.22	0.00	0.09	-0.22	1.00																	
0.63	-0.32	0.56	0.52	-0.11	0.59	NaN	0.16	-0.71	0.00	0.97	0.00	0.00	1.00																
0.00	-0.45	-0.13	0.00	0.30	0.42	NaN	-0.45	0.33	0.00	0.14	0.33	0.65	0.00	1.00															
-0.31	0.00	0.69	-0.54	0.26	-0.18	NaN	-0.39	0.00	-0.50	0.00	0.00	-0.76	0.00	-0.58	1.00														
0.63	-0.32	0.56	0.52	-0.11	0.59	NaN	0.16	-0.71	0.00	0.97	0.00	0.00	1.00	0.00	0.00	1.00													
0.16	-0.40	0.36	-0.14	0.27	0.75	NaN	-0.60	-0.15	0.00	0.61	0.60	0.20	0.47	0.75	-0.13	0.47	1.00												
0.43	-0.54	0.87	0.35	0.37	0.18	NaN	0.11	-0.24	-0.63	0.67	-0.49	0.00	0.69	-0.24	0.42	0.69	0.11	1.00											
0.77	0.07	0.43	0.03	0.24	0.94	NaN	0.07	-0.78	0.27	0.88	0.47	0.10	0.77	0.16	0.00	0.77	0.63	0.42	1.00										
0.61	-0.35	0.56	-0.07	0.80	0.75	NaN	-0.14	-0.16	-0.27	0.62	0.16	0.51	0.44	0.47	0.00	0.44	0.63	0.53	0.71	1.00									
0.66	0.42	-0.22	-0.15	0.56	0.50	NaN	0.42	-0.19	0.32	0.03	0.19	0.61	-0.13	0.19	-0.32	-0.13	0.00	-0.09	0.38	0.55	1.00								
0.71	0.45	0.13	0.21	-0.30	0.63	NaN	0.45	-1.00	0.58	0.69	0.33	-0.22	0.71	-0.33	0.00	0.71	0.15	0.24	0.78	0.16	0.19	1.00							
0.75	0.00	0.28	-0.07	0.53	0.96	NaN	0.00	-0.47	0.20	0.68	0.47	0.46	0.50	0.47	-0.20	0.50	0.69	0.26	0.88	0.88	0.66	0.47	1.00						
0.13	-0.42	0.81	0.27	0.11	-0.15	NaN	0.08	-0.19	-0.64	0.43	-0.56	-0.36	0.53	-0.56	0.64	0.53	-0.17	0.90	0.15	0.15	-0.38	0.19	-0.13	1.00					
0.88	0.32	0.28	-0.07	0.43	0.85	NaN	0.32	-0.71	0.31	0.63	0.35	0.23	0.50	0.00	0.00	0.50	0.32	0.34	0.88	0.72	0.72	0.71	0.88	0.07	1.00				
0.38	-0.32	-0.37	0.66	0.11	0.00	NaN	0.47	0.24	0.00	0.00	-0.47	0.93	0.00	0.47	-0.82	0.00	-0.05	0.00	-0.11	0.22	0.39	-0.24	0.17	-0.26	0.00	1.00			

Expected EPA sign + - - category based dataset – A dimension

1.00																													
-0.35	1.00																												
0.27	-0.77	1.00																											
0.54	-0.25	0.48	1.00																										
0.51	-0.59	0.38	0.09	1.00																									
0.27	-0.39	0.50	0.48	0.76	1.00																								
-0.49	0.80	-0.77	-0.31	-0.88	-0.77	1.00																							
0.14	0.50	-0.77	0.06	0.00	0.00	0.40	1.00																						
-0.09	0.47	0.00	0.21	-0.79	-0.52	0.54	-0.27	1.00																					
0.27	0.00	0.50	0.71	-0.38	0.00	0.00	-0.39	0.78	1.00																				
0.75	-0.49	0.71	0.70	0.63	0.71	-0.80	-0.25	-0.08	0.48	1.00																			
-0.16	0.00	0.00	-0.41	0.65	0.58	-0.45	0.00	-0.60	-0.58	0.14	1.00																		
-0.47	0.45	0.00	0.41	-0.65	0.00	0.45	0.00	0.60	0.58	-0.14	-0.33	1.00																	
0.79	-0.25	0.48	0.55	0.09	0.00	-0.31	-0.31	0.46	0.71	0.70	-0.41	-0.14	1.00																
0.00	-0.39	0.50	0.00	-0.38	-0.50	0.00	-0.77	0.52	0.50	0.00	-0.58	0.00	0.48	1.00															
-0.78	0.00	0.00	-0.41	-0.65	-0.58	0.45	-0.45	0.30	0.00	-0.69	-0.33	0.33	-0.41	0.58	1.00														
0.32	0.14	-0.27	-0.02	-0.51	-0.81	0.49	0.07	0.52	0.27	-0.24	-0.78	-0.16	0.49	0.54	0.16	1.00													
-0.80	0.18	0.17	-0.43	-0.26	0.00	0.09	-0.57	0.21	0.00	-0.30	0.39	0.39	-0.43	0.17	0.59	-0.49	1.00												
-0.35	0.00	0.00	-0.80	0.29	0.00	-0.20	-0.40	-0.27	-0.52	-0.18	0.75	-0.45	-0.31	0.00	0.15	-0.35	0.61	1.00											
-0.49	0.80	-0.77	-0.31	-0.88	-0.77	1.00	0.40	0.54	0.00	-0.80	-0.45	0.45	-0.31	0.00	0.45	0.49	0.09	-0.20	1.00										
0.31	-0.67	0.58	-0.14	0.87	0.58	-0.89	-0.45	-0.60	-0.29	0.55	0.67	-0.67	0.14	0.00	-0.33	-0.47	0.10	0.60	-0.89	1.00									
-0.49	-0.33	0.32	-0.03	0.36	0.64	-0.42	-0.17	-0.56	-0.32	0.03	0.56	0.19	-0.64	-0.32	0.19	-0.90	0.51	0.25	-0.42	0.37	1.00								
0.62	0.22	0.00	0.82	0.00	0.29	0.00	0.45	0.30	0.58	0.55	-0.33	0.33	0.55	-0.29	-0.67	0.16	-0.59	-0.75	0.00	-0.33	-0.37	1.00							
0.49	-0.80	0.77	0.31	0.88	0.77	-1.00	-0.40	-0.54	0.00	0.80	0.45	-0.45	0.31	0.00	-0.45	-0.49	-0.09	0.20	-1.00	0.89	0.42	0.00	1.00						
-0.56	0.36	0.23	-0.05	-0.43	0.00	0.18	-0.53	0.60	0.46	-0.05	0.13	0.66	-0.05	0.23	0.40	-0.31	0.86	0.30	0.18	-0.13	0.22	-0.13	-0.18	1.00					
0.55	-0.40	0.31	-0.05	0.93	0.61	-0.79	-0.08	-0.59	-0.31	0.63	0.71	-0.71	0.24	-0.31	-0.71	-0.39	-0.17	0.47	-0.79	0.88	0.13	0.00	0.79	-0.28	1.00				
0.64	-0.87	0.84	0.63	0.48	0.42	-0.76	-0.43	-0.15	0.42	0.77	-0.24	-0.24	0.63	0.42	-0.24	0.04	-0.38	-0.33	-0.76	0.49	0.05	0.24	0.76	-0.29	0.34	1.00			

Expected EPA sign - + + category based dataset – E dimension

1.00	0.10																									
0.10	1.00																									
0.28	0.58	1.00																								
0.16	0.32	0.39	1.00																							
0.57	0.45	0.93	0.24	1.00																						
NaN	NaN	NaN	NaN	NaN	NaN																					
0.00	0.77	0.64	-0.20	0.58	NaN	1.00																				
0.32	0.28	0.40	0.95	0.31	NaN	-0.18	1.00																			
-0.11	0.45	-0.19	0.47	-0.33	NaN	0.00	0.52	1.00																		
0.36	0.76	0.23	0.17	0.24	NaN	0.42	0.08	0.24	1.00																	
-0.40	0.66	0.45	0.26	0.19	NaN	0.64	0.29	0.56	0.05	1.00																
0.52	0.59	0.12	0.15	0.22	NaN	0.38	0.34	0.65	0.48	0.36	1.00															
-0.10	0.20	-0.33	0.47	-0.45	NaN	-0.39	0.28	0.45	0.54	-0.17	0.00	1.00														
-0.11	0.45	-0.19	0.47	-0.33	NaN	0.00	0.52	1.00	0.24	0.56	0.65	0.45	1.00													
0.25	0.40	0.58	0.95	0.45	NaN	0.00	0.97	0.45	0.11	0.42	0.29	0.20	0.45	1.00												
0.25	0.49	0.51	0.97	0.37	NaN	0.00	0.97	0.55	0.27	0.41	0.36	0.37	0.55	0.98	1.00											
0.79	0.39	0.32	-0.20	0.58	NaN	0.50	0.00	0.00	0.42	0.00	0.76	-0.39	0.00	0.00	0.00	1.00										
-0.43	0.51	-0.21	-0.40	-0.32	NaN	0.56	-0.40	0.49	0.31	0.57	0.42	0.04	0.49	-0.36	-0.27	0.14	1.00									
0.36	0.76	0.23	0.17	0.24	NaN	0.42	0.08	0.24	1.00	0.05	0.48	0.54	0.24	0.11	0.27	0.42	0.31	1.00								
0.49	0.66	0.84	0.66	0.80	NaN	0.46	0.75	0.27	0.32	0.50	0.52	-0.12	0.27	0.84	0.81	0.46	-0.17	0.32	1.00							
0.65	0.70	0.48	0.62	0.52	NaN	0.30	0.70	0.52	0.63	0.29	0.80	0.23	0.52	0.70	0.76	0.60	0.00	0.63	0.84	1.00						
0.25	0.40	0.58	0.95	0.45	NaN	0.00	0.97	0.45	0.11	0.42	0.29	0.20	0.45	1.00	0.98	0.00	-0.36	0.11	0.84	0.70	1.00					
0.11	0.76	0.90	0.60	0.73	NaN	0.63	0.60	0.24	0.29	0.72	0.32	-0.11	0.24	0.76	0.73	0.21	0.02	0.29	0.91	0.63	0.76	1.00				
0.84	0.27	0.23	0.43	0.41	NaN	0.00	0.64	0.41	0.30	0.00	0.80	0.00	0.41	0.55	0.56	0.71	-0.20	0.30	0.65	0.85	0.55	0.30	1.00			
0.14	-0.76	-0.50	-0.69	-0.24	NaN	-0.42	-0.68	-0.73	-0.29	-0.86	-0.48	-0.22	-0.73	-0.76	-0.80	0.00	-0.31	-0.29	-0.71	-0.63	-0.76	-0.82	-0.30	1.00		
0.58	0.27	0.22	0.53	0.30	NaN	0.00	0.75	0.60	0.07	0.28	0.79	-0.07	0.60	0.67	0.66	0.52	-0.10	0.07	0.68	0.79	0.67	0.40	0.92	-0.51	1.00	
0.39	0.00	0.00	0.82	0.00	NaN	-0.50	0.90	0.58	0.00	0.00	0.38	0.39	0.58	0.77	0.79	0.00	-0.42	0.00	0.46	0.60	0.77	0.21	0.71	-0.42	0.78	1.00

Expected EPA sign - + + category based dataset – P dimension

1.00																										
0.11	1.00																									
0.24	0.45	1.00																								
0.44	0.48	0.00	1.00																							
-0.42	-0.77	-0.87	-0.42	1.00																						
0.41	-0.11	0.73	-0.44	-0.42	1.00																					
0.41	0.54	0.73	0.61	-0.84	0.29	1.00																				
-0.43	0.80	0.22	0.00	-0.39	-0.22	0.11	1.00																			
-0.42	0.00	-0.58	-0.21	0.50	-0.42	-0.42	0.39	1.00																		
0.16	0.29	0.44	-0.08	-0.38	0.48	0.48	0.29	0.38	1.00																	
-0.11	0.20	0.00	-0.16	0.00	0.11	0.11	0.40	0.77	0.88	1.00																
-0.24	0.45	-0.33	0.36	0.00	-0.73	-0.24	0.45	0.00	-0.65	-0.45	1.00															
-0.37	0.69	-0.24	0.26	-0.10	-0.66	-0.14	0.82	0.41	-0.16	0.11	0.83	1.00														
-0.69	0.32	0.00	-0.26	0.00	-0.34	-0.34	0.63	0.00	-0.46	-0.32	0.71	0.67	1.00													
-0.11	0.20	0.00	-0.16	0.00	0.11	0.11	0.40	0.77	0.88	1.00	-0.45	0.11	-0.32	1.00												
-0.11	0.20	0.00	-0.16	0.00	0.11	0.11	0.40	0.77	0.88	1.00	-0.45	0.11	-0.32	1.00	1.00											
-0.34	-0.32	-0.71	0.00	0.61	-0.69	-0.69	-0.16	0.00	-0.93	-0.63	0.71	0.34	0.50	-0.63	-0.63	1.00										
0.17	-0.32	-0.88	0.38	0.61	-0.69	-0.43	-0.40	0.31	-0.46	-0.16	0.35	0.15	-0.25	-0.16	-0.16	0.63	1.00									
-0.24	-0.45	-0.33	-0.84	0.58	0.24	-0.73	0.00	0.58	0.22	0.45	-0.33	-0.12	0.00	0.45	0.45	0.00	0.00	1.00								
-0.79	0.29	0.00	-0.08	0.00	-0.48	-0.16	0.59	0.00	-0.43	-0.29	0.65	0.62	0.93	-0.29	-0.29	0.46	-0.23	-0.22	1.00							
0.11	1.00	0.45	0.48	-0.77	-0.11	0.54	0.80	0.00	0.29	0.20	0.45	0.69	0.32	0.20	0.20	-0.32	-0.32	-0.45	0.29	1.00						
0.11	-0.20	0.00	0.48	0.00	-0.11	0.54	-0.40	0.00	0.29	0.20	-0.45	-0.42	-0.63	0.20	0.20	-0.32	0.16	-0.45	-0.29	-0.20	1.00					
0.29	0.76	0.73	0.26	-0.84	0.41	0.76	0.54	0.00	0.79	0.54	-0.24	0.14	-0.17	0.54	0.54	-0.86	-0.60	-0.24	-0.16	0.76	0.11	1.00				
0.00	0.00	0.12	-0.26	0.00	0.34	0.17	0.16	0.61	0.93	0.95	-0.71	-0.21	-0.50	0.95	0.95	-0.75	-0.25	0.47	-0.46	0.00	0.32	0.51	1.00			
-0.59	0.00	0.20	-0.15	0.00	0.00	0.30	0.27	0.35	0.53	0.55	-0.41	-0.07	0.00	0.55	0.55	-0.43	-0.43	0.00	0.27	0.00	0.55	0.30	0.58	1.00		
-0.54	-0.20	0.45	-0.81	0.00	0.54	-0.11	0.20	0.00	0.29	0.20	-0.45	-0.27	0.32	0.20	0.20	-0.32	-0.79	0.45	0.29	-0.20	-0.20	0.11	0.32	0.55	1.00	
0.41	-0.11	0.49	0.44	-0.42	0.29	0.65	-0.54	-0.84	-0.16	-0.54	-0.24	-0.58	-0.34	-0.54	-0.54	-0.17	-0.17	-0.73	-0.16	-0.11	0.54	0.06	-0.34	0.00	-0.11	1.00

Expected EPA sign - + + category based dataset – A dimension

1.00																										
0.56	1.00																									
0.56	-0.20	1.00																								
-0.32	-0.18	0.18	1.00																							
NaN	NaN	NaN	NaN	NaN																						
0.66	0.20	0.80	0.18	NaN	1.00																					
0.56	0.32	0.32	0.28	NaN	0.63	1.00																				
0.05	0.20	0.20	-0.18	NaN	0.40	-0.32	1.00																			
-0.19	-0.76	0.54	0.29	NaN	0.43	0.17	0.11	1.00																		
0.79	0.00	0.77	-0.23	NaN	0.77	0.61	0.00	0.42	1.00																	
-0.66	-0.20	-0.20	0.53	NaN	-0.40	-0.63	0.20	-0.11	-0.77	1.00																
-0.59	-0.77	0.00	0.23	NaN	0.00	0.00	0.00	0.84	0.00	0.00	1.00															
0.11	-0.21	0.46	0.02	NaN	-0.07	-0.52	0.06	-0.09	0.00	0.46	-0.40	1.00														
-0.78	-0.08	-0.58	0.37	NaN	-0.66	-0.66	0.08	-0.32	-0.96	0.91	0.00	0.19	1.00													
0.56	-0.20	1.00	0.18	NaN	0.80	0.32	0.20	0.54	0.77	-0.20	0.00	0.46	-0.58	1.00												
0.05	-0.40	0.80	0.53	NaN	0.70	0.16	0.40	0.76	0.39	0.20	0.39	0.26	-0.17	0.80	1.00											
0.16	0.63	-0.32	0.00	NaN	0.32	0.50	0.32	-0.17	0.00	-0.32	0.00	-0.83	-0.13	-0.32	-0.16	1.00										
0.23	-0.52	0.62	0.21	NaN	0.52	0.60	-0.33	0.80	0.73	-0.52	0.55	-0.16	-0.69	0.62	0.52	-0.15	1.00									
-0.81	-0.32	-0.32	0.56	NaN	-0.16	-0.25	0.32	0.34	-0.61	0.63	0.61	-0.30	0.66	-0.32	0.32	0.25	-0.15	1.00								
-0.56	-1.00	0.20	0.18	NaN	-0.20	-0.32	-0.20	0.76	0.00	0.20	0.77	0.21	0.08	0.20	0.40	-0.63	0.52	0.32	1.00							
0.16	-0.32	0.63	0.28	NaN	0.79	0.50	0.32	0.86	0.61	-0.32	0.61	-0.30	-0.53	0.63	0.79	0.25	0.75	0.25	0.32	1.00						
0.34	-0.27	0.94	0.36	NaN	0.67	0.11	0.27	0.51	0.52	0.13	0.00	0.61	-0.28	0.94	0.88	-0.43	0.45	-0.11	0.27	0.53	1.00					
0.22	-0.29	0.88	0.43	NaN	0.59	0.00	0.29	0.48	0.38	0.29	0.00	0.67	-0.12	0.88	0.88	-0.46	0.35	0.00	0.29	0.46	0.99	1.00				
-0.11	-0.11	-0.43	-0.19	NaN	-0.71	-0.09	-0.87	-0.41	-0.21	-0.11	-0.21	0.11	0.09	-0.43	-0.71	-0.43	-0.05	-0.43	0.11	-0.69	-0.48	-0.48	1.00			
-0.14	0.11	0.11	0.48	NaN	0.54	0.34	0.54	0.41	0.00	0.11	0.42	-0.53	0.05	0.11	0.54	0.69	0.13	0.69	-0.11	0.69	0.15	0.16	-0.82	1.00		
NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
-0.25	0.35	-0.44	0.55	NaN	0.04	0.49	-0.09	-0.10	-0.34	0.09	0.17	-0.74	0.25	-0.44	-0.09	0.76	-0.08	0.55	-0.35	0.14	-0.41	-0.39	-0.17	0.67	NaN	1.00

Expected EPA sign - - - category based dataset – E dimension

1.00																										
0.49	1.00																									
-0.03	0.37	1.00																								
0.56	-0.01	-0.13	1.00																							
0.78	0.12	0.22	0.27	1.00																						
-0.25	0.36	0.42	-0.01	-0.49	1.00																					
0.78	0.68	0.54	0.37	0.70	-0.07	1.00																				
0.77	0.46	0.53	0.22	0.91	-0.20	0.91	1.00																			
-0.19	-0.50	0.38	-0.36	0.47	-0.41	0.00	0.33	1.00																		
0.74	0.80	0.36	0.21	0.48	0.38	0.72	0.69	-0.29	1.00																	
0.09	0.24	0.69	0.30	0.08	0.77	0.32	0.31	0.00	0.52	1.00																
0.72	0.70	0.51	0.22	0.61	0.33	0.78	0.81	-0.06	0.97	0.61	1.00															
0.14	-0.13	0.52	-0.03	0.61	-0.55	0.50	0.61	0.76	-0.13	-0.06	0.07	1.00														
0.53	0.03	-0.60	0.02	0.40	-0.28	-0.05	0.16	-0.12	0.36	-0.28	0.28	-0.36	1.00													
-0.51	0.34	0.17	-0.40	-0.76	0.85	-0.36	-0.50	-0.47	0.13	0.35	0.01	-0.67	-0.22	1.00												
0.41	-0.11	0.30	0.82	0.41	0.20	0.41	0.41	0.06	0.29	0.68	0.41	0.18	-0.13	-0.33	1.00											
0.96	0.49	-0.17	0.59	0.63	-0.11	0.63	0.61	-0.37	0.76	0.13	0.70	-0.12	0.63	-0.35	0.40	1.00										
0.12	-0.54	-0.09	0.54	0.23	0.15	-0.16	0.03	0.19	0.02	0.49	0.12	-0.12	0.23	-0.23	0.76	0.21	1.00									
0.50	0.07	0.41	0.69	0.49	0.33	0.49	0.54	0.07	0.53	0.81	0.65	0.12	0.01	-0.21	0.95	0.51	0.74	1.00								
-0.12	0.37	0.65	0.31	-0.27	0.53	0.38	0.07	-0.25	0.12	0.56	0.15	0.15	-0.84	0.31	0.39	-0.17	-0.14	0.32	1.00							
0.12	-0.14	0.73	0.38	0.45	0.16	0.45	0.53	0.52	0.16	0.71	0.37	0.60	-0.45	-0.30	0.80	0.00	0.51	0.78	0.49	1.00						
0.56	0.07	0.52	0.53	0.78	-0.29	0.78	0.81	0.42	0.29	0.33	0.46	0.78	-0.21	-0.69	0.70	0.38	0.26	0.66	0.32	0.80	1.00					
0.38	0.94	0.21	-0.22	0.06	0.14	0.55	0.34	-0.45	0.60	-0.09	0.48	-0.07	0.06	0.28	-0.41	0.35	-0.78	-0.26	0.21	-0.37	-0.07	1.00				
0.86	0.34	0.17	0.37	0.91	-0.54	0.85	0.89	0.21	0.49	-0.07	0.57	0.60	0.28	-0.75	0.32	0.70	-0.05	0.36	-0.08	0.30	0.78	0.32	1.00			
0.94	0.49	0.29	0.45	0.89	-0.19	0.89	0.94	0.07	0.78	0.28	0.84	0.37	0.36	-0.51	0.50	0.84	0.15	0.62	0.00	0.40	0.74	0.35	0.91	1.00		
0.30	-0.28	0.32	-0.07	0.83	-0.49	0.33	0.67	0.87	0.09	0.07	0.30	0.75	0.21	-0.68	0.28	0.13	0.31	0.34	-0.36	0.56	0.65	-0.30	0.59	0.52	1.00	
0.79	0.75	-0.04	0.34	0.35	0.27	0.56	0.47	-0.57	0.91	0.28	0.79	-0.39	0.56	0.11	0.20	0.88	0.01	0.39	-0.04	-0.16	0.08	0.60	0.44	0.68	-0.15	1.00

Expected EPA sign - - - category based dataset – P dimension

1.00																													
0.65	1.00																												
0.48	0.03	1.00																											
0.83	0.27	0.42	1.00																										
0.93	0.74	0.44	0.61	1.00																									
0.75	0.26	0.19	0.67	0.77	1.00																								
0.81	0.81	0.35	0.34	0.91	0.54	1.00																							
0.13	-0.22	0.89	0.18	0.03	-0.23	0.03	1.00																						
0.75	0.00	0.56	0.89	0.53	0.69	0.32	0.36	1.00																					
0.60	0.77	0.56	0.36	0.66	0.09	0.63	0.37	0.13	1.00																				
0.76	0.71	0.46	0.66	0.61	0.16	0.59	0.34	0.46	0.81	1.00																			
-0.16	-0.26	0.14	-0.39	-0.17	-0.23	0.14	0.31	0.00	-0.33	-0.20	1.00																		
-0.24	-0.09	-0.60	-0.42	-0.25	-0.10	0.04	-0.47	-0.22	-0.61	-0.36	0.66	1.00																	
0.15	0.04	0.76	-0.08	0.14	-0.28	0.33	0.86	0.15	0.41	0.35	0.63	-0.11	1.00																
0.81	0.81	0.35	0.34	0.91	0.54	1.00	0.03	0.32	0.63	0.59	0.14	0.04	0.33	1.00															
-0.25	-0.15	0.33	-0.10	-0.43	-0.77	-0.31	0.68	-0.10	0.24	0.36	0.21	-0.21	0.60	-0.31	1.00														
0.11	0.12	0.62	-0.25	0.19	-0.24	0.45	0.68	0.00	0.35	0.22	0.73	0.08	0.95	0.45	0.41	1.00													
0.56	0.64	0.04	0.08	0.62	0.35	0.86	-0.14	0.17	0.25	0.37	0.50	0.53	0.31	0.86	-0.26	0.48	1.00												
0.62	0.80	-0.02	0.25	0.83	0.65	0.78	-0.43	0.05	0.51	0.30	-0.35	-0.10	-0.23	0.78	-0.68	-0.08	0.55	1.00											
0.42	0.57	0.54	-0.09	0.60	0.09	0.81	0.38	0.00	0.64	0.39	0.41	-0.03	0.73	0.81	0.05	0.84	0.69	0.47	1.00										
0.84	0.81	0.44	0.47	0.82	0.36	0.92	0.22	0.41	0.72	0.83	0.15	-0.02	0.47	0.92	0.04	0.49	0.80	0.56	0.74	1.00									
-0.43	-0.31	0.32	-0.64	-0.33	-0.57	-0.04	0.56	-0.33	-0.07	-0.25	0.79	0.23	0.79	-0.04	0.48	0.85	0.14	-0.44	0.51	-0.03	1.00								
0.75	0.80	0.25	0.62	0.61	0.18	0.62	0.12	0.37	0.75	0.97	-0.23	-0.21	0.19	0.62	0.25	0.11	0.46	0.39	0.34	0.84	-0.35	1.00							
0.66	0.31	0.65	0.42	0.54	0.25	0.67	0.57	0.61	0.39	0.62	0.56	0.11	0.74	0.67	0.25	0.71	0.68	0.08	0.65	0.81	0.32	0.54	1.00						
0.35	0.22	0.80	0.30	0.45	0.15	0.27	0.61	0.21	0.75	0.39	-0.38	-0.90	0.42	0.27	0.17	0.30	-0.22	0.25	0.44	0.26	0.06	0.22	0.17	1.00					
0.11	0.12	0.62	-0.25	0.19	-0.24	0.45	0.68	0.00	0.35	0.22	0.73	0.08	0.95	0.45	0.41	1.00	0.48	-0.08	0.84	0.49	0.85	0.11	0.71	0.30	1.00				
0.64	0.44	0.56	0.76	0.45	0.15	0.27	0.46	0.53	0.75	0.89	-0.47	-0.69	0.22	0.27	0.41	0.00	-0.07	0.11	0.11	0.53	-0.37	0.80	0.38	0.59	0.00	1.00			

Expected EPA sign - - - category based dataset – A dimension

1.00																													
0.63	1.00																												
-0.96	-0.57	1.00																											
0.92	0.45	-0.87	1.00																										
0.85	0.86	-0.72	0.77	1.00																									
-0.35	0.47	0.39	-0.56	0.05	1.00																								
0.42	0.73	-0.47	0.46	0.56	0.24	1.00																							
0.56	0.65	-0.67	0.53	0.52	0.09	0.86	1.00																						
0.72	0.53	-0.65	0.47	0.64	0.00	0.00	0.33	1.00																					
0.33	0.29	-0.30	0.62	0.45	-0.24	0.73	0.55	-0.21	1.00																				
0.39	0.05	-0.51	0.60	0.17	-0.50	0.56	0.72	0.00	0.72	1.00																			
-0.39	-0.05	0.51	-0.60	-0.17	0.50	-0.56	-0.72	0.00	-0.72	-1.00	1.00																		
-0.89	-0.43	0.84	-0.95	-0.74	0.57	-0.41	-0.38	-0.36	-0.53	-0.43	0.43	1.00																	
-0.43	-0.85	0.46	-0.39	-0.63	-0.41	-0.97	-0.81	-0.11	-0.59	-0.36	0.36	0.37	1.00																
0.27	0.48	-0.06	0.30	0.61	0.16	0.22	-0.18	0.00	0.32	-0.36	0.36	-0.45	-0.32	1.00															
-0.77	-0.37	0.81	-0.52	-0.45	0.30	0.00	-0.24	-0.71	0.30	0.00	0.00	0.59	0.07	0.00	1.00														
-0.44	-0.13	0.64	-0.48	-0.10	0.38	-0.52	-0.79	-0.15	-0.38	-0.87	0.87	0.36	0.38	0.57	0.32	1.00													
-0.26	0.15	0.34	-0.23	0.02	0.33	0.12	-0.37	-0.54	0.06	-0.53	0.53	-0.02	-0.21	0.73	0.23	0.58	1.00												
-0.65	-0.87	0.54	-0.65	-0.90	-0.19	-0.78	-0.56	-0.27	-0.64	-0.20	0.20	0.67	0.83	-0.72	0.19	0.08	-0.33	1.00											
0.09	-0.22	-0.21	0.41	-0.08	-0.54	0.45	0.47	-0.39	0.76	0.91	-0.91	-0.31	-0.22	-0.29	0.27	-0.70	-0.28	-0.07	1.00										
0.44	0.60	-0.20	0.44	0.79	0.17	0.24	-0.03	0.31	0.34	-0.26	0.26	-0.49	-0.34	0.93	-0.07	0.49	0.44	-0.77	-0.32	1.00									
-0.41	-0.15	0.47	-0.37	-0.23	0.17	-0.18	-0.62	-0.61	-0.15	-0.62	0.62	0.10	0.11	0.58	0.22	0.65	0.94	-0.03	-0.32	0.25	1.00								
0.65	0.76	-0.46	0.62	0.91	0.11	0.45	0.22	0.39	0.43	-0.08	0.08	-0.68	-0.54	0.88	-0.27	0.23	0.39	-0.91	-0.20	0.95	0.16	1.00							
0.71	0.00	-0.70	0.73	0.38	-0.71	-0.08	0.30	0.65	0.16	0.54	-0.54	-0.59	0.16	-0.25	-0.55	-0.51	-0.76	-0.04	0.30	0.00	-0.72	0.10	1.00						
-0.61	-0.54	0.42	-0.72	-0.83	0.11	-0.45	-0.37	-0.39	-0.71	-0.33	0.33	0.61	0.43	-0.59	0.00	0.00	0.06	0.77	-0.20	-0.79	0.28	-0.80	-0.40	1.00					
0.96	0.59	-0.94	0.79	0.77	-0.29	0.24	0.47	0.84	0.06	0.23	-0.23	-0.77	-0.29	0.16	-0.89	-0.38	-0.33	-0.49	-0.11	0.34	-0.43	0.54	0.71	-0.43	1.00				
0.20	0.17	-0.05	0.44	0.45	-0.12	0.32	0.25	0.07	0.76	0.45	-0.45	-0.26	-0.23	0.31	0.44	0.00	-0.18	-0.45	0.43	0.51	-0.34	0.43	0.29	-0.86	0.00	1.00			

Expected EPA sign + - + category based dataset – E dimension

1.00																													
0.46	1.00																												
0.59	0.50	1.00																											
0.80	0.00	0.63	1.00																										
-0.30	-0.55	0.00	0.27	1.00																									
0.61	0.56	0.62	0.59	0.23	1.00																								
-0.62	0.00	0.00	-0.43	0.32	-0.25	1.00																							
0.61	0.82	0.55	0.14	-0.80	0.23	-0.16	1.00																						
-0.23	0.00	-0.59	-0.30	0.11	-0.12	0.34	-0.22	1.00																					
0.12	0.86	0.38	-0.19	-0.31	0.36	0.50	0.63	0.28	1.00																				
0.82	0.67	0.84	0.59	-0.43	0.49	-0.19	0.86	-0.37	0.48	1.00																			
-0.14	0.55	0.55	-0.27	-0.20	0.23	0.32	0.40	-0.54	0.52	0.31	1.00																		
0.51	0.00	-0.15	0.52	0.22	0.42	-0.34	-0.11	0.59	-0.06	0.07	-0.76	1.00																	
0.69	0.82	0.82	0.41	-0.45	0.51	0.00	0.89	-0.24	0.70	0.96	0.45	0.00	1.00																
0.17	0.07	0.58	0.37	0.13	-0.02	0.55	0.29	-0.07	0.35	0.53	0.13	-0.10	0.54	1.00															
0.66	0.61	0.24	0.30	-0.49	0.25	-0.07	0.71	0.41	0.58	0.67	-0.22	0.53	0.70	0.36	1.00														
-0.36	0.35	-0.35	-0.53	0.00	0.00	0.61	0.00	0.84	0.67	-0.24	0.00	0.21	0.00	0.00	0.34	1.00													
0.82	0.12	0.24	0.72	-0.09	0.57	-0.90	0.18	-0.24	-0.32	0.38	-0.35	0.59	0.20	-0.33	0.25	-0.51	1.00												
0.16	0.43	0.00	-0.11	-0.16	0.55	-0.50	0.08	-0.17	0.08	-0.05	0.32	0.04	0.00	-0.78	-0.18	0.00	0.45	1.00											
0.71	0.58	0.87	0.58	-0.32	0.40	0.00	0.79	-0.34	0.50	0.97	0.32	0.00	0.94	0.72	0.63	-0.20	0.21	-0.25	1.00										
0.69	0.59	0.89	0.59	-0.11	0.78	-0.34	0.54	-0.65	0.28	0.77	0.54	-0.06	0.73	0.16	0.17	-0.42	0.52	0.43	0.69	1.00									
0.18	-0.43	0.00	0.22	-0.32	-0.61	-0.25	0.16	-0.34	-0.50	0.19	-0.32	-0.17	0.00	0.34	0.07	-0.61	0.07	-0.63	0.25	-0.17	1.00								
0.82	0.00	0.55	0.82	-0.20	0.23	-0.63	0.40	-0.54	-0.31	0.68	-0.20	0.22	0.45	0.29	0.31	-0.77	0.70	-0.16	0.63	0.54	0.63	1.00							
0.46	0.18	0.71	0.71	0.39	0.48	0.31	0.19	0.00	0.34	0.59	0.00	0.32	0.58	0.83	0.43	0.00	0.08	-0.46	0.71	0.42	0.00	0.39	1.00						
-0.29	0.18	0.00	-0.55	-0.54	-0.31	-0.11	0.27	-0.59	0.00	-0.04	0.67	-0.84	0.00	-0.34	-0.42	-0.26	-0.24	0.37	-0.11	0.15	0.11	-0.13	-0.65	1.00					
0.53	0.43	0.87	0.43	-0.32	0.36	-0.25	0.63	-0.86	0.17	0.78	0.63	-0.43	0.71	0.34	0.07	-0.61	0.28	0.13	0.75	0.86	0.25	0.63	0.31	0.43	1.00				
-0.55	0.00	-0.71	-0.71	0.00	-0.09	0.00	-0.39	0.42	0.00	-0.71	0.00	0.00	-0.58	-0.83	-0.34	0.50	-0.17	0.61	-0.82	-0.42	-0.61	-0.77	-0.75	0.26	-0.61	1.00			

Expected EPA sign + - + category based dataset – P dimension

1.00																													
0.40	1.00																												
0.32	0.48	1.00																											
0.53	0.88	0.24	1.00																										
0.45	0.63	-0.02	0.92	1.00																									
0.29	0.39	-0.29	0.75	0.92	1.00																								
0.44	0.61	-0.10	0.79	0.79	0.85	1.00																							
0.64	0.46	-0.30	0.76	0.84	0.84	0.83	1.00																						
0.69	0.39	0.28	0.63	0.68	0.43	0.21	0.55	1.00																					
0.10	0.01	0.19	0.33	0.54	0.47	0.05	0.16	0.67	1.00																				
0.29	0.62	-0.12	0.88	0.96	0.96	0.88	0.82	0.45	0.41	1.00																			
0.04	0.53	-0.25	0.72	0.79	0.89	0.90	0.68	0.08	0.18	0.93	1.00																		
0.37	0.19	0.84	-0.09	-0.36	-0.65	-0.44	-0.43	0.23	-0.08	-0.52	-0.68	1.00																	
0.17	0.21	-0.21	0.54	0.71	0.59	0.18	0.53	0.77	0.71	0.58	0.32	-0.30	1.00																
0.20	0.18	0.09	0.50	0.68	0.78	0.62	0.43	0.32	0.68	0.71	0.66	-0.37	0.31	1.00															
0.63	0.68	0.25	0.61	0.41	0.36	0.79	0.57	0.07	-0.37	0.47	0.49	0.08	-0.27	0.22	1.00														
-0.23	0.35	-0.35	0.44	0.49	0.68	0.77	0.43	-0.32	-0.09	0.71	0.92	-0.74	0.00	0.50	0.44	1.00													
-0.05	-0.34	0.27	-0.66	-0.84	-0.78	-0.42	-0.60	-0.61	-0.67	-0.78	-0.62	0.51	-0.93	-0.49	0.12	-0.35	1.00												
-0.43	0.18	-0.44	-0.06	-0.19	-0.10	0.15	0.00	-0.63	-0.78	0.00	0.26	-0.37	-0.31	-0.50	0.22	0.50	0.14	1.00											
-0.07	-0.57	0.21	-0.73	-0.77	-0.63	-0.42	-0.59	-0.54	-0.36	-0.73	-0.59	0.38	-0.84	-0.17	-0.04	-0.34	0.90	-0.17	1.00										
0.14	0.78	0.66	0.71	0.55	0.39	0.50	0.14	0.25	0.36	0.57	0.53	0.18	0.10	0.56	0.44	0.40	-0.29	-0.16	-0.30	1.00									
0.71	-0.06	0.39	-0.16	-0.31	-0.43	-0.16	0.00	0.20	-0.31	-0.45	-0.58	0.70	-0.39	-0.32	0.35	-0.63	0.61	-0.32	0.54	-0.25	1.00								
0.08	0.63	0.57	0.68	0.63	0.49	0.43	0.15	0.39	0.63	0.62	0.53	0.06	0.32	0.70	0.21	0.35	-0.49	-0.35	-0.39	0.95	-0.39	1.00							
0.25	0.81	0.31	0.91	0.85	0.75	0.78	0.54	0.40	0.41	0.88	0.82	-0.18	0.38	0.69	0.52	0.63	-0.61	-0.06	-0.60	0.89	-0.40	0.88	1.00						
-0.09	-0.46	-0.34	-0.64	-0.70	-0.51	-0.20	-0.24	-0.70	-0.86	-0.59	-0.36	0.00	-0.76	-0.55	0.15	-0.07	0.79	0.49	0.67	-0.65	0.44	-0.83	-0.69	1.00					
0.29	0.54	-0.08	0.84	0.95	0.97	0.87	0.77	0.44	0.50	0.98	0.91	-0.51	0.54	0.82	0.43	0.70	-0.75	-0.13	-0.63	0.60	-0.44	0.68	0.89	-0.61	1.00				
0.10	0.62	-0.25	0.71	0.69	0.55	0.43	0.61	0.45	0.13	0.67	0.56	-0.35	0.72	0.00	0.16	0.35	-0.78	0.35	-0.97	0.23	-0.45	0.25	0.53	-0.49	0.54	1.00			

Expected EPA sign + - + category based dataset – A dimension

1.00																								
-0.28	1.00																							
0.46	-0.89	1.00																						
0.17	0.78	-0.53	1.00																					
0.12	0.42	-0.19	0.84	1.00																				
0.07	0.17	0.19	0.55	0.79	1.00																			
-0.34	0.20	-0.45	0.12	0.08	-0.42	1.00																		
0.49	0.39	0.00	0.81	0.80	0.80	-0.39	1.00																	
0.46	0.40	-0.45	0.60	0.42	-0.08	0.20	0.39	1.00																
-0.32	0.44	-0.63	-0.15	-0.58	-0.65	0.03	-0.45	0.13	1.00															
-0.38	0.12	0.14	-0.04	-0.03	0.43	-0.31	0.12	-0.80	-0.10	1.00														
-0.02	0.45	-0.33	0.80	0.93	0.56	0.45	0.58	0.45	-0.52	-0.14	1.00													
-0.50	0.38	-0.24	0.42	0.63	0.77	-0.22	0.42	-0.11	-0.22	0.37	0.49	1.00												
-0.28	0.28	-0.47	0.42	0.55	0.03	0.77	0.00	0.49	-0.21	-0.49	0.78	0.27	1.00											
0.08	0.16	0.00	0.09	-0.13	-0.13	0.32	0.00	-0.32	-0.04	0.49	0.00	-0.43	-0.22	1.00										
0.26	0.39	0.00	0.69	0.64	0.64	0.00	0.75	0.00	-0.50	0.48	0.58	0.21	0.00	0.61	1.00									
-0.12	0.77	-0.58	0.46	0.00	0.00	0.00	0.25	0.00	0.50	0.48	0.00	0.00	-0.27	0.61	0.50	1.00								
0.61	-0.22	0.24	-0.32	-0.63	-0.50	-0.43	-0.11	0.11	0.43	-0.17	-0.73	-0.74	-0.72	0.17	-0.21	0.21	1.00							
-0.24	-0.55	0.41	-0.49	-0.23	-0.23	0.55	-0.53	-0.55	-0.42	0.17	0.00	-0.30	0.19	0.43	0.00	-0.35	-0.30	1.00						
-0.06	-0.80	0.45	-0.84	-0.58	-0.58	0.20	-0.77	-0.20	-0.03	-0.43	-0.45	-0.43	0.07	-0.32	-0.77	-0.77	0.11	0.55	1.00					
-0.04	0.40	0.00	0.60	0.66	0.91	-0.40	0.77	-0.20	-0.41	0.68	0.45	0.71	-0.14	0.16	0.77	0.39	-0.38	-0.27	-0.80	1.00				
0.60	0.47	-0.16	0.61	0.24	0.15	-0.15	0.63	0.36	0.05	0.11	0.16	-0.28	-0.28	0.57	0.70	0.70	0.45	-0.40	-0.73	0.36	1.00			
0.10	0.20	0.00	-0.06	-0.42	-0.17	-0.20	0.00	-0.40	0.33	0.61	-0.45	-0.38	-0.70	0.79	0.39	0.77	0.54	0.00	-0.40	0.20	0.62	1.00		
0.26	0.39	0.00	0.46	0.32	0.64	-0.77	0.75	0.00	0.00	0.48	0.00	0.42	-0.54	0.00	0.50	0.50	0.21	-0.71	-0.77	0.77	0.56	0.39	1.00	
-0.46	-0.40	0.45	-0.60	-0.42	0.08	-0.20	-0.39	-1.00	-0.13	0.80	-0.45	0.11	-0.49	0.32	0.00	0.00	-0.11	0.55	0.20	0.20	-0.36	0.40	0.00	1.00
0.18	0.59	-0.22	0.87	0.85	0.85	-0.29	0.94	0.29	-0.34	0.27	0.65	0.64	0.10	0.00	0.76	0.38	-0.32	-0.53	-0.88	0.88	0.53	0.00	0.76	-0.29
0.27	0.00	0.22	0.52	0.85	0.85	-0.29	0.76	0.29	-0.71	-0.09	0.65	0.64	0.31	-0.46	0.38	-0.38	-0.48	-0.27	-0.29	0.59	0.00	-0.59	0.38	-0.29