Reflections on Interdisciplanary Communications - Metaperspectives; Exploring the Affective Domain

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ABSTRACT

Innovation and/or research performed by Inter, Cross, and Trans disciplinary teams requires individuals to develop an understanding of how their discipline relates to other disciplines. Such understanding is obtained primarily by effective verbal, non-verbal, and written communications. However, due to each domain's institutional and psychological complexities, gaining adequate understandings of multiple disciplines can be problematic and at times seemingly impossible. This can lead to failures of the intents and goals of Inter, Cross, and Trans disciplinary teams. This reflection paper will propose an approach to ease gaining of understanding between individuals from different disciplines in an affective domain context, and possibly lay a foundation for applying affective domain rigor to how understanding between individuals occurs over time.

***Keywords*—**metaperspective, attitudes, beliefs, values, Interdisciplanary, Crossdisciplanary, Transdisciplanary, Communication, Interdisciplinarian, Intradisciplinary, Semiotic System, affective domain

1. INTRODUCTION

Although this reflection paper can relate to the concepts of Interdisciplinary, Crossdisciplinary, Transdisciplinary, for brevity, only the concept of Interdisciplinary is discussed. In Julie Thompson Klein's book *Interdisciplinarity: history, theory, and practice* [1], "Interdisciplinarity has been variously defined in this century: as a methodology, a concept, a process, a way of thinking, a philosophy, and a reflexive ideology." In the book, interdisciplinary uses include: "a means of solving problems and answering questions that cannot be satisfactorily addressed using single methods or approaches. Whether the context is a short-range instrumentality or a long-range reconceptualization of epistemology, the concept represents an important attempt to define and establish common ground." The representation of interdisciplinary as an "important attempt to define and establish common ground", infers the use of effective communication processes such as verbal, non-verbal, or written communications between individuals, also known as Interdisciplinarians, in establishing common ground understandings between their respective disciplines.

Based on the premise of Interdisciplinary need to establish common ground understandings between their respective disciplines, a closer look at how understandings are accomplished is warranted. Interdisciplinary understandings begin with an individual discipline-based field of knowledge. This knowledge is formed by Intradisciplinary communications by Intradisciplinarians within a specific discipline. In forming a knowledgebase utilizing Intradisciplinary communications, a system of concepts, the symbols representing the concepts, and the relationships between the concepts forms and evolves over time. As a domain knowledgebase evolves, a bias unique to discipline is established, reflecting how the knowledgebase forms unique agreed upon meanings of existing concepts, and generation of additional concepts, symbols, and relationships. These biases usually take the form of attitudes, beliefs, and values toward the concepts, symbols used to represent concepts, and relationships between the concepts contained in the existing and evolving knowledgebase.

In studying the evolvement of a domain knowledgebase, the field of Semiotics emerged. In the article *Elements of Semiotics*, Prof. Louis Hébert of the Université du Québec à Rimouski, basically describes Semiotics as "the field of study that is concerned with signs and/or signification (the process of creating meaning)." [2] It can be argued when Semiotic techniques identified by a disicpline are implemented by Intradisciplinary communications, a unique Disciplinary Semiotic System is formed [3]. Inherent to the Disciplinary Semiotic System are the attitude, belief, and value biases formed by Intradisciplinarian communications. It can be argued these attitudes, beliefs, and values form perspectives unique to a discipline, a reflection of the affective domain of a discipline.

When Interdisciplinary teams are formed, one of the greatest obstacles to the team's success is establishment of common grounds. Key in the establishment of common grounds are translations between the Disciplinary Semiotic Systems of the unique disciplines involved in the Interdisciplinary team. [3] Translations between the Disciplinary Semiotic Systems involved are usually accomplished by *effective* communication between Interdisciplinarians representing their respective disciplines. The communication process can be fraught with misunderstandings between Interdisciplinarians

during, or as a result of communication processes. What seems to be missing in the translations of Disciplinary Semiotic Systems are the inherent attitude, belief, and value perspectives of the concepts, the symbols representing the concepts, and the relationships between the concepts when communicating content from one Interdisciplinarian's knowledgebase to another Interdisciplinarian from another unique discipline. A methodology is needed to allow the communication process measure inherent attitudes, beliefs and values of a concept from a sender's viewpoint (Interdisciplinarian team member from a unique discipline) to a receiver's (Intradisciplinarian team member from a another unique discipline) in a manner where the sender's view of the receiver's viewpoint of attitudes, beliefs, and values of the concept are properly aligned in an affective domain context. In some disciplines, this conceptual methodology can be termed metaperspective. In the above contexts, this paper will introduce a theory to measure and align attitudes, beliefs, and values between Disciplinary Semiotic Systems in obtaining metaperspective in an affective domain context.

2. BASIC THEORITICAL METHODOLOGY

This theoretical computational methodology to measure metaperspective in an attitude, belief, and value context is based on the work of Martin Fishbein's measuring beliefs as applied to attitudes [4], and on the work of Milton Rokeach's utilization of attitudes, beliefs and values to measure change of a person's behavior and self -regard [5].

Base Algorithm

A computational based algorithm is required to capture an individual's attitude, belief and value affective domain perspective on a concept, including the concept itself, symbol used to represent the concept, or concept relationships.

$$P_0 = \sum A\,B\,V$$

Where P_0 = The person's perspective of Concept 0
A = Attitude: the person's attitude of a concept (Attitude in this context is defined as a predisposition to act in a positive or negative way toward the concept)
B = Belief: the person's belief the attitude towards the concept is true
V = Value: the person's degree of importance placed on the concept

Please note there may be multiple (N) number of separate ABV observations for an individual concept.

Obtain Data for Algorithm

To obtain data for the algorithm, a series of Likert scale questions and answers based on attitudes, beliefs, and values for the concept is generated. The answers to attitude, belief and value questions would be pre-determined with a numerical value assigned to each answer. For example, for each question, an implementer may provide 5 answers. Each answer would be assigned a number, in this case 1-5. The numbers assigned to each answer given would be summed, resulting in a number representing a person's attitude, belief and value perspective for a concept under consideration, P_0 .

Expansion of the Base Algorithm for Interdisciplinarian Team Use

To compute metaperspective to reflect obtaining common ground understandings of attitude, belief, and value affective domain perspectives for concepts in a communication process within an Interdisciplinary environment, the base algorithm must be slightly expanded and modified.

$$SP_0 = \left(\sum A\,B\,V\right)_x = RP_0 = \left(\sum A\,B\,V\right)_y$$

Where SP_0 = The sender's perspective of Concept 0

A = Attitude: the sender's attitude of a concept (Attitude in this context is defined as a predisposition to act in a positive or negative way toward the concept)
B = Belief: the sender's belief the attitude towards the concept is true
V = Value: the sender's degree of importance placed on the concept
x = Sender's discipline

Where RP_0 = The receiver's perspective of Concept 0
A = Attitude: the receiver's attitude of a concept (Attitude in this context is defined as a predisposition to act in a positive or negative way toward the concept)
B = Belief: the receiver's belief the attitude towards the concept is true
V = Value: the receiver's degree of importance placed on the concept
y = Receiver's discipline SP_0

SP_0 and RP_0 are necessary for the algorithm to accurately identify the sender's and receiver's attitude, belief and value affective domain perspectives for a concept under consideration in an Interdisciplinary communication process. This allows the communication process measure inherent attitudes, beliefs and values of a concept from a

sender's viewpoint (Interdisciplinarian team member from a unique discipline) to a receiver's (Interdisciplinarian team member from a another unique discipline), in a manner where the sender's view of the receiver's viewpoint of attitudes, beliefs, and values of the concept are properly aligned in obtaining "common ground" in an affective domain context. Using evaluative techniques in

Evaluation of Data, it is theorized a form of metaperspective can be achieved in an affective domain context.

Subscripts *x* and *y* are added to clearly identify the sender's and receiver's domain. Having this type of domain information can be useful in long term pattern analysis for the effectiveness of the communication process used to obtain common ground, and to identify potential domain conflicts over time. If identified, future potential conflicts between domains may be identified and planned for during Interdisciplinary team interactions.

Evaluation of Data

Using techniques for obtaining data described in sub-section **B. Obtain Data for Algorithm**, data is collected for the sender and receiver sides of the algorithm. In a perfect world, the sums on both sides of the algorithm should be equal, indicating a sender's attitude, belief and value affective domain perspective for a concept under consideration matches the receiver's. In theory, metaperspective on gaining a common understanding for a concept under consideration in the context of the affective domain is achieved.

In the below example, a number representing a sender's attitude, belief and value perspective for a concept under consideration matches the receiver's attitude, belief and value perspective for a concept under consideration, 12. In this case, metaperspective in an affective domain context is achieved.

$$SP_0 \ = \ (12)_x = \ RP_0 = (12)_y$$

In reality, it is expected the sum on both sides of the algorithm will be different for the first communication attempt. In the example below, the number representing a sender's attitude, belief and value perspective for a concept under consideration is 12, while the receiver's number representing attitude, belief and value perspective for a concept under consideration 0. In this extreme example, metaperspective on gaining a common understanding for a concept under consideration in the context of the affective domain is not achieved.

$$SP_0 \ = \ (12)_x \neq \ RP_0 = (0)_y$$

It is theorized if data is collected on the sender and receiver over time, the expected the sum on both sides of the algorithm will become closer to each other. In the below example, assuming the data is collected at 1-week intervals over 4 weeks, where numerous effective communications occur between the sender and receiver each week, as data is evaluated, the sum on both sides of the algorithm should become closer, indicating partial common ground understanding of attitude, belief and value perspectives for a concept under consideration in the context of the affective domain.

Week 1:

$$SP_0 \ = \ (12)_x \neq \ RP_0 = (0)_y$$

Week 2:

$$SP_0 \ = \ (12)_x \neq \ RP_0 = (3)_y$$

Week 3:

$$SP_0 \ = \ (12)_x \neq \ RP_0 = (7)_y$$

Week4:

$$SP_0 \ = \ (12)_x \neq \ RP_0 = (10)_y$$

It is theorized the sum on both sides of the algorithm will rarely be equal. That being said, data collected over longer period of times in the contexts of *x*, and *y*, and in the context of the concept under consideration, patterns emerge indicating a range of numerical "closeness" for sums between both the sender and receiver. For example, in the domains of Mathematics and Biology, a 4 may be the acceptable range for obtaining a partial common ground understanding of attitude, belief and value perspectives for a concept under consideration in the context of the affective domain.

$$SP_0 \ = \ (12)_{Mathmatics} \sim \ RP_0 = (8)_{Neuroscience}$$

It should be noted in all of the above examples, metaperspective is achieved by the sender and receiver. By having the sum data on both sides of the algorithm, the sender's view of the receiver's viewpoint of attitudes, beliefs, and values of the concept become known, and vice versa. Using this knowledge, the sender and receiver can explore communication options to better understand differing viewpoints in the context of the affective domain, and as a result, gain a better understanding of both common ground, and uncommon ground.

3. CONCLUSIONS

In our increasingly complex world, one of the potential problems of gaining "common ground" understanding between 2 individuals is ignoring the affective domain. The proposed methodology is conceived to address the affective domain aspects of identifying and creating "common ground" between Interdisciplinary, Crossdisciplinary, and Transdisciplinary, team members as innovation or research occurs. The methodology is conceived to allow the communication process measure inherent attitudes, beliefs and values of a concept from a

sender's viewpoint and a receiver's viewpoint, in a manner where the sender's view of the receiver's viewpoint of attitudes, beliefs, and values of the concept are properly identified in an affective domain context. In the situations where teams create new products or knowledge, the proposed methodology can be used to identify affective domain aspects of the attitude, belief, and value perspectives for newly generated concepts, symbols representing newly generated concepts, and the relationships between the existing concepts and newly generated concepts.

Additionally, the proposed methodology has other uses. The methodology can be used in learning, education and training situations where measurement of the affective domain is necessary. Currently, as in the past, the affective domain in learning, education, and training activities is often ignored. For an example of the propose methodologies use in the context of classroom instruction, the algorithm can be modified to reflect a teacher and a student for concepts being taught and learned:

$$Instructor\ P_0 = \left(\sum A\,B\,V\right)_x = Student\ P_0 = \left(\sum A\,B\,V\right)_y$$

In this situation, a pretest consisting of a series of Likert scale questions and answers based on attitudes, beliefs, and values for the concept would be given. It is theorized the differences between the sums on each side of the algorithm will be large:

$$Instructor_0 = (12)_x \neq Student_0 = (0)_y$$

At the conclusion of instruction, a posttest using the same Likert scale questions and answers is given to the student. It is theorized the sums on each side of the algorithm will become closer than the pretest:

$$Instructor_0 = (12)_x \sim Student_0 = (9)_y$$

Although there are many other uses for the proposed methodology, research utilizing the methodology is needed to evolve and test its fitness for measuring the affective domain in determining metaperspective.

4.REFERENCES

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