

# Exploring the Noosphere: Uniting Minds, Shaping Futures

## Initial Report from the Science of the Noosphere Masterclass Research Study

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# Introduction

The Science of the Noosphere (SON) masterclass, a collaboration between [Human Energy](#) and [ProSocial World](#), aimed to unite a diverse group of participants interested in exploring the concept of the noosphere<sup>1</sup>—a collective sphere of human knowledge, culture, and potential. The main learning objective of the course included the co-development of a worldview that can lead to worldwide cooperation. Human Energy is a nonprofit organization whose purpose is to advance scientific research about the future of human collective consciousness. ProSocial World is a non-profit research organization whose purpose is to consciously evolve a world that works for all. Over the course of 10 weeks, the class delved into 25 video conversations featuring experts discussing scientific concepts related to the noosphere, as originally conceived by Pierre Teilhard de Chardin, Vladimir Vernadsky, and Eduard Suess in the early 1900s. With many of the experts serving as guest speakers, peer interaction and engagement were integral to the class experience, leading to the emergence of self-organized interest groups. Furthermore, the masterclass served as a unique laboratory for studying how minds can change within the context of collaborative learning, emphasizing research conducted with participants rather than on them.

Two groups were established to facilitate the co-development of the class: the coordination team and the research advisory team. Each of these project teams comprised members from both Human Energy (HE) and ProSocial World (PW), along with external consultants from Missouri State University (MSU). Details regarding the individuals and their respective roles in the masterclass are provided in Table A.1 and A.2. in the Appendix.

Our research analysis was guided by two prominent theories: Dual Inheritance Theory (DIT) and Relational Frame Theory (RFT). DIT posits the existence of two streams of inheritance - genetic and cultural - and emphasizes the importance of symbolic thought in shaping cultural evolution. By examining DIT at the micro-scale of individual interactions, our study introduces the concept of "symbotype" to better understand how symbolic systems influence behavior. Conversely, RFT offers insights into the formation of cognitive connections through derived relational responding and transformation of stimulus function. We integrate RFT into our research methodology to illuminate the development and evolution of symbotypes, enhancing our understanding of individual and collective behaviors within the context of the Masterclass.

## Guiding Theories

### ***Dual Inheritance Theory***

Dual Inheritance Theory (DIT) identifies two streams of inheritance in our species; the genetic stream found in all species and a cultural stream based on our capacity for symbolic thought. Thinking of our symbolic systems as the cultural equivalent of our genes provides a novel perspective that complements other perspectives on symbolic systems in the humanities, social sciences, and applied behavioral sciences.

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<sup>1</sup> The word "Noosphere" descends from the Greek word "noos," covering "mind" and "spirit" and is used to describe a sphere of being, like the geosphere and biosphere.

To date, DIT has been studied primarily at a macro scale of entire cultures and long time periods. One of our contributions is to study DIT at the micro scale of individuals interacting with each other and their environments. For this purpose, the term "symbotype" has been coined, referring to an individual's symbolic system and stressing the comparison with the individual's genotype and phenotype.

The Masterclass focuses on the particular symbotype of Teilhard de Chardin, which is a synthesis of science and spirituality and maps closely onto the modern concept of major evolutionary transitions. In addition, the Masterclass is an experiment in symbotype evolution of the participants, measured by a battery of assessment tools and natural language analysis.

### ***Relational Frame Theory***

Relational Frame Theory (RFT) is a behavioral theory of human language and cognition that explains how we form relations between stimuli, specifically through processes known as derived relational responding and transformation of stimulus function. Derived relational responding can occur through the process of mutual and combinatorial entailment. For example, two stimuli become mutually entailed when Stimulus A is directly trained to Stimulus B ( $A=B$ ) resulting in a novel bidirectional relationship between the stimuli which is that Stimulus B is now also the same as Stimulus A ( $B=A$ ). Combinatorial entailment occurs when a third stimulus is introduced, for example, Stimulus C. Now, if Stimulus B is taught to be the same as Stimulus C, an individual should be able to relate Stimulus C to Stimulus A without ever being explicitly taught this. A transformation of stimulus function occurs when the functions of one stimulus alter the functions of another stimulus as aligned with the derived relation between the two.

Essentially, RFT suggests that our thought is made up of complex networks of stimuli that are acquired through both direct and indirect experiences, and the way that we frame these stimuli are context dependent.

RFT aligns well with Dual Inheritance Theory and can be useful for providing insight into how a symbotype is developed and might change. Specifically, RFT can provide theory on how our symbotypes affect our interpretation of the world and further guide our actions.

In practical application, RFT underpins the therapeutic approach Acceptance and Commitment Therapy. In the SON Masterclass research program, we incorporated RFT as one of our guiding theories to enhance our research methodologies, so that we could both capture and understand individual and collective symbotypes better.

# Building the Class

## Content and Materials

The class curriculum comprised [25 video conversations](#) previously produced by Human Energy for the series *The Science of the Noosphere*. These videos were organized weekly based on thematic similarities. Each video featured moderator David Sloan Wilson, the principal investigator of this project, engaging in discussions with experts in the respective topic areas. All conversation partners were invited to participate as panelists in the Masterclass. Those who were not currently affiliated with Human Energy received an honorarium for their involvement. Additionally, two articles were assigned for reading: Teilhard de Chardin's seminal work (1959) on the formation of the Noosphere and Wilson's (2021) exploration of Teilhard de Chardin's ideas in the context of modern evolutionary science. A detailed syllabus outline, including the order of video conversations and the panelists in attendance, is provided in Table A.3. in the Appendix.

The class consisted of twice-weekly sessions conducted remotely on Zoom, each lasting 90 minutes with an additional 30 minutes allotted for overflow interest. Sessions were held every Tuesday and Thursday from July 11th to September 14th. Tuesday sessions featured panel discussions with select conversation partners from the weekly video assignments. Each panelist shared their perspectives on the designated topic, followed by an opportunity for other panelists to respond. Breakout sessions allowed participants, and conversation partners, to discuss their perspectives on the materials in small groups. Thursday sessions served various purposes, including elaborating on weekly materials, introducing the scientific research program, and facilitating the formation of small groups.

Hylo, a free and open-source platform designed for group collaboration, facilitated interaction among class members. Individuals have to either request to join a group or be invited by administrators. Hylo allowed members to create and comment on posts, specifying purposes such as discussions, projects, events, requests, offers, or resources. Other features included detailed member directories, direct messaging, and the ability to create and link subgroup pages. The recurring Zoom meeting link was posted and pinned on the Hylo page. All sessions were recorded and shared on Hylo weekly, along with a copy of the Zoom chat record.

A collaborative visual platform, Mural, was utilized for brainstorming and idea mapping. An open Mural board was created for the group, with the link pinned on Hylo for easy access by members.

Furthermore, a dedicated Zoom meeting room was set up for the duration of the course, accessible at any time without the presence of a host. This room served as an open space for remote group meetings outside of class hours. A calendar system prevented scheduling conflicts by allowing members or subgroups to book time slots. All sessions using the open

Zoom link were automatically recorded. Participants were asked for consent regarding the use of their recordings for research purposes.

## Recruitment and Onboarding

An overview of the 10-week Masterclass was posted on the Human Energy website one month before the scheduled start date. While the class was free, applicants were informed of the significant time commitment required. The overview, detailed in the Appendix, includes a link to the application form. Although the original plan was to accept only 100 individuals, all applicants were ultimately accepted without specific criteria for participation.

Applicants were onboarded in two phases. Nineteen days before the class began, all applicants were notified of their acceptance via email, welcoming them to the class and sharing a word cloud generated from participants' responses to the "I am..." question on the application. A week later, another email was sent with instructions on joining the Hylo platform, accompanied by a video tutorial. Hylo participation was tracked, and individuals who did not join were contacted for confirmation of their participation. A welcome message was pinned atop the platform feed, encouraging participants to introduce themselves on Hylo.

## Building the Research Program

As outlined earlier in this report, the Masterclass was structured to include an optional research component approved by an institutional review board (IRB). It's essential to emphasize that participation in the class did not require involvement in the research aspect.

## Methods

Various psychometric scales and tools were chosen to assess participants before and after the class (i.e., pre-test and post-test measures). These surveys, listed below and detailed in Table A.5. in the Appendix, encompass different aspects of well-being, connectedness, and psychological flexibility.

1. Meaning in Life Questionnaire (MLQ), developed by Steger et al. (2006), gauges the presence of meaning in life and the search for meaning through two subscales. Participants rate each of the 10 items on a seven-point Likert scale, with higher scores indicating a greater sense of meaning.
2. "Psy-Flex" survey, introduced by Gloster et al. (2021), assesses psychological flexibility by assessing six skills that are considered integral to the construct. The six skills include being present, being open to experiences, leaving thoughts be, having a steady self, awareness of one's own values, and being engaged. The survey was developed to be context-sensitive. Participants rate each of the six items on a five-point Likert scale, with higher scores indicating greater psychological flexibility.

3. Social Connectedness Scale – Revised (SCS-R), developed by Lee et al. (2001), measures social connectedness with 20 items rated on a six-point Likert scale. Higher scores indicate stronger social connectedness.
4. Connectedness to Nature Scale (CNS), developed by Mayer & Frantz (2004), evaluates participants' feelings of connectedness to the natural world with 14 items. Higher scores reflect stronger connectedness to nature.
5. Flourishing Scale (FS), created by Diener et al. (2010), measures psychological well-being with eight items. Participants rate each item on a seven-point Likert scale, with higher scores indicating higher psychological well-being.
6. Individualism and Collectivism Scale (Reduced; Sivadas et al., 2008) assesses horizontal and vertical dimensions of individualism and collectivism, reflecting preferences for independence or interdependence. Individualism places value on independence and personal preferences, while collectivism emphasizes interdependence and group values. Horizontal and vertical dimensions are a further aspect of both cultural orientations, where horizontal refers to preferences for equality, and vertical refers to preferences for hierarchy.

The Process Based Assessment Tool (PBAT; Ciarrochi et al., 2021) assesses biopsychosocial processes of change (i.e., targets) that lead to related outcomes of behavior change. The tool was originally developed for a clinical population and was adapted by the research team to be relevant to this context. Process targets include affect, cognition, attention, social connection, motivation, overt behavior, health, variation, and retention (see Table 1). The selected outcome variables/questions are listed below:

1. How much do you feel that you are connected with other people?
2. How much do you feel that you are connected with nature?
3. How much vitality do you feel?
4. How much distress do you feel?
5. How much do you feel that your life is meaningful?
6. How much do you feel that life has no clear purpose?
7. How hopeful do you feel?
8. How resigned do you feel?

Using an application called ExpiWell, participants were asked to complete this survey once a day for eight weeks. Participants were notified each day at 5:00 PM in their personal time zone. The survey then remained open until 11:59 PM. The data collected from this can be analyzed using a network analysis to display how these processes interlock with other processes and outcomes. In addition, there's been a call for greater use of idiographic approaches in behavioral science research. Previous research has suggested using a Group Iterative Multiple Model Estimation (GIMMIE) approach in response to this call, specifically with use of the PBAT (Sanford et al., 2022). The GIMMIE identifies relationships present in individual longitudinal networks and in an iterative fashion seeks out pathways applicable at the sub-group and group level, only retaining them if they improve fit at the individual level. This could potentially help identify clusters of individuals with similar inner behavior or processes that can then predict outcomes of interest.

**Table 1. Process Targets and Associated Responses**

| <b>Process Target</b>                                      | <b>Negative Items</b>  | <b>Positive Items</b>  |
|--|--|--|
| <b>Affect</b>  | I did not find an appropriate outlet for my emotions                       | I was able to experience a range of emotions appropriate to the moment |
| <b>Cognitive processes including those related to self</b> | My thinking got in the way of things that were important to me             | I used my thinking in ways that helped me live better                  |
| <b>Attention</b>   | I struggled to connect with the moments in my day-to-day life              | I paid attention to important things in my daily life                  |
| <b>Social/Connection</b>                                   | I did things that hurt my connection with people who are important to me   | I did things to connect with people who are important to me            |
| <b>Motivation/Autonomy</b>                                 | I did things only because I was complying with what others wanted me to do | I chose to do things that were personally important to me              |
| <b>Overt Behavior/Competence</b>                           | I did not find a meaningful way to challenge myself                        | I found personally important ways to challenge myself                  |
| <b>Health</b>  | I acted in ways that hurt my physical health                               | I acted in ways that helped my physical health                         |
| <b>Variation</b>   | I felt stuck and unable to change my ineffective behavior                  | I was able to change my behavior, when changing helped my life         |
| <b>Retention</b>   | I struggled to keep doing something that was good for me                   | I stuck to strategies that seemed to have worked                       |

In addition to structured instruments, we collected natural language data from participants' open-ended reflections, Zoom transcripts, and Hylo activity. This holistic approach provides deeper insights into participant experiences and interactions.

Multidimensional scaling (MDS) is an analytical tool that utilizes proximity data to generate a spatial representation, allowing us to explore and understand how participants perceive and relate to various stimuli. Proximity data can be gathered through methods such as similarity ratings, ranking, or sorting. The goal of MDS is to represent this data within a reduced number of dimensions while maintaining the relative proximities between each data point. This method provides a dynamic visual representation, offering insights into the psychological perspectives of the participants.

Stimuli for the procedure were selected from a paper by Koltoko-Rivera in 2004, which highlights several worldview domains, listed below, and adapted.

Worldview domains (Koltoko-Rivera 2004):

- Worth of Life (Optimistic, Resigned)
- Complexity (Complex, Simple)
- Connection (Dependent, Independent, Interdependent)
- Interaction (Competitive, Cooperative, Disengaged)
- Relation to Group (individualism, Collectivism)
- Relation to the biosphere (Anthropocentrism, Vivicentrism)

The research advisory team identified domains relevant to the noosphere and class content and adapted them into concise statements. These 14 statements, listed below, cover various aspects such as the worth of life, the complexity of human nature, social connections, interactions, and attitudes toward groups and the biosphere.

1. Life is worthwhile
2. Life is inevitably headed for deterioration
3. Human nature is complex
4. Human nature is simple
5. People conform to the group
6. People act independently
7. People act in the context of group and individual needs
8. Human nature is competitive
9. Human nature is cooperative
10. Human nature is disengaged
11. The individual is prioritized over the group
12. The group is prioritized over the individual
13. Humans are prioritized over nonhuman species
14. Human and nonhuman species are equally prioritized

Additionally, three stimuli were included to gauge how participants perceive their own worldview and society: "My Worldview," "Society Today," and "Society 100 years from today." Hence, a total of 17 items were incorporated into the MDS procedure.

Participants were then presented with pairwise combinations of the 17 stimuli and asked to rate the relatedness of each on a scale from 1 to 10. This procedure allowed for 272 possible pairwise combinations; however, each participant received approximately 50% of the total items mitigating response fatigue. The final segment involved assessing the valence of each item included in the analysis. Participants were presented with all 17 stimuli and instructed to rate how each stimulus made them feel using emoticons, ranging from ":)" to ":(" . The MDS procedure was conducted at both pre-test and post-test stages.

In addition to utilizing structured instruments, we collected natural language data to delve into the evolution of participant language in its unfiltered form, within the authentic contexts of their responses. Each week, denoted as "X" (e.g., 1, 2, 3), we solicited open-ended reflections from participants, asking: "What are your most significant insights from Week X's material and discussions?" Additionally, we requested participants to rate the level of their "understanding" and "relevance" of the week's material and discussions on a scale of 1 to 5.

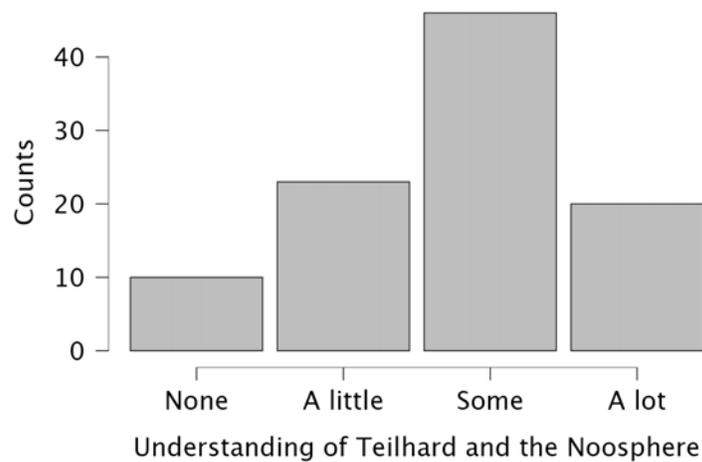


age from 23 to above 80. The majority of the participants resided in the United States (61%), while 19 other countries were represented including Canada (7%), the United Kingdom (5%), and Belgium (4%).

In terms of familiarity with Teilhard and the concept of the noosphere, most participants reported having "some" or more than "some" understanding. Similarly, the majority indicated having "some" or more than "some" understanding of evolutionary theory. For a visual representation of this distribution, please see Figure 2 and Figure 3.

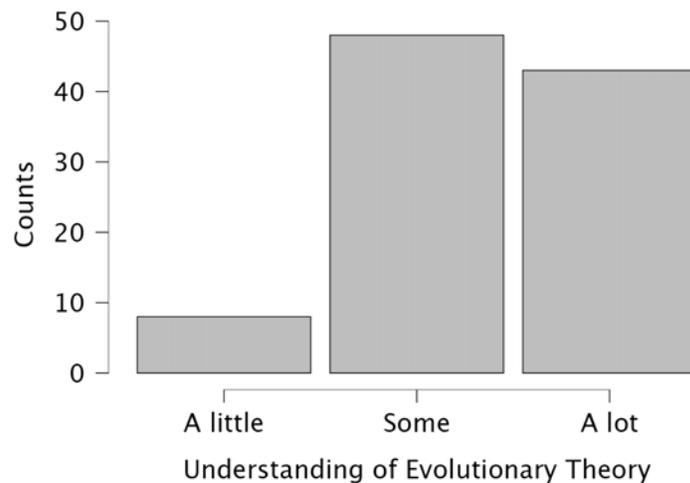
**Figure 2.**

*Distribution of participant understanding of Teilhard and the concept of the noosphere.*



**Figure 3.**

*Distribution of participant understanding of evolutionary theory.*



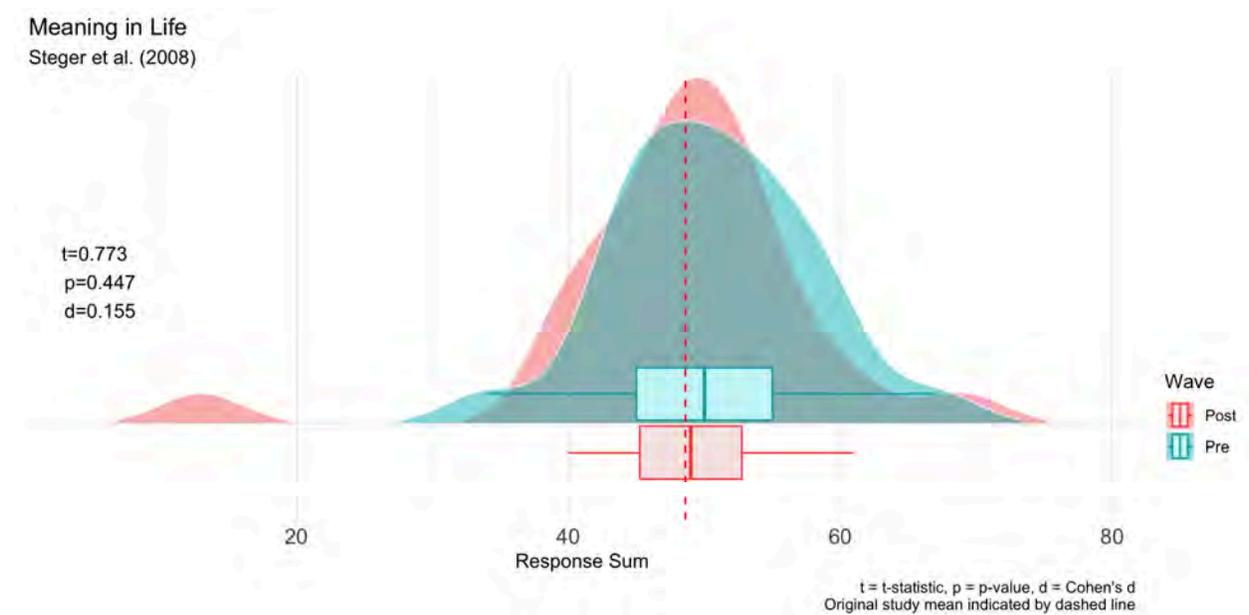
# Psychometric Data

Changes in psychometric pretest and posttest scores were analyzed using a paired t-test. The analysis was based on participants who completed both pretest and posttest surveys, thus encompassing 26 individuals.

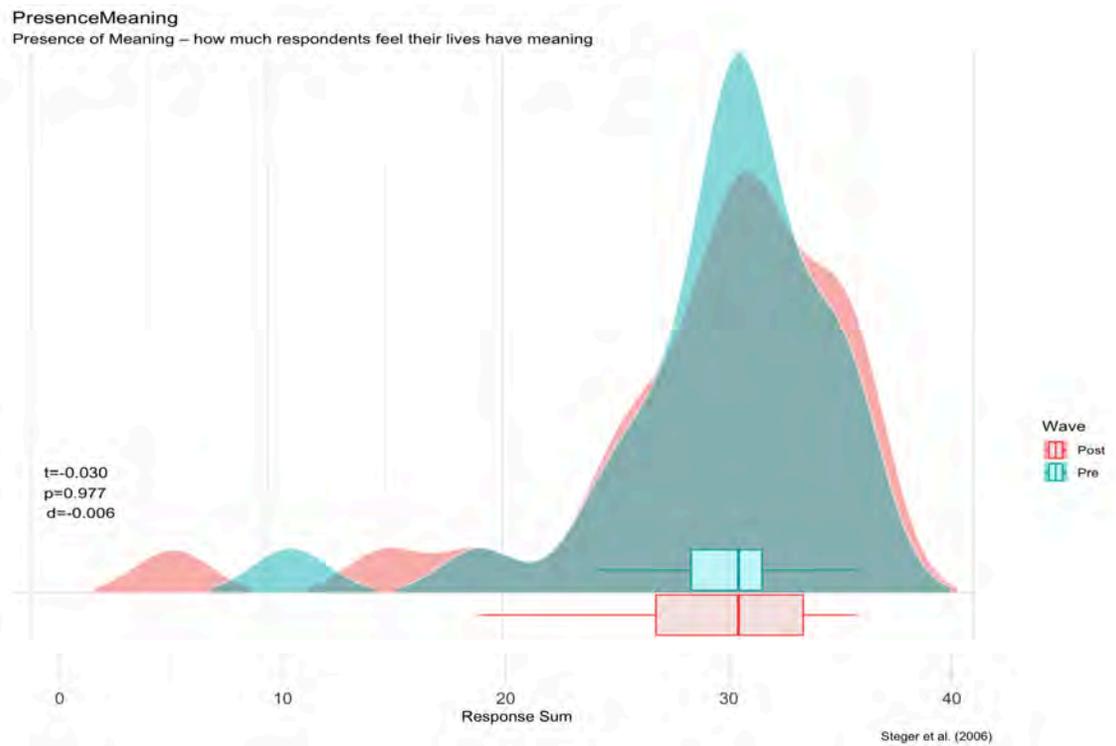
## Meaning in Life Questionnaire

Initially, at the pretest stage, the mean total score on the MLQ was 50.6 (SD=7.15). By the posttest, this mean score shifted slightly to 48.3 (SD=9.82), indicating a modest decrease in both experienced meaning in life and the search for meaning. However, no significant differences were observed between pretest and posttest scores ( $t = 0.773$ ,  $p = 0.447$ ), with a small effect size (Cohen's  $d = 0.155$ ). Figures 4, 5, and 6 visually represent these results, illustrating the change in scores for the presence of meaning and search for meaning subscales.

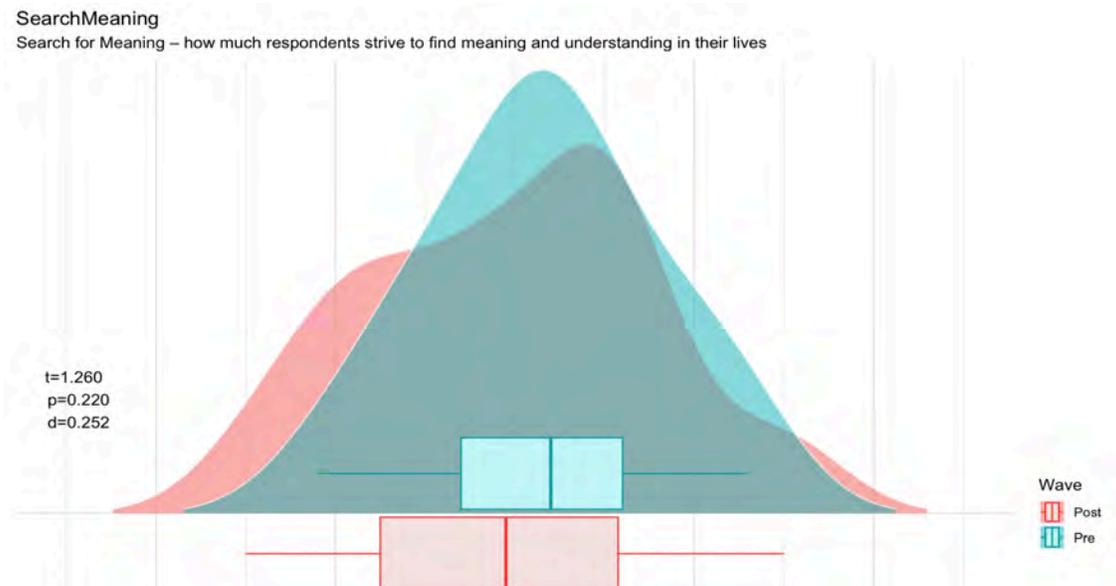
**Figure 4.**  
*Change scores for the Meaning of Life subscale of the MLQ*

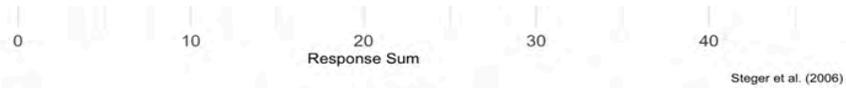


**Figure 5.**  
*Change scores for the Presence of Meaning subscale of the MLQ*



**Figure 6.**  
*Change scores for the Search for Meaning subscale of the MLQ*

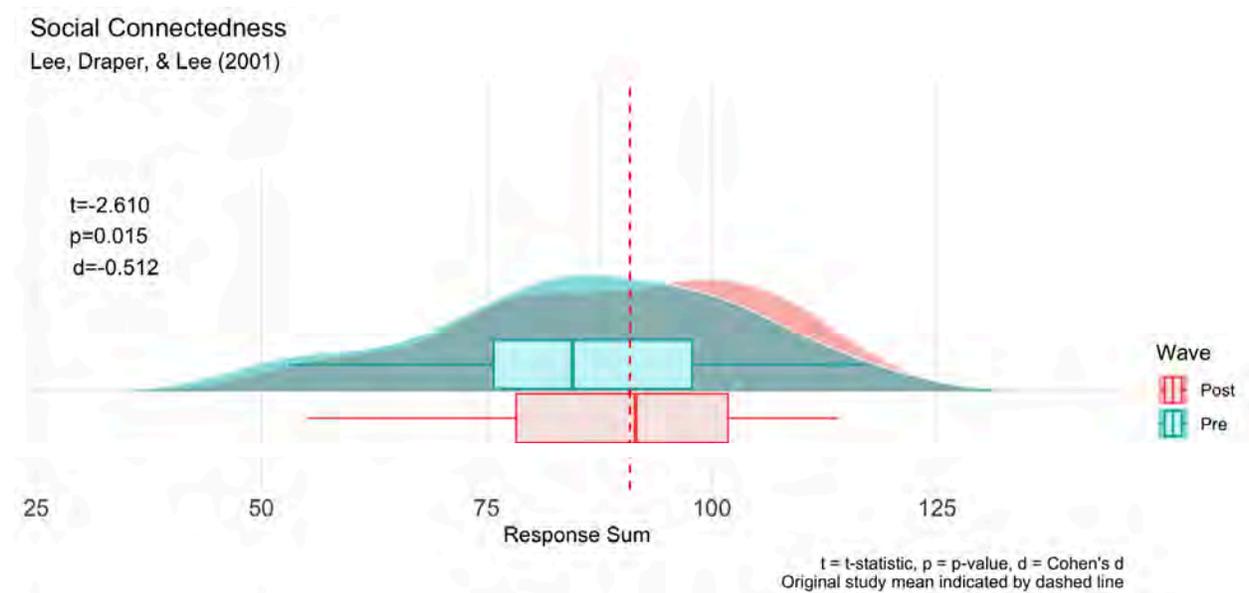




## Social Connectedness Scale-Revised

The pretest mean total score on the Social Connectedness Scale was 86 (SD=17.1), whereas, at the posttest, it increased to 89.2 (SD=16.5), indicating a notable enhancement in social connectedness. A significant difference was found between pretest and posttest scores ( $t=2.610$ ,  $p=0.015$ ), with a medium effect size (Cohen's  $d=0.512$ ). These findings are graphically depicted in Figure 7.

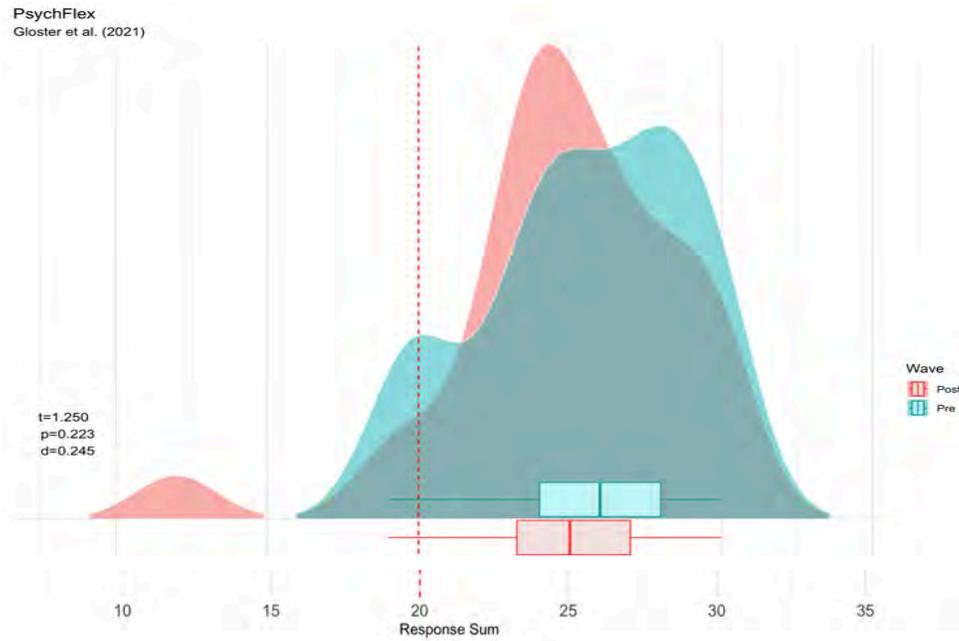
**Figure 7.**  
*Change scores for the Social Connectedness Scale.*



## Psychological Flexibility

Initially, at the pretest, the mean total score on the Psychological Flexibility measurement (“Psy-Flex”) was 25.5 (SD=3.40). However, by the posttest, it decreased to 24.8 (SD=3.93), suggesting a decline in psychological flexibility. Nevertheless, no significant differences were identified between pretest and posttest scores ( $t=1.250$ ,  $p=0.223$ ), with a small effect size (Cohen's  $d=0.245$ ). This can be seen in Figure 8.

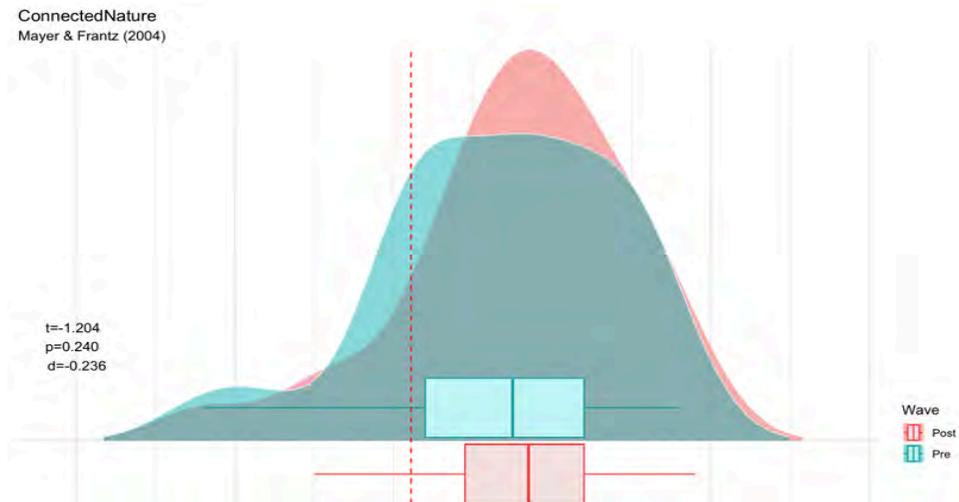
**Figure 8.**  
*Change scores for Psy-Flex.*



## Connectedness to Nature Scale

The pretest mean total score was 56.7 (SD=7.44), which rose to 57.8 (SD=7.11) at the posttest, indicating an increase in connectedness to nature. However, no significant differences were detected between pretest and posttest scores ( $p=0.240$ ), with a small effect size (Cohen's  $d=0.236$ ) (See Figure 9.)

**Figure 9.**  
*Change scores for the Connectedness to Nature Scale.*

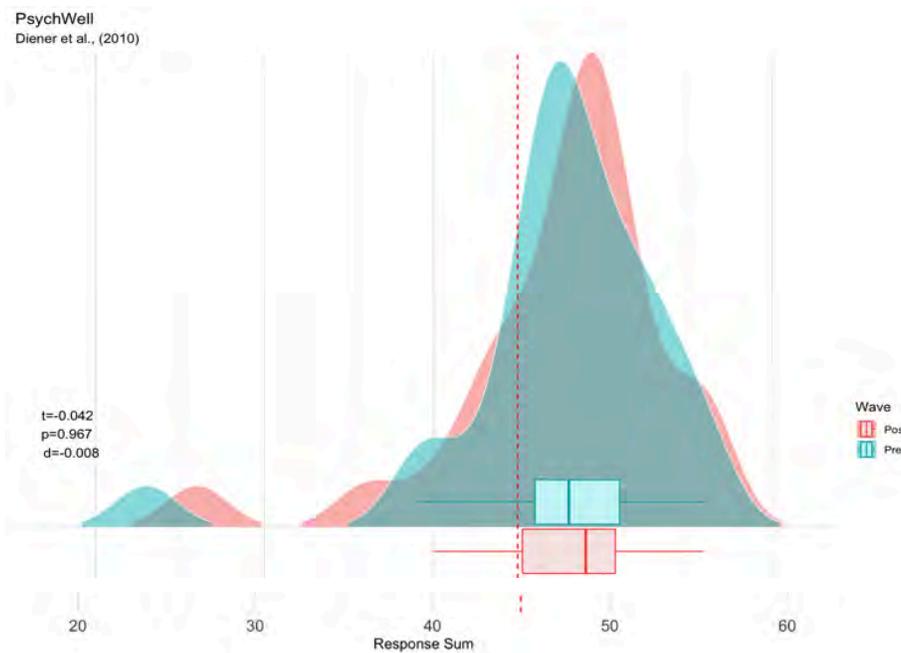




## Flourishing Scale

Initially, at the pretest, the mean total score on the Flourishing Scale was 47.5 (SD=6.54), which stayed at 47.5 (SD=6.44) at the posttest, suggesting no change in psychological well-being. No significant differences were observed between pretest and posttest scores ( $t=1.250$ ,  $p=0.223$ ), with a minimal effect size (Cohen's  $d=0.008$ ). Figure 10 illustrates these results.

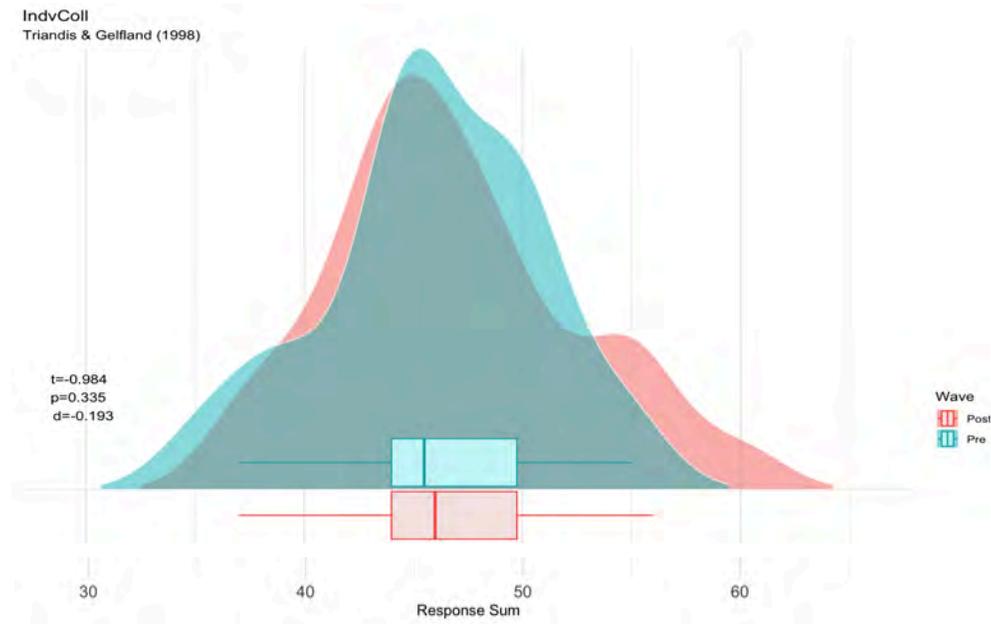
**Figure 10.**  
Change scores for the Flourishing Scale.



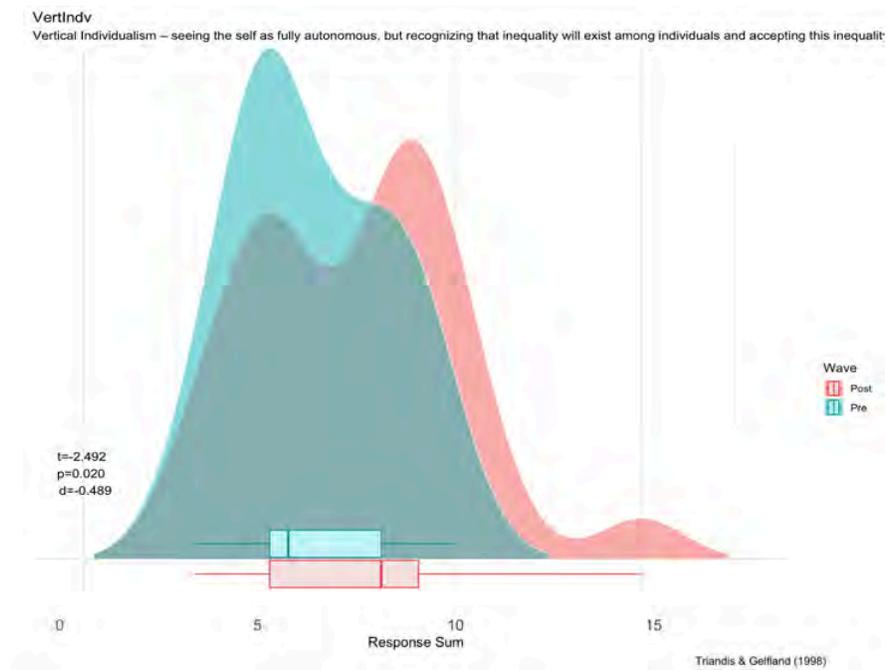
## Individualism and Collectivism Scale – Reduced

At the pretest stage, the mean score for the Individualism and Collectivism Scale was 45.9 (SD=4.94), whereas at the posttest, it remained consistent at 46.8 (SD=5.66) ( $t=-0.984$ ,  $p=0.335$ ), as depicted in Figure 12. Notably, on the vertical individualism subscale, the pretest mean score was 6.19 (SD=2.04), which increased to 7.35 (SD=2.83) at the posttest, signifying an escalation in vertical individualistic responding. This difference was statistically significant ( $t=-2.492$ ,  $p=0.020$ ), with a small to medium effect size (Cohen's  $d=-0.489$ ). Figures 12, 13, and 14 outline the results for the other three subscales: horizontal collectivism, horizontal individualism, and vertical collectivism, where no meaningful differences were observed between pretest and posttest scores.

**Figure 11.**  
*Change scores for the Individualism and Collectivism scale.*

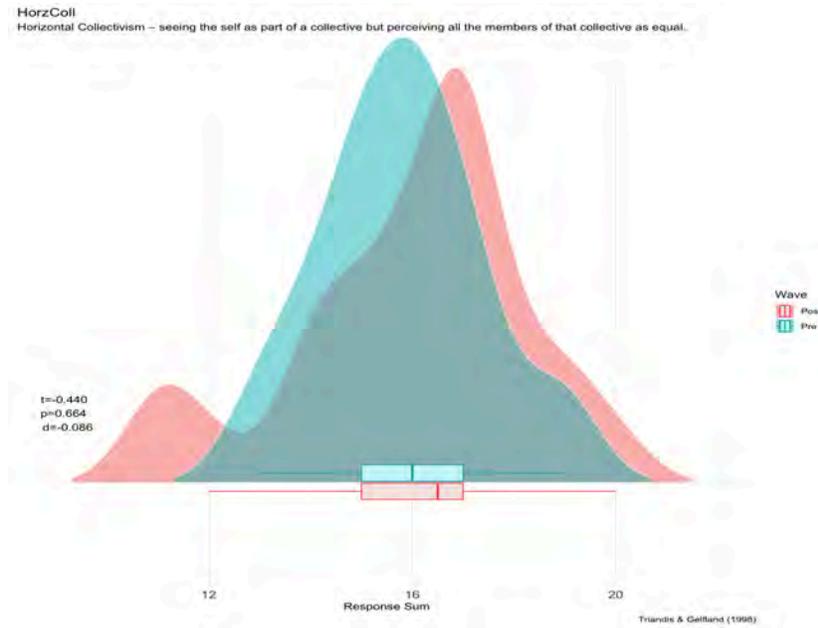


**Figure 12.**  
*Change scores for the vertical individualism subscale of the Individualism and Collectivism scale.*



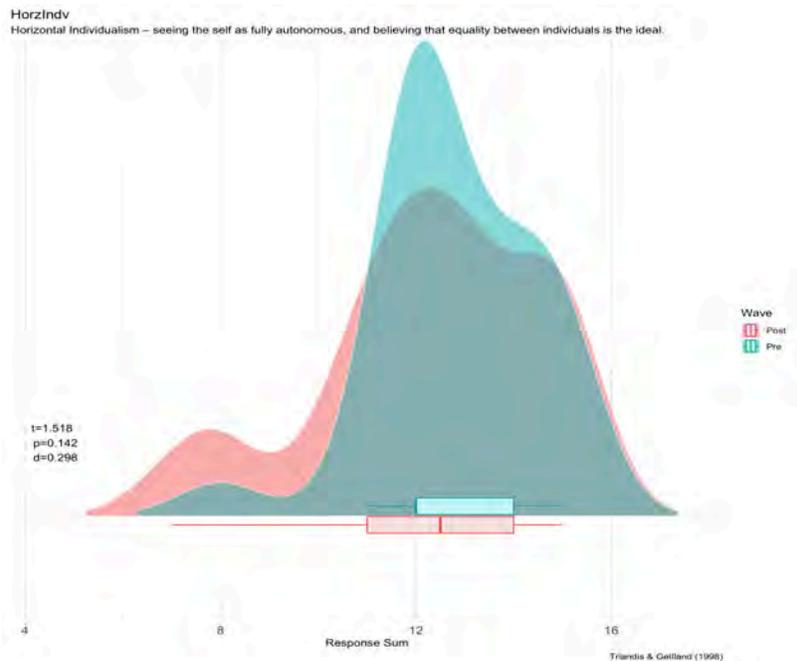
**Figure 13.**

*Change scores for the horizontal collectivism subscale of the Individualism and Collectivism scale.*



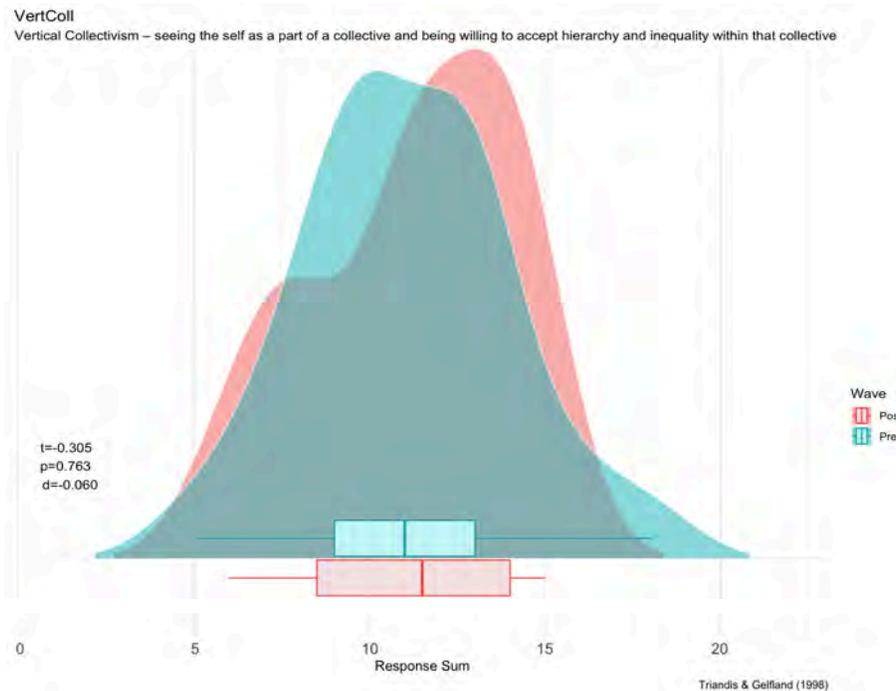
**Figure 14.**

*Change scores for the horizontal individualism subscale of the Individualism and Collectivism scale.*



**Figure 15.**

*Change scores for the vertical collectivism subscale of the Individualism and Collectivism scale.*



## Multidimensional Scaling Procedure

The multidimensional scaling (MDS) statistical procedure was employed to analyze the results from the questions administered at both the beginning and end of the Masterclass. This procedure generated a two-dimensional "geospace," showcasing all 17 stimuli utilized in the MDS, positioned in proximity to each other based on participants' ratings of each pairing's relatedness. Nineteen participants were included in this analysis, each of whom completed both the pretest and posttest MDS, along with the semantic differential items.

When orienting to the graph, data points are plotted along abstract dimensions derived statistically to represent distances or dissimilarities among the data points. The axes in the geospace lack inherent meaning until the configuration is interpreted, which is based on the distances between points in the space. The relative positioning of the points to each other is crucial for interpreting an MDS plot, rather than their absolute position on the axes. Items closer together indicate greater similarity, forming a relational class, and the entire geospace can be viewed as a relational network.

Figure 16 illustrates aggregated pretest scores, revealing four clusters of items. Dimension 2 emerges as the most interpretable, seemingly representing valence. Clusters 3 and 4, positioned at the top left and right, respectively, signify negative valence, while Clusters 1 and 2, situated at the bottom left and right, denote positive valence. Each plot is color-coded based on semantic differential results, determined by the highest valence rating of each item.

Insights further suggest that "society today" receives a somewhat negative rating and is closely associated with other negatively valenced items. Conversely, "Society 100 years from today" and "my worldview" receive positive ratings and are closely related to other positively valenced items. Dimension 1 (horizontal axis) presents less clarity but may be interpreted as function versus output. Clusters 1 and 3 on the left side may be viewed as values that, when acted upon, result in items represented by Clusters 2 and 4 on the right side.

**Figure 16.**  
*Multidimensional Scaling Procedure pretest results.*

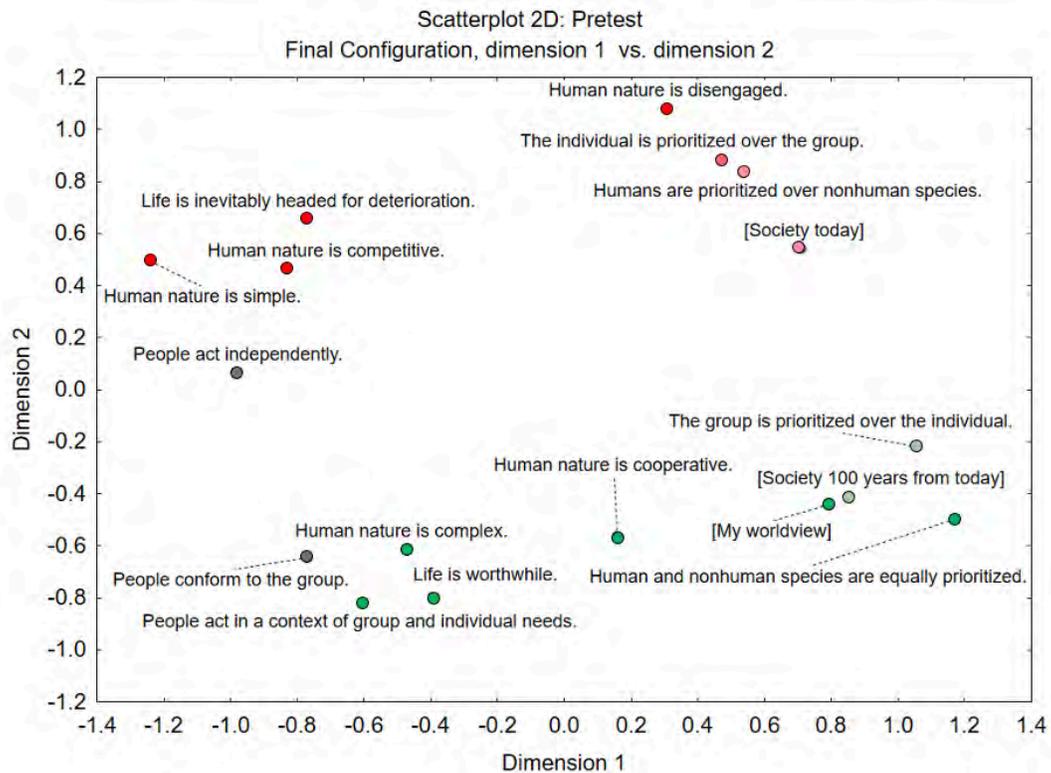
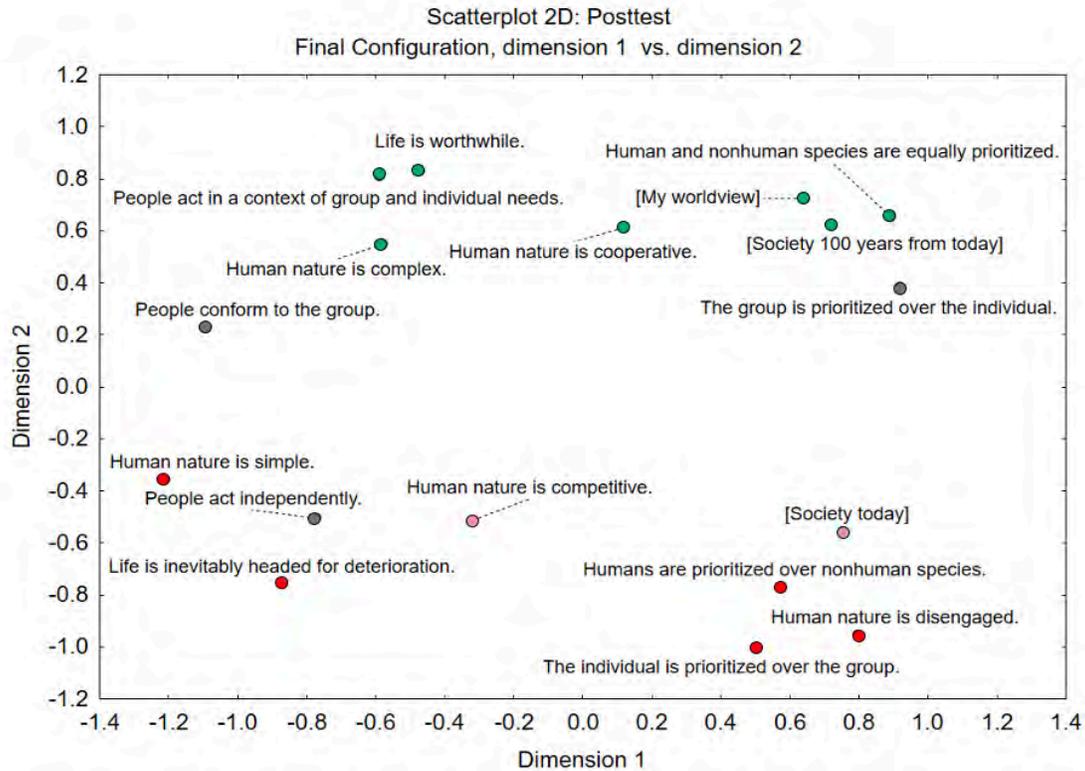


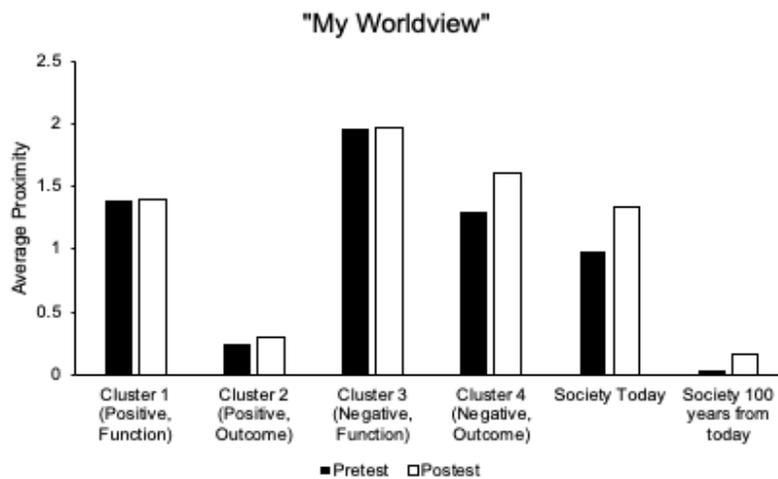
Figure 17 illustrates the posttest results, with the data points rotated so that positive items are now positioned at the top of the configuration. However, the dimensions and relative distances remain consistent. Understanding MDS results is akin to interpreting a map, where rotation is permissible as the points reflect proximity relative to similarity. Insights suggest that participants continue to associate stimuli based on positive/negative valence and function versus outcome. Despite this rotation, four clusters persist, with "human nature is cooperative" still situated between Clusters 1 and 2. Notably, the clusters appear less dense than at the pretest stage, indicating potentially more flexible responding.

Figures 18 to 21 depict changes in proximity for four significant items: "my worldview," "society today," "society 100 years from today," and "human nature is cooperative." These figures offer insights into how the relationships among these items have evolved throughout the Masterclass.

**Figure 17.**  
*Multidimensional Scaling posttest results.*

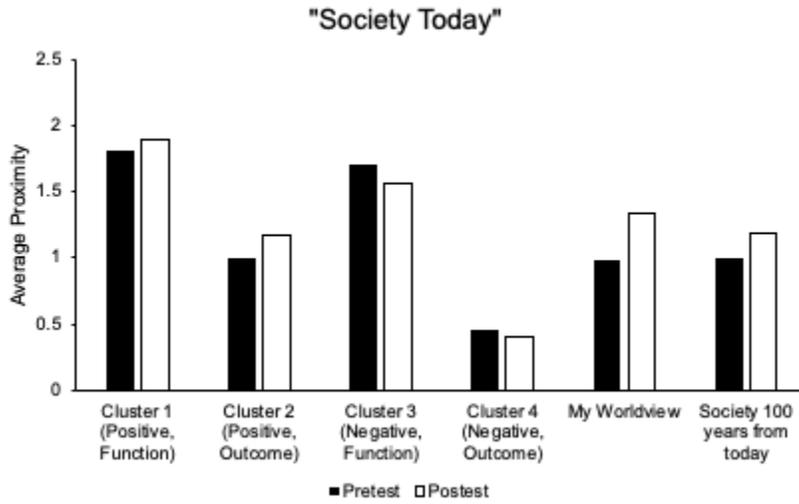


**Figure 18.**  
*Average proximity of the item "my worldview" relative to each cluster and other key stimuli at pretest and posttest.*



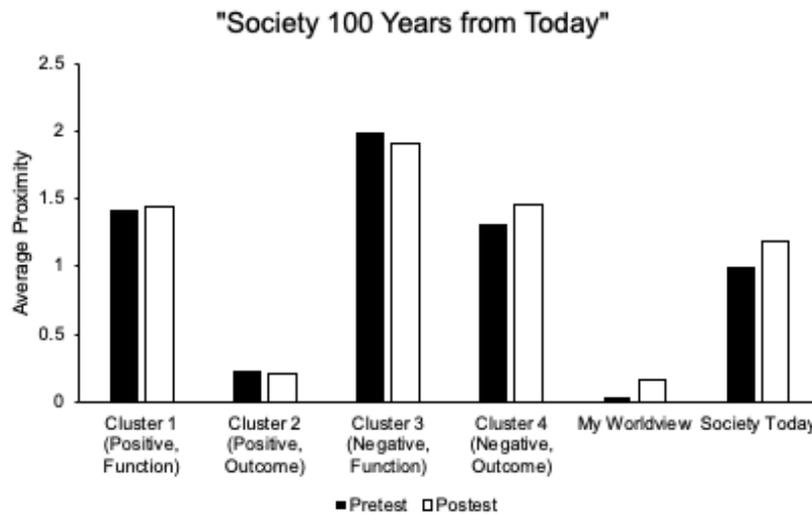
**Figure 19.**

*Average proximity of the item “society today” relative to each cluster and other key stimuli at pretest and posttest.*



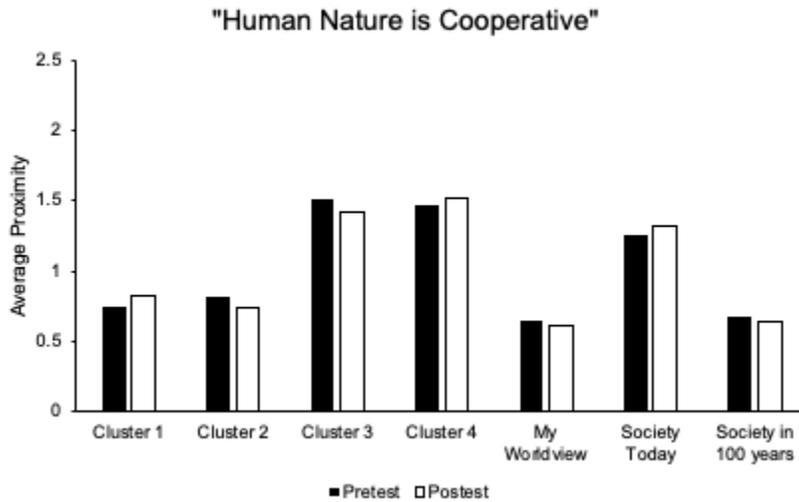
**Figure 20.**

*Average proximity of the item “society 100 years from today” relative to each cluster and other key stimuli at pretest and posttest.*



**Figure 21.**

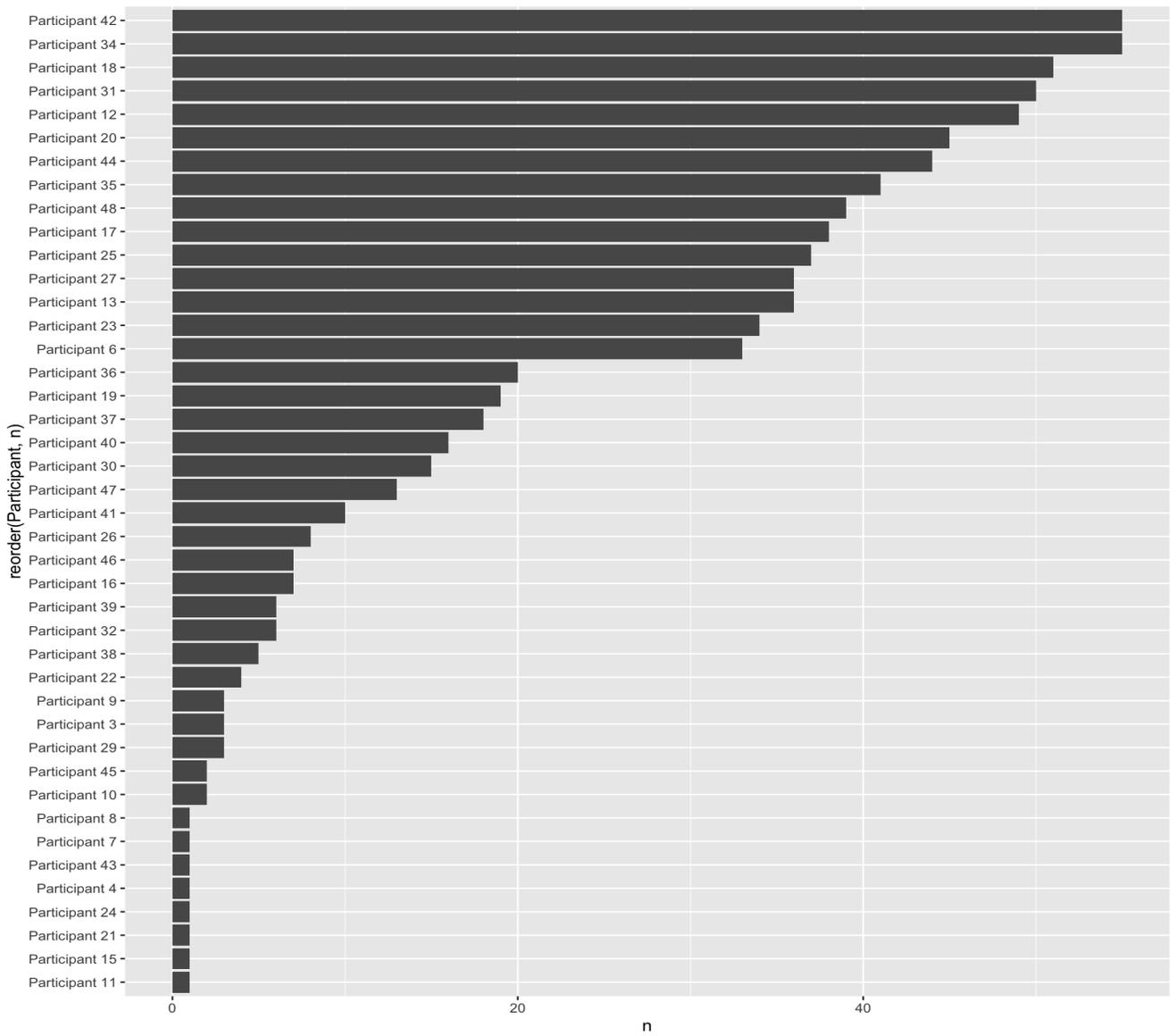
*Average proximity of the item “human nature is cooperative” relative to each cluster and other key stimuli at pretest and posttest.*



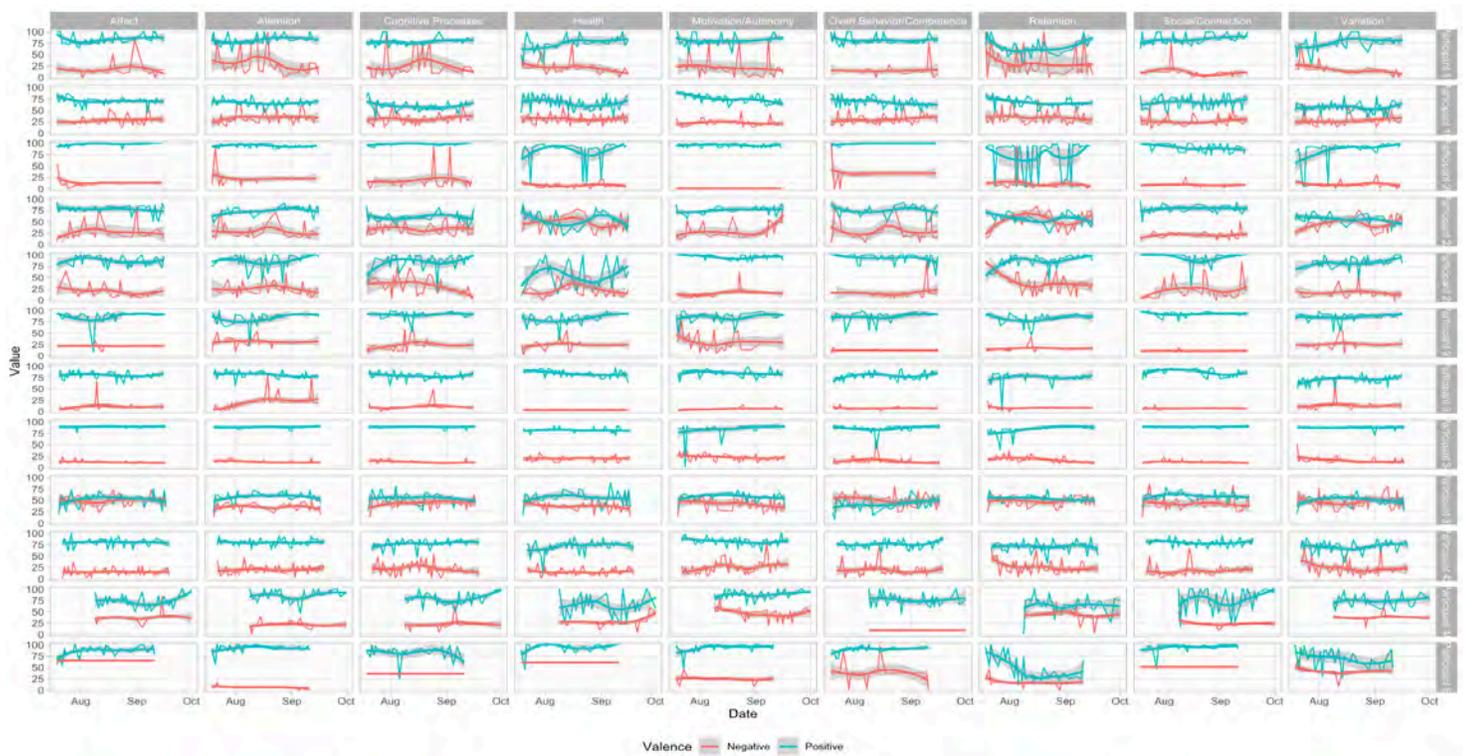
## Process-Based Assessment Tool

The PBAT resulted in 15 participants who responded more than 30 times, and 6 individuals who responded 10-20 times. The remaining participants had very minimal responding. Since this was the case, we were unable to complete the GIMMIE analysis as our sample was underpowered. Figure 22 shows participant responding levels. Instead, we conducted a construct level longitudinal analysis with data from participants who responded more than 30 times. Three additional participants were removed because of missing data and low variability in their responses. This produced the following visualization (see Figure 23) which displays participants responses from July through September of 2024. It is broken up by process target on the PBAT and displays participant's ratings on negative and positive affect items for each target. Looking at these figures participants' ratings appear to be mostly consistent across time.

**Figure 22**  
*Participant Responding on PBAT*



**Figure 23**  
*Construct level longitudinal analysis across participants and process targets.*

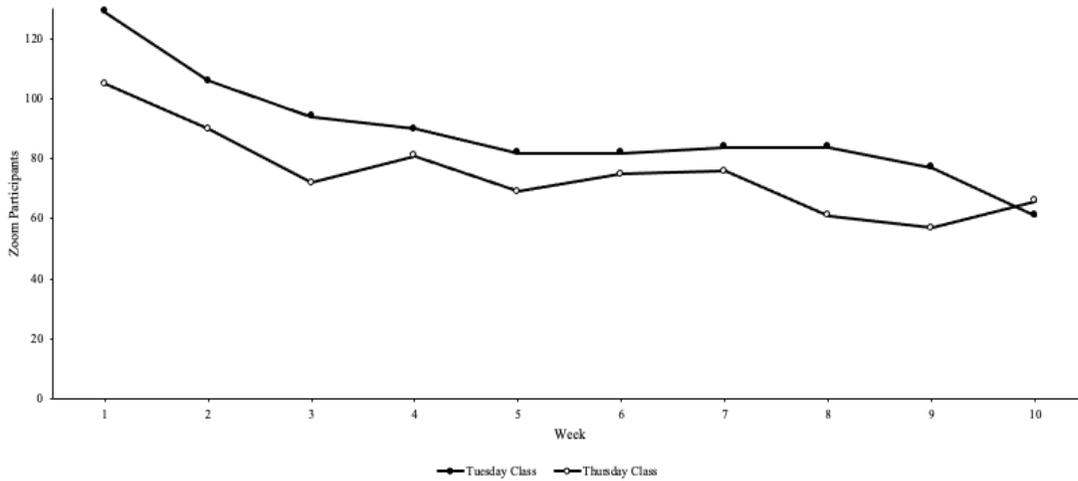


Although we were not able to complete the GIMMIE analysis, we can still create individual network analysis for participants. This is planned for in our future goals of reengaging the Masterclass cohort.

## Engagement Data

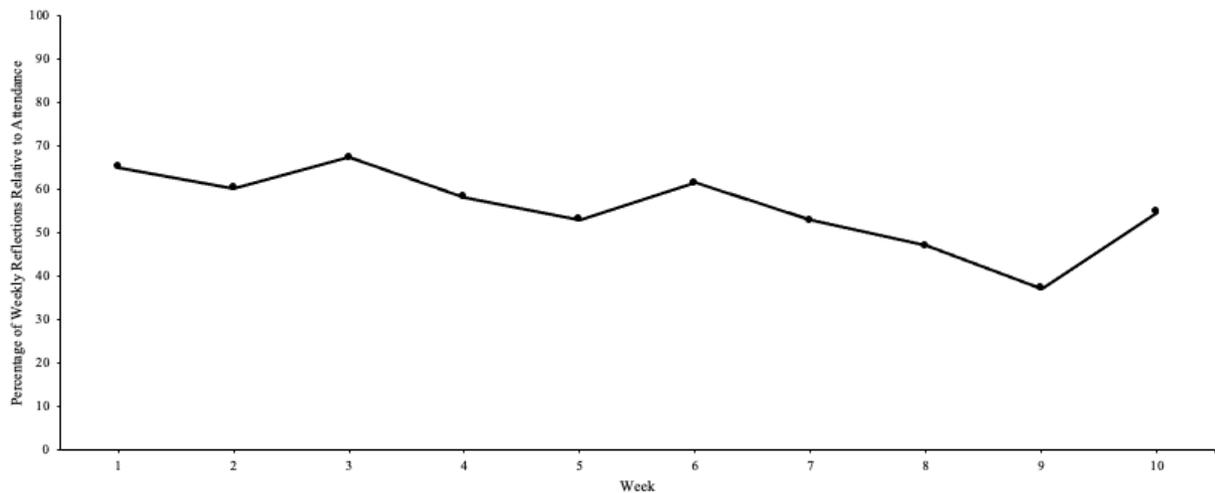
Over the course of the 10-week class, attendance during the online Tuesday plenary sessions fluctuated between 129 and 61 Zoom attendees, with an average of 89 participants. Similarly, attendance during the Thursday sessions saw an average of 75 participants.

**Figure 24.**  
*Weekly live Zoom attendance graph.*



The proportion of weekly reflection submissions compared to the number of participants in the plenary Zoom session varied from 68% to 38%, averaging at 56%. Throughout the entire duration of the course, a total of 508 reflections were submitted across the 10 weeks.

**Figure 25.**  
*Weekly Reflection Submission Rate.*



Throughout the class, 13 public subgroups formed which acted as “special interest groups”. Some of these subgroups met regularly on Zoom and others kept their discussion just on Hylo. Table 2 shows the name of each subgroup and the number of members in each group.

**Table 2. Subgroup Names and Number of Members**

| <b>Subgroup Name</b>                                 | <b>Number of Participants</b> |
|--|-------------------------------|
| Reimagining Economics in the Noosphere               | 46                            |
| Spirituality and the Noosphere                       | 46                            |
| Major Evolution Transitions Discussion Group         | 36                            |
| Visualizing the Noosphere and Noodeomos              | 27                            |
| Me2We2All  | 26                            |
| Music and the Noosphere                              | 24                            |
| Education in the Noosphere                           | 20                            |
| Evolutionary Psychotherapy                           | 17                            |
| The Evolution of Love                                | 17                            |
| Evolved Universe Hypothesis                          | 14                            |
| Civil Resistance to Elites Conscious Evolution       | 12                            |
| Deep Transformation Network                          | 9                             |
| Election Reform for Fair & Inclusive Decision-Making | 9                             |

### ***Weekly Reflection Submission Length***

The Hylo group had high engagement throughout the class. In total, there were 418 posts which consisted of 380 discussions; and 7 events, 4 offers, 9 projects, 2 requests, and 16 resource postings. In total, there were 2,108 comments across all posts.

## **Natural Language Analysis**

### **Modeling Relational Frames**

We explored various common methods for modeling natural language use, such as topic modeling, biterm topic modeling, UMAP, and embedded vector models. Ultimately, these approaches were too abstract in their outputs and thus insufficient in capturing the character of how language was actually expressed as a behavior. For topic models, the granularity of a “topic” depends directly on the number of topics specified at the start for the whole corpus, which is not dynamic enough to model the different granularities of relational frames in particular contexts. For UMAP or word embeddings, the mapped dimensions are better used for analyzing statistical patterns over interpreting a given expression in terms of its particular context.

Instead, we needed a method that would preserve the natural structure of language as it is actually expressed. Rather than defining language in terms of tokens or vectors, we took a pattern-oriented modeling approach (Railsback and Grimm 2012) and defined it in terms of sentences as our basic unit of behavior and universal dependency relations as our primary relational analysis. Universal dependency relations (De Marneffe et al. 2014) categorize words in terms of their functional grammatical role in a sentence. They originated from the field of

semiotics but have been more increasingly applied to computational approaches to natural language analysis, such as the “udpipe” package in R (Van de Cruys and Wijffels 2023). The cross-language explanatory validity of the taxonomy has been studied broadly, but for our purposes it effectively models the relationships words have with each other, in terms of how they are actually used in everyday language (e.g. in sentences). This comports with a naturalistic or pattern-oriented modeling approach to studying complex adaptive systems such as contextual behavior. It also comports with a functional contextualist view of verbal behavior, in that the most foundational behavioral function of choosing a word to express is in the context of the culturally inherited rules for how words can be strung together. Thus, to the extent the universal dependency relations are a sufficient model for the patterns of these culturally inherited rules, we can use them to model natural language in a way that is functionally comparable across momentary expressions.

Our first step was to encode our natural language data in terms of universal dependency relations using the udpipe package in R. We piloted this approach with the participants’ weekly reflections data, which were written responses to that week’s material and discussion sessions. There were 439 reflections, containing 9,263 unique sentences. Future work can expand to include data from Zoom meetings (text chat and spoken participation) as well as posts and comments shared on Hylō.

With all sentences in weekly reflections encoded by their universal dependency relations, the next step was to model the relational frames through which the reflections could be related to each other.

## Dependency Relation Networks

Our first step was to create networks aggregated by matching dependency relations of words across sentences. Aggregation across sentences without further conditions also aggregates contexts of expression, which limits the validity of these networks as relational frames on their own. However, they are useful for exploring the broad associations that characterize the Science of the Noosphere within the basic shared context of grammatical function.

The basic method was to first choose a particular dependency relation and gather all of the words that have this relation. Next, we created individual networks for each of these words, adding nodes and edges for each observation of that dependency relation to the focal word. We then added additional edges between modified nodes where both nodes co-occurred and were modified in the same sentence, paragraph, or overall reflection. Finally, we weighted these additional edges by the proximity of their co-occurrence, with an edge weight of 3 for co-occurrence in sentences, 2 for paragraphs, and 1 for the same reflection.

For example, a basic dependency relation is the “adjective modifier” which captures the way in which one word gives descriptive quality to another word, usually a noun. Figure 26, below, shows the top 50 adjective modifiers across all of the reflections data.

**Figure 26:**  
*50 most frequent “adjective modifiers” in reflections data*

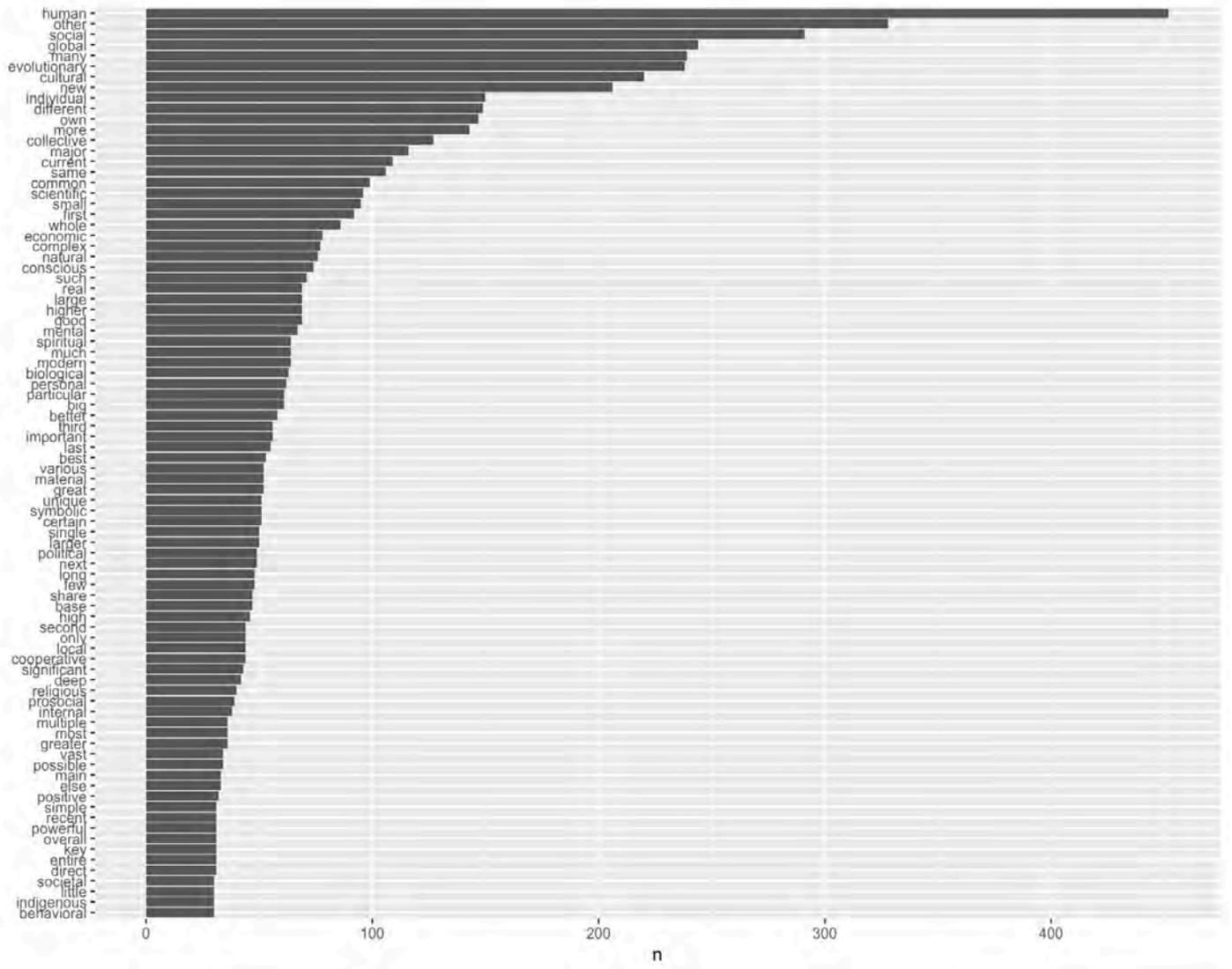
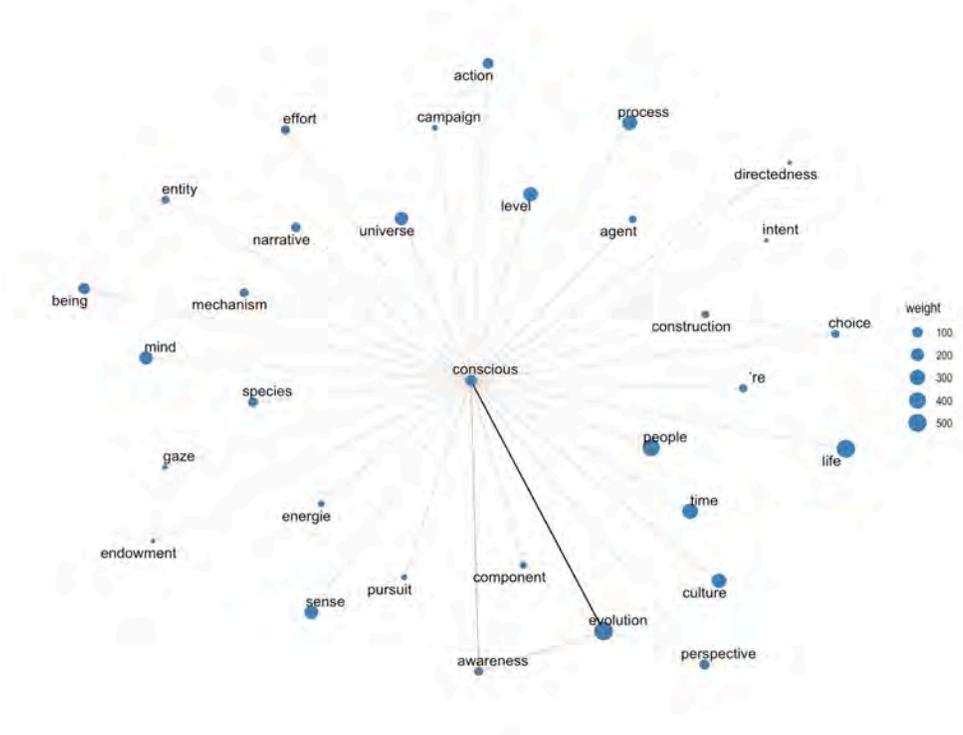


Figure 27 shows the aggregate network of all adjective modifier relationships of the word “conscious”. We can see that the most common “adjective modifier” relationship for “conscious” is “conscious - evolution”. We can also see that “conscious - evolution” was expressed in co-occurrence with “conscious - perspective”, “conscious - awareness”, and “conscious - component”, as indicated by the additional edges between those modified words and “evolution”. From a relational frame theory perspective, we would say that the additional edges between “evolution” and “awareness”, “perspective”, and “component” are *combinatorial derived relations* within the context of “conscious” being used as a descriptive quality for “evolution”. The community cluster that is formed gives us a better sense of what the “conscious - evolution” dyad means, as defined by the associative consequences from its initial relational context.

At this high level of aggregation, we can’t define the exact quality of these derived relations (e.g. as equivalent, as contrasting, etc.). However, this method still gives us an accurate conditional prediction of descriptive expression at the collective level because we are only adding derived relations between modified nodes where they are explicitly co-occurrent with a shared dependency relation dyad.

**Figure 27:**  
*Adjective modifier dependency relations for “conscious”.*

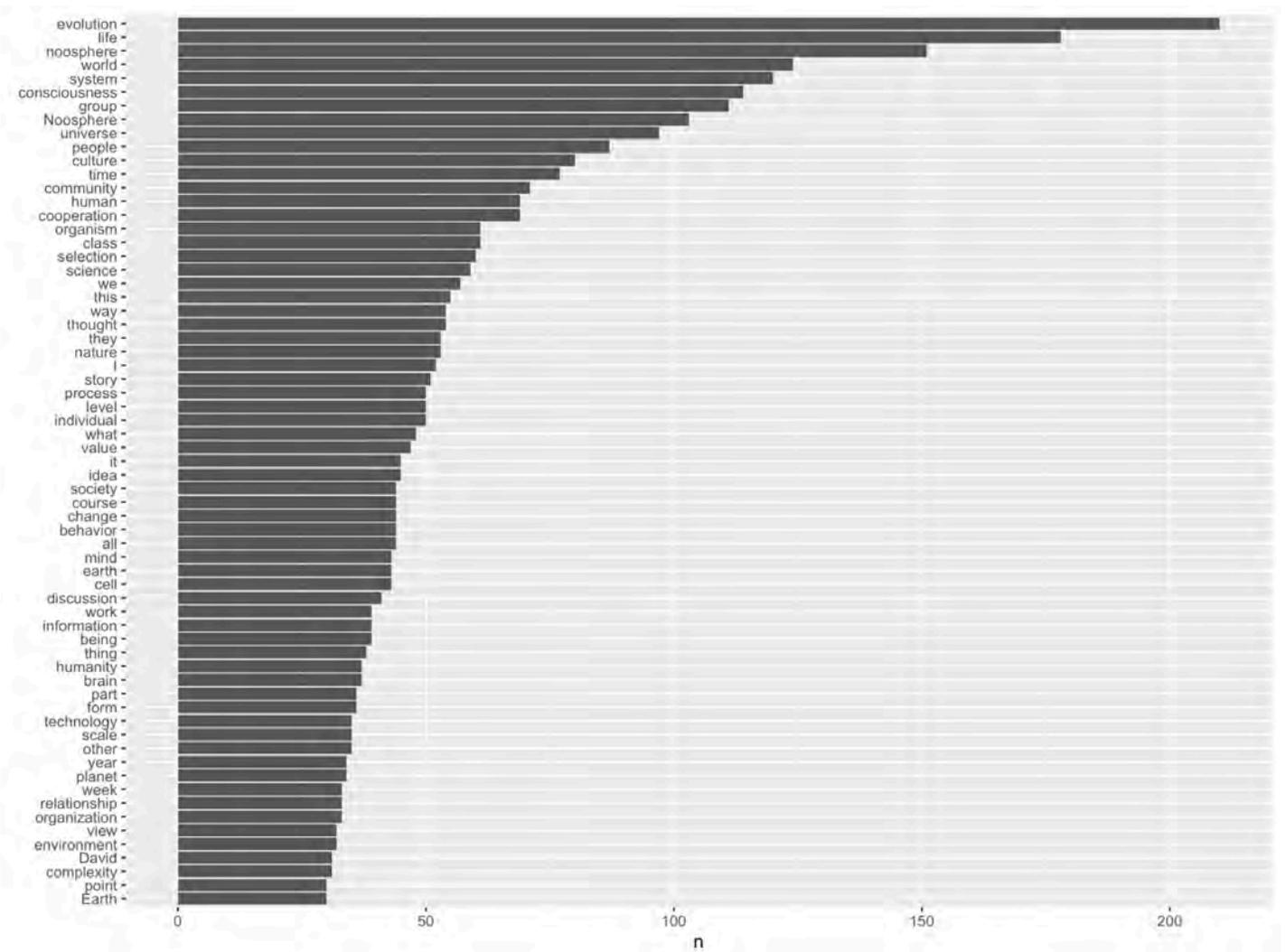


*Figure Note: Node size is the frequency of that word overall and edge thickness is the frequency of that particular relationship. Edges between modified nodes indicate co-occurrence in the same sentence, paragraph or reflection.*

Another descriptive dependency relation are “noun modifiers”, which are similar to “adjective modifiers” except that the modifying word is a noun, rather than an adjective. They are either expressed as a compound noun (e.g. “library” in “library book”) or with prepositions or



**Figure 29:**  
*50 most frequent “noun modifiers” in reflections data*



We also modeled aggregated dependency relation networks using multiple focal terms, whose overlaps, or lack thereof, reflect the similarities and differences between their usage. Figure 30 shows an example of a combined network for nominal modifiers of “technology”, “humanity”, and “cooperation”.

Figure 30 is a complex network, but some key relationships can be visually identified. For instance, we can see that “evolution” is the main bridging word between the “technology”, “humanity”, and “cooperation” focal words, as in “evolution of... [focal word]”. We can also see that the “role” and “expression” of “technology” is linked to that of “cooperation”.



of ignoring the functional context of verbal behavior in the first place. Additional contextual information can help bridge the gap to higher-level functional contexts.

Examples include:

- Verbal behavior in the context of cultural transmissions: Network comparisons of each individual's reflections to that week's conversation transcripts to identify what was effectively transmitted and reproduced.
  - This can include data gathered on the "most influential" people in the class (e.g. conversation experts and other participants) to predict from who a participant is most similar to in expression given their affinity.
- Verbal behavior in the context of individual learning: Network comparisons of an individual's reflections to their previous reflections to identify what changed and what resisted change.
  - This can include calculating the volume (number of nodes) and density (number of edges) in a given relational language network to predict resistance to change (Belisle & Dixon 2020)
- Verbal behavior in the context of lived experience: Analyzing verbal behavior in relation to self-reported psychometric data to determine the relationship between broader psychological experience and symbolic expression.

Our central interest is in the symbotype-phenotype relationship. Verbal behavior in the context of other verbal behavior captures part of this, but does not always tell us how differences in symbolic associations lead to differences in how one behaves, or would behave, in daily life. Fortunately, there is a particular kind of verbal behavior that embeds this dynamic directly: causal statements.

## Causal Statements

Dependency relation networks are a good starting method to define the structure of the symbolic space, but taken alone it is unclear how these conceptual associations inform behavior (verbal or otherwise) and expected consequences. For that, we need to identify relational frames that relate to three-term contingencies (context - behavior - consequence). In natural language, this is captured in causal statements.

Causal statements like, "If wages are too low, workers will strike"<sup>2</sup>, are complete relational frames for a three-term contingency (context - behavior - consequence). If functioning as a behavioral rule, we would expect that, for workers, if they feel wages are too low, they should strike. And through mutual entailment derived relations, we can assume that they do this because they believe striking will make wages go up. We can then measure the veracity of this causal statement by seeing if and at what wage depreciation amount, workers strike, and whether it is effective in improving wages. Additionally, we can evaluate whether an individual who holds this belief does indeed strike, thus describing the symbotype-phenotype relationship.

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<sup>2</sup> An abridged version of a real causal statement in the reflections data.

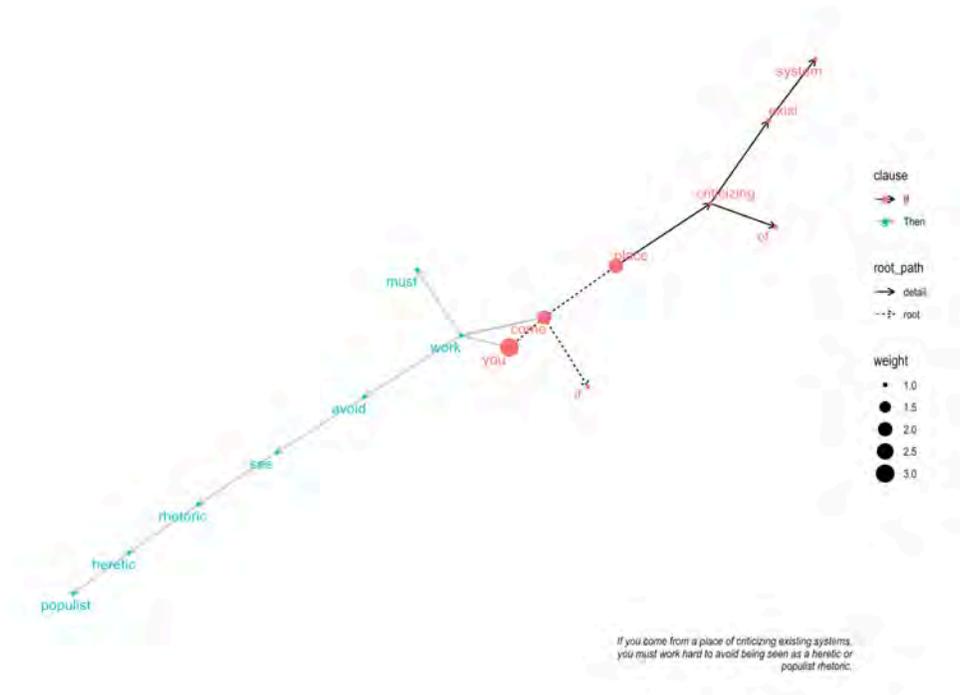
Of critical interest here, is under what conditions this symbotype-phenotype holds true for the actual behavior of people. For instance, if action on the basis of this belief is dependent on other beliefs, personal situation, or psychological flexibility. Seen this way, we can explore the full adaptive possibilities of a given symbotype-phenotype relationship in context.

Causal statements are readily identified by words with dependency relations such as “mark”, (e.g. “if” or “because”), or “adverbial clause modifier”, which is a clause that modifies a verb or other predicate (adjective, etc.) (Universal Dependencies n.d.). We can separate the causal sentence into an “If” clause and a “Then” clause, with “then” indicated by words that have a “root” or “noun subjective” dependency relation, indicating the action being done and by who. In the reflections data, we found 149 causal statements that began with “If”.

Figure 31 shows an example of a causal statement from the reflections data graphed in terms of dependency relations and role in either the “If” or “Then” clause.

**Figure 31:**

*Causal statement graphed by dependency relation and role in either the “If” or “Then” clause.*



*Figure Note: Node weight indicates degree, dashed edge line shape indicates direct connection to the mark of “If”, bold solid line edge shape indicates detail in the “If” clause, faded solid line edge shape indicates detail in the “Then” clause.*

Taken at face value, these kinds of causal statements can better be thought of as high-level descriptions about how the world works, rather than descriptions of three-term contingencies for actual behavior. Nevertheless, they represent the paradigmatic assumptions that might inform

actual behavior, and can still be defined as three-term contingencies, albeit at a higher descriptive level.

Further work is needed to develop a method that better directly graphs these statements as three-term contingencies, but they can still be visually identified. In Figure 6, we can identify the context as “criticizing existing systems”, the behavior as “avoid being seen”, and the consequence as “to [NOT] be seen as a heretic or populist rhetoric”.

Causal statements, even for high-level three-term contingencies, are unique in that they embed logical conditions for how other causal statements can be related. If one statement is held, it creates a context for what other statements can be held. Because each term of a three-term contingency can be separated, we can directly compare how verbal behavior varies given different assumptions of context, behavior, and consequence.

Using the logical deduction of relational frame theory, we can relate multiple causal statements to derive relations between them. This approach of relating causal statements can be extended to include second-order derived relations from other kinds of symbolic associations, such as functional equivalencies in adjective-modifiers or noun-modifiers as shown in Figure 31.

Our ability to replace our experience with symbolic referents means part of our context is verbal behavior itself- we can express relational frames in relation to other relational frames. This allows for a level of abstraction which needs only have an implicit relation to experienced behavior and consequences, especially given the possible macro scale of processes that could be related. Much of the verbal behavior in the Science of the Noosphere Masterclass is at this level of abstraction. Often, the behavioral focus is the actions of the entirety of the human species and at scales and rates that cannot be directly related to lived experience. And yet, if these models of the world are taken seriously, they could constitute a cultural inheritance capable of motivating behavior whose context and consequences are far beyond the purview of a single individual, but still within their grasp to participate in.

## Cultural Evolution

The “Science of the Noosphere” is not a single, coherent framework, but rather an unresolved intersection of philosophical ideas, scientific knowledge and theories, and spiritual perspectives on humanity and its place in the world. Throughout the course, participants embarked on a collective journey to explore and co-create a unique representation of this complex intersection.

This representation is nothing less than the product of cultural evolution at the micro-scale. In the class, participants repeatedly made choices, consciously or not, on who to learn from, what ideas, perspectives, associations, or assumptions to assimilate into their own thinking, and what to reconstruct in their own expression and to whom. These iterative choices and expressions constitute a process of variation, selection, and replication- the three necessary ingredients for an evolutionary process. Through this evolutionary process at the individual and collective

scales, the representation of the “Science of the Noosphere” that emerged was bigger than any one person could create on their own.

If we want to understand how this language and behavior evolved, we must include the dynamics by which language is transmitted, interpreted, responded to, and reproduced over time and in different social contexts.

To this end, there a number of research questions we can ask that concern the cultural evolution of language in the class:

- How is the form of language expressed across the population and how does it change over time? (evolutionary history of a trait over a population)
  - Does it simplify or converge?
  - What forms become most frequent, for who, and in what contexts?
- What are the functional contexts of language expression?
  - To learn, to teach, to compare, to argue, to be acknowledged, etc.
- How is the form of language expression being selected?
  - By consequence in given contexts
  - By universal cognitive processes of inferential transformation (e.g. memorability, emotional valence, etc.)
  - By situated processes of individual learning (e.g. coherence with existing symbolic associations, categorical induction, etc.)
  - By biased learning from preferred sources (e.g. self-similarity bias, prestige bias, success bias)
  - By biased learning from trait distribution (e.g. conformity bias, blended transmission, etc.)
- Where does variation come from?
  - Error in social transmission
  - Change through individual reproduction
- How are forms of language replicated in the population?
  - Cycles of cultural transmission and individual public reproductions
- What is the structure of the population?
  - Affinity relationships between participants, including subgroups
  - Expert sources and participant learners

When combined with relational frame theory and a contextual view of behavior, these questions into the cultural evolution of language can offer a deeply integrated perspective of the symbotype-phenotype relationship.

# Discussion

## Overview

The "Science of the Noosphere Masterclass" spanned an intense 10-week journey delving into scientific topics and evidence related to the concept of the noosphere, as elucidated by Teilhard. Weekly content served as the backbone, but the essence of the class lay in its deeply embedded peer interaction and participation. Participants engaged in a myriad of activities, including weekly surveys, bi-weekly Zoom sessions, and asynchronous exchanges where thoughts, ideas, and personal projects were shared, often sparking collaboration. Notably, within this dynamic environment, special interest groups organically emerged, underscoring the diverse backgrounds and worldviews of the participants.

The class fostered a convergence of varied perspectives, ranging from highly spiritual to rigorously scientific, with many falling somewhere in between. These worldviews intersected, merged, separated, and occasionally collided, manifesting during activities such as lively discussions, guided breathing exercises, and the formation of special interest groups on topics like major evolutionary transitions and the interplay of science and spirituality. Drawing from dual inheritance theory, one's worldview could be likened to a symbotype, evident in both overt behaviors, or phenotypes, and covert changes potentially influenced by exposure to class materials and interactions.

Future endeavors of the research team aim to delve deeper into understanding how symbotypes may predict behavior and to explore the intricacies of the class experience using a blend of qualitative methods and natural language processing techniques. Questions on group identity, values driving actions, and the transmission of beliefs throughout the class are poised to shed light on these phenomena.

The strengths of the project lie in its commitment to open science, with all materials readily accessible online, fostering replicability and extension. Stakeholders also aspire to adapt the class for college students, envisioning it as a semester-long course. Embracing a participatory approach, the team plans to provide deidentified data to participants, empowering them to pose their own research questions and conduct analyses. Furthermore, the class's high engagement levels reflect its success, prompting future inquiries into the defining features and support mechanisms of such vibrant communities. Unveiling the underlying factors contributing to the class's success promises to be an exciting and illuminating journey as research progresses.

## Future Directions

Although this is an initial report that's main purpose is to highlight the data sets of the class with some preliminary results, future goals include writing manuscripts that focus on specific research questions while incorporating theory more fully, as well as replicating and extending aspects of the Masterclass. Intended explorations are highlighted below.

## State of the Fields – Behavioral and Brain Sciences Paper

In this paper, David Sloan Wilson and colleagues will lay out a unified theoretical framework for understanding and evaluating evolutionary behavior. There are multiple academic areas that are likely studying symbotype and phenotype interaction, but are using different language to describe it. This project will include working with scholars across disciplines such as anthropology, biology, contextual behavior science, and complexity science to gain insight into their research to further translate it into a shared framework. Citation analysis will additionally be used to assess the current state of the field's interactions with each other.

## Causal Language Schematic Diagram and Natural Language Extension

Clément Vidal's approach in using concept mapping, specifically a casual language schematic diagram, to analyze Teilhard's Chapter 10 on the formation of the noosphere is an example of an approach that can help evaluate the main paradigms of worldview. By using this approach in addition to natural language processing of causal language, we hope to be able to better predict behavior based on symbotype. Future plans include using this approach to map Teilhard's chapter 10 with multiple observers, as well as Wilson's (2022) paper on reintroducing Teilhard to modern evolutionary science.

## Relational Density Theory Extension Paper Using Natural Language

Jordan Belisle and Dana Pallilunas are both active members of the contextual behavior science community and have conducted extensive research in relational density theory (RDT), an extension of relational frame theory. Through partnering with Belisle and Paliliunas we hope to extend current RDT research by combining their framework with natural language processing to further capture relational networks beyond our multidimensional scaling procedure results. This will help us further understand how symbotype might have changed throughout the duration of the class.

## Feminine and Masculine Mini-Study

Throughout the 10 weeks we noticed emergent class discussion and curiosity around the idea of femininity and masculinity. These conversations were showing up across multiple sessions, in whole group discussion and breakout rooms. In response to this interest, we decided to create a "mini-study". The purpose of this mini-study was to evaluate the class' thoughts and associations to femininity and masculinity. We were interested in observing any major distinctions or similarities between the two, as well as how these constructs related to identity. The survey we created to answer these questions asked participants to freely list the first ten associations that came to mind when presented with the stimuli: feminine, masculine, and human. Participants were then re-presented with all of their listed associations and were asked to rate the valence of each association as negative, neutral, or positive. Participants were also asked to reflect in a longer format on what they believe the essence of being masculine, feminine, and human is. Lastly, participants reflected on the importance of gender identity and rated how much they identified with their own descriptions of what it means to be masculine,

feminine, and human. There were 28 participants who completed this study in its entirety. Next steps include analyzing this data and presenting the results back to participants.

## Cultural Transmission Networks Mini-Study

Individual preferences for who (or what) to learn from are an integral part of cultural evolution. Of all of the possible cultural models, which ones will best help the learner? When individuals act on these preferences, they bias cultural transmission and thus their own behavioral reproduction. This, in turn, acts as a selection mechanism for cultural evolution. To the extent that individuals agree on their preferences, cultural evolution will be biased towards the behaviors of cultural models.

What influences individual preferences for cultural models? There is evidence of universal biases for selection of cultural models with greater age or similarity to oneself, or biases for people who are perceived as more successful, experienced, knowledgeable, or prestigious (Henrich, Boyd, and Richerson 2008). Furthermore, we also know that these perceptions of success, knowledge, or prestige can themselves be socially learned and are typically conventional (Henrich & Broesch n.d.). Thus, whether through convergence by direct experience or social learning of perceptions, preferences for cultural models can become cultural traits in their own right. This can stabilize overall behavioral variation, and if preferred cultural models are indeed more successful in a behavioral domain, this stabilization acts to maintain adaptive cultural transmission and reproduction over time.

In cultural evolutionary field studies, individual perceptions of potential cultural models can be measured by asking participants questions like who they would go to for advice if they had a question about a specific behavioral domain or subject (Henrich & Broesch 2011). You can then model these perceptions as cultural transmission networks to measure the level of agreement in the population and predict whether cultural models are indeed more successful, and if cultural models' behavioral expression influences learners' behavioral expression.

In the Science of the Noosphere class, we ran a "mini-study" during week five and week ten where we asked participants four questions relating to their perceptions of potential cultural models:

- How impactful has each conversation partner been on how you think and speak about the content of the class? (Conversation partners are those who participated in the Science of the Noosphere conversations which were part of the weekly class material and/or the class discussion sessions. Participants ranked conversation partners from the last five weeks on a five-point scale from "Not at all impactful" to "Extremely impactful".)
- If you had a question about the content of the class, which participants would you ask? (participants free-list up to ten other participants)
- Among those who have influenced you over your life, who has had the greatest impact on how you think and speak about the content of the class? (participants free-list up to ten people)

- Imagine you could have a conversation about the content of the class with anyone- living or dead- who would you talk to? (participants free-list up to ten people)

In the week five measurement wave, we received 33 complete responses. In the week ten measurement wave, we received 25 complete responses. We have not yet analyzed this data, but future work could involve the following steps:

- Fuzzy match free-listed names
- Creating distinct cultural transmission networks for each question and measurement waves
- Determine agreement in cultural model preferences across the population by calculating measures of in-degree and centrality for each network and person or through methods like Exponential Random Graphs of ego networks.
- Analyze the extent to which cultural model preferences predict language expression by calculating network comparisons of models and learners.
- Analyze the relationship between cultural model preferences and self-reported understanding and relevance of that week's material.

## Masterclass Replication

Ellen Rigsby, of Human Energy, is currently in the process of developing a semester-long university level course on the noosphere, adapting class materials and research protocol from the SON Masterclass. This will provide a rich opportunity to conduct similar research on worldview transformation with a different population than the one in our study, young adults. Susan Hanisch and Dustin Eirdosh are cofounders of the non-profit organization [Global ESD](#) and conduct research in evolutionary education. Similarly to the Masterclass, Hanisch's and Eirdosh's have found high engagement in their teaching of the global sustainability issues through the lens of evolution. Their teaching experience in conceptual and transformational learning would be helpful in guiding teaching practices around the concept of the noosphere for a young population.

## Participatory Modeling and Class Reengagement

Reengaging the Masterclass cohort is a principal priority for future directions. We'd like to present our current findings to the class, and not only gather their thoughts on the results but additionally carry out a participatory modeling exercise – where as a group we can use methods such as concept mapping to create both shared and individual symbotype representations. Class discussions around the representations can then focus on the validity of them, in addition to how taking on certain perspectives can lead to action. A main goal is to explore how class content and engagement has maintained, and led to a shift in perspective and/or real-world action now that we are at the 6-month follow-up mark since the class ended in September.

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# Appendix

**Table A.1. Research Advisory Team**

| <b>Role</b>                              | <b>Name</b>        | <b>Affiliation</b> |
|--|--------------------|--------------------|
| Principal Investigator, Class Instructor | David Sloan Wilson | PW                 |
| Research Director                        | Beth Hawkins       | PW                 |
| Research/Teaching Assistant              | Lauren Hutchison   | HE, PW, MSU        |
| Research Assistant                       | Amanda Middleton   | HE, MSU            |
| Research Consultants                     | Sage Gibbons       | PW                 |
|  | Ian MacDonald      | PW                 |
|  | Clément Vidal      | HE                 |
|  | Marta Lenartowicz  | HE                 |
|  | Jordan Belisle     | MSU                |
|  | Dana Paliliunas    | MSU                |

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|---|--------------------|--------------------|
| Principal Investigator,<br>Class Instructor | David Sloan Wilson | PW                 |
| Research Director                           | Beth Hawkins       | PW                 |
| Research/Teaching Assistant                 | Lauren Hutchison   | HE, PW, MSU        |
| Class Coordination                          | Alan Honick        | HE                 |
| Coordination Assistant                      | Anna Purpera       | PW                 |
| Community Engagement                        | Dounia Saeme       | PW                 |

**Table A.3. Session Topics and Conversation Partners**

| Week | Topic and Assigned Readings/Recordings  | Conversation Partners   |
|------|---|---|
| 1    | Introduction to the Masterclass and Initial Reflections <ul style="list-style-type: none"> <li>● Pierre Teilhard de Chardin (1959), <i>Chapter 10: Formation of the Noosphere</i></li> <li>● David Sloan Wilson (2021), <i>Reintroducing Pierre Teilhard de Chardin to Modern Evolutionary Science</i></li> </ul> | Clément Vidal   |
| 2    | <a href="#">Major Evolutionary Transitions</a> <ul style="list-style-type: none"> <li>● Part 1 and 2</li> </ul>   | Terrence Deacon   |
| 3    | <a href="#">Origins of Life</a><br><a href="#">Cosmological Evolution</a><br><a href="#">Teilhard and the Noosphere</a>   | Bruce Damer,<br>Brian Swimme,<br>Clément Vidal<br>Parham Pourdavood       |
| 4    | <a href="#">Cancer, Cheating, and Cell Communication</a><br><a href="#">Origin of Multicellularity</a><br><a href="#">Insect Superorganisms</a>   | Richard Michod,<br>Paul Rainey,<br>Athena Aktipis                         |
| 5    | <a href="#">Human Origins</a><br><a href="#">Indigenous Views of Society</a><br><a href="#">Human Groups as Organisms</a>   | Garry Shteynberg,<br>Jim Coan   |
| 6    | <a href="#">Origins of Democracy in Classical Greece</a><br><a href="#">Expanding Scale of Human Society</a><br><a href="#">Noopolitik and Realpolitik</a>  | Peter Turchin,<br>David Ronfeldt  |
| 7    | <a href="#">Evolution of Technology</a><br><a href="#">Coevolution of Humans and Technology</a><br><a href="#">Risks and Benefits of AI</a>   | Terrence Deacon,<br>Gregory Stock   |
| 8    | <a href="#">The Global Brain</a><br><a href="#">Collective Consciousness</a><br><a href="#">A Brain of Brains</a><br><a href="#">Collective Consciousness and the Web</a>   | Francis Heylighen,<br>Marta Lenartowicz,<br>Michael Jacob,<br>Shima Beigi |
| 9    | <a href="#">The Global Commons</a><br><a href="#">Wikipedia as Superorganism</a><br><a href="#">Smart Cities</a>  | David Bollier,<br>Anne Clin,<br>Shima Beigi                               |
| 10   | <a href="#">Envisioning the Future Through Story</a>  | PJ Manney,<br>David Brin  |

## Masterclass Description

### Science of the Noosphere Masterclass - A Fantastic Opportunity that Requires a Commitment

The Science of the Noosphere Masterclass is a fantastic opportunity that requires a solid commitment on your part. The opportunity is to spend 10 weeks with some of the greatest thinkers of our age, learning in the company of other inquiring minds, free of charge.

The commitment is to spend the time and effort required to make the most of the opportunity, which is roughly equivalent to a semester-length college course. In particular, you should plan to attend two 90-minute online sessions and several hours of preparation each week.

The reason that we are offering the opportunity free of charge is because *we want to work with people who have a high intrinsic motivation to learn about the concept of the noosphere from a modern scientific perspective*. The desire to learn and reflect upon a meaningful worldview is our primary criterion for accepting people into the course.

In every other respect, we want the course participants to be *diverse*, including scientists, scholars, students, social change agents, spiritual seekers, technology experts, and artists. We also want them to be *culturally* diverse, including but going beyond WEIRD (Western, Educated, Industrial, Rich, and Democratic) societies.

As you contemplate whether this course is right for you, please do not be intimidated by the material. Yes, Teilhard's writing can be dense and the video conversations "geek out" in many different directions, from molecular biology, to world history, to digital technology. But the meaning of it all can become highly intuitive and your own challenges can help to guide the conversations that will be taking place throughout the 10 week period.

That brings up another important feature of the Masterclass: It will be *highly interactive*. You will be asked to reflect upon each reading/viewing assignment. One of the weekly 90-minute sessions will include the whole class, up to ~100 students, interacting with Wilson and his conversation partners. The other session will be in smaller groups that form around interests nominated by you and your classmates. There will be a digital platform for asynchronous interactions in addition to online meetings. In general, the course is designed for you to be an active agent on your learning path and for that path to lead from a *meaning system* to *meaningful action*.

### The Course Material

The main course material will be the [24 videos](#) (totaling 31 hours), and readings, including selections from Teilhard de Chardin and an academic article by Wilson with commentaries titled "[Reintroducing Teilhard de Chardin to Modern Evolutionary Science](#)". This material is already available online and you are welcome to peruse it to see if the Masterclass is right for you.

The material will be divided into weekly assignments with the expectation that you will write a reflection after each assignment. Reflections will be shared with the other participants. The written reflections perform two important functions. As a private exercise, they will help you process and find meaning in the material that you have encountered. As a social exercise, they will help you learn from others.

Every week, the assignment will be discussed in two 90-minute online sessions. The first session will give you direct access to Wilson and his conversation partners, with plenty of time for Q&A and small group interactions in breakout rooms. The second session will be in smaller groups organized around topic areas nominated by the class participants.

Class material will be available on a digital platform called [Hylo.com](https://hylo.com), which will also allow for asynchronous interactions such as discussion threads and a library of resources. Hylo is an open-source platform that provides a free site for any group. Learning to use Hylo will be an important benefit of taking the course in its own right.

As the weekly sessions unfold, the discussions will increasingly transition from developing a *meaning system*, which is internal, to *meaningful action*, which is external. In other words, what does the trove of information that we have encountered and processed together enable us to *do*.

### **A Class that is also a Scientific Research Program**

We hope and expect that the Masterclass will literally change your mind. Can you imagine all that material and processing *not* changing the way that you think, feel, and act in any way at all? In addition, the Masterclass is uniquely designed to be a laboratory for the study of how minds change—research done *with*, rather than being done *to*, those taking part in the experiment. We think that the research will add a whole new dimension to an already dynamic experience.

What this means in practical terms is that, with your consent, the language generated during the course, including the reflections and transcripts of conversations, will be used as data that will be analyzed with an array of natural language analysis tools and techniques. Language analysis will be combined with survey information and other methods of studying the personal and cultural evolution of symbolic systems.

If you have ever taken an introductory psychology class that includes opportunities to participate in research, then that is what the Masterclass will be like—although in our case, the research will be more highly aligned with the learning objects of the course—developing a worldview that can lead to worldwide cooperation. The research component is approved by an Institutional Review Board (IRB) (an IRB is a group that is formally designated to review and monitor human subject research). Please go here [\[link\]](#) to fill out an application.

**Table A.4. Information Requested on Application Form**

| Item | Question  |
|------|---|
| 1    | <i>Please introduce yourself by completing the sentence “I am...” ten times. This helps to convey your most important personal and social identities unprompted.</i>  |
| 2    | <i>What is your interest in taking the Masterclass? Take as long as you like to answer this question, including more information about yourself for context. We expect more applications than we can accept, so your response will help us make the most informed decision.</i> |
| 3    | <i>Generally speaking, what is your level of understanding of Teilhard de Chardin and the concept of the noosphere?</i>   |
| 4    | <i>Generally speaking, what is your level of understanding of evolutionary theory?</i>  |
| 5    | <i>What is your primary organizational affiliation?</i>   |
| 6    | <i>What is your primary role in the organization?</i>   |
| 7    | <i>What is your country of residence?</i>   |
| 8    | <i>In what city are you located?</i>  |
| 9    | <i>What is the highest degree or level of education that you completed?</i>   |
| 10   | <i>What is/was your education focus area?</i>   |
| 11   | <i>What is your current religious or spiritual affiliation, if any? Be as specific as you would like.</i>   |
| 12   | <i>What gender do you most identify with?</i>   |
| 13   | <i>What ethnicity do you most identify with?</i>  |
| 14   | <i>What year were you born?</i>   |
| 15   | <i>Please provide links to online material that can help us learn more about you, if possible.</i>  |

**Table A.5. Selected Psychometric Scales**

| Survey                                      | Items  | Authors              |
|---|--|----------------------|
| <b>Meaning in Life Questionnaire</b>        | <ul style="list-style-type: none"> <li>● I understand my life’s meaning.</li> <li>● I am looking for something that makes my life feel meaningful.</li> <li>● I am always looking to find my life’s purpose.</li> <li>● My life has a clear sense of purpose.</li> <li>● I have a good sense of what makes my life meaningful.</li> <li>● I have discovered a satisfying life purpose.</li> <li>● I am always searching for something that makes my life feel significant.</li> <li>● I am seeking a purpose or mission for my life.</li> <li>● My life has no clear purpose.</li> <li>● I am searching for meaning in my life.</li> </ul>   | Steger et al. (2006) |
| <b>Social Connectedness Scale – Revised</b> | <ul style="list-style-type: none"> <li>● I feel distant from people.</li> <li>● I don’t feel related to most people.</li> <li>● I feel like an outsider.</li> <li>● I see myself as a loner.</li> <li>● I feel disconnected from the world around me.</li> <li>● I don’t feel I participate with anyone or any group.</li> <li>● I feel close to people.</li> <li>● Even around people I know, I don’t feel that I really belong.</li> <li>● I am able to relate to my peers.</li> <li>● I catch myself losing a sense of connectedness with society.</li> <li>● I am able to connect with other people.</li> <li>● I feel understood by the people I know.</li> <li>● I see people as friendly and approachable.</li> <li>● I fit in well in new situations.</li> <li>● I have little sense of togetherness with my peers.</li> <li>● My friends feel like family.</li> <li>● I find myself actively involved in people’s lives.</li> <li>● Even among my friends, there is no sense of brother/sisterhood.</li> <li>● I am in tune with the world.</li> <li>● I feel comfortable in the presence of strangers</li> </ul> | Lee et al. (2001)    |

|   |   |                                  |
|---|---|----------------------------------|
| <p><b>Psy-Flex</b></p>                      | <ul style="list-style-type: none"> <li>● Even if I am somewhere else with my thoughts, I can focus on what's going on in important moments.</li> <li>● If need be, I can let unpleasant thoughts and experiences happen without having to get rid of them immediately.</li> <li>● I can look at hindering thoughts from a distance without letting them control me.</li> <li>● Even if thoughts and experiences are confusing me I can notice something like a steady core inside of me.</li> <li>● I determine what's important for me and decide what I want to use my energy for.</li> <li>● I engage thoroughly in things that are important, useful, or meaningful to me.</li> </ul>   | <p>Gloster et al., (2021)</p>    |
| <p><b>Connectedness to Nature Scale</b></p> | <ul style="list-style-type: none"> <li>● I often feel a sense of oneness with the natural world around me.</li> <li>● I think of the natural world as a community to which I belong.</li> <li>● I recognize and appreciate the intelligence of other living organisms.</li> <li>● I often feel disconnected from nature.</li> <li>● When I think of my life, I imagine myself to be part of a larger cyclical process of living.</li> <li>● I often feel a kinship with animals and plants.</li> <li>● I feel as though I belong to the Earth as equally as it belongs to me.</li> <li>● I have a deep understanding of how my actions affect the natural world.</li> <li>● I often feel part of the web of life.</li> <li>● I feel that all inhabitants of Earth, human, and nonhuman, share a common 'life force'.</li> <li>● Like a tree can be part of a forest, I feel embedded within the broader natural world.</li> <li>● When I think of my place on Earth, I consider myself to be a top member of a hierarchy that exists in nature.</li> <li>● I often feel like I am only a small part of the natural world around me, and that I am no more important than the grass on the ground or the birds in the trees.</li> <li>● My personal welfare is independent of the welfare of the natural world.</li> </ul> | <p>Mayer &amp; Frantz (2004)</p> |

|   |   |                        |
|---|---|------------------------|
| <b>Flourishing Scale</b>                              | <ul style="list-style-type: none"> <li>● I lead a purposeful and meaningful life</li> <li>● My social relationships are supportive and rewarding</li> <li>● I am engaged and interested in my daily activities</li> <li>● I actively contribute to the happiness and well-being of others</li> <li>● I am competent and capable in the activities that are important to me</li> <li>● I am a good person and live a good life</li> <li>● I am optimistic about my future</li> <li>● People respect me</li> </ul>  | Diener et al. (2010)   |
| <b>Individualism and Collectivism Scale – Reduced</b> | <ul style="list-style-type: none"> <li>● My happiness depends very much on the happiness of those around me</li> <li>● I would do what would please my family, even if I detested that activity</li> <li>● usually sacrifice my self-interest for the benefit of my group</li> <li>● I enjoy working in situations involving competition with others</li> <li>● The well-being of my co-workers is important to me</li> <li>● I enjoy being unique and different from others in many ways</li> <li>● Children should feel honored if their parents receive a distinguished award</li> <li>● I often “do my own thing”</li> <li>● Competition is the law of nature</li> <li>● If a co-worker gets a prize, I would feel proud</li> <li>● I am a unique individual</li> <li>● I would sacrifice an activity that I enjoy very much if my family did not approve of it</li> <li>● Without competition it is not possible to have a good society</li> <li>● I feel good when I cooperate with others</li> </ul> | Sivadas et al., (2008) |