

**APPLYING THE CONCEPTS AND TECHNIQUES
OF INFORMATION COORDINATION
TO HARMONIZE CULTURAL MULTIPLICITY
AND DIVERSITY EFFECTS***

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ABSTRACT

Cultural multiplicity and diversity are realities that need to be dealt with. Our society and world are currently generating major effects in which cultural, ethnic, racial and national factors are playing important, critical and decisive roles. An information coordination model is intended to interpret and harmonize the multilateral relationships existing in many forms of informational and organizational activities.

To be discussed in this paper is a quadrilateral relationship which interconnects reader/user, information manager/specialist, information system/organization and machine. A specific task of this presentation is to introduce information coordination modelling techniques. The information coordination system operation will conform itself by re-emphasizing its concerns in communication formats, structure, contents and qualities. Information programming, processing and mapping, and checked and balanced acculturation are the two major operational techniques. Understanding the system's internal and external structures/procedures is the key successful factor for cultivating a healthier, more intelligent and harmonious information society and information world.

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1. Introduction

As human beings, we often compliment and praise when we witness order, grace, glory and harmony. As we reach our goals and objectives, we usually achieve a sense of satisfaction, relaxation and confidence. On the other hand, we express our fears, disgust and great sorrow at greedy aggressions, bloody oppressions and chaos. No matter how we experience pleasures and react to pressures, we command our senses to coordinate, maintain and cope with all related mental and physical parties to preserve ourselves in a state of balance and unification.

The word "coordinate" is a key term. It is the core for information science to be a unique legitimate scientific discipline. What is coordination? How does it function? Why can coordination stabilize and harmonize multiplicity and diversity as well as different orientations and effects?

2. What is Coordination?

Coordination can be simply defined as a kind of common action, movement or condition. In mathematics, a coordinate is a pair of numbers which indicate the position of a point on a line on a two-dimensional plane or in a three-dimensional space. One step further, a "polar" coordinate is a polarized coordinate which involves angular direction and measurement, namely, a reference vector. The ultimate purpose of coordination is to achieve harmony - a pleasing or congruent arrangement of parts. The Chinese culture has recognized this as a virtual unified state without actually revealing unification (心境統一而"无"現心境之相貌 -- which can be represented in the Chinese character (禪), pronounced "Tsan" or "Zen." (The Chinese character "Tsan" by itself means a unique or unified instruction.) Natural Law allows all organic and non-organic matter to co-exist equally in the universe. The function of coordination has been tiptoeing everywhere, thus creating a sense of direction. A diversified multiplicity is henceforth being recognized, recited and self-disciplined throughout interactivities, interconnectivities and resonance among corresponding poles. The following section will try to convey a general concept of these poles.

3. The Functionality of Self-Cognition

The recognition of "self" has been one of the most significant topics among all human races on earth, from prehistoric eras to present time. Various forms of self-cognition aim to renounce common ancestry or clansmanship and claim autonomy (self-governance). The science of psychotherapy currently uses the term "self" to refer to:

"a hypothetical entity that is conceived as the total of mental faculties operating as an integrated system of capacities and having a developmental history. Therefore, all humans are born with a self, and its component mental faculties are possessed in common with all people."¹

A new science of self-organization has claimed itself as "the science of dissipative structure."² The Cognitive-Experiential Self Theory has four basic functions: to enhance pleasure, to assimilate the data of reality, to maintain relatedness to others and to enhance self-esteem.³ Generally, the intention of these studies is to better understand this "self-cognitive" ability. The studies are strongly related to the field called automatic instruction. But what is it and how does it function in coordination with other functions?

This autonomy (self-governance) may be derived from four driving forces, namely, command, statement, term-term bond and query.⁴ These four forces are generally found in an information programming and mapping process. Their interrelationship is shown in Figure 1.

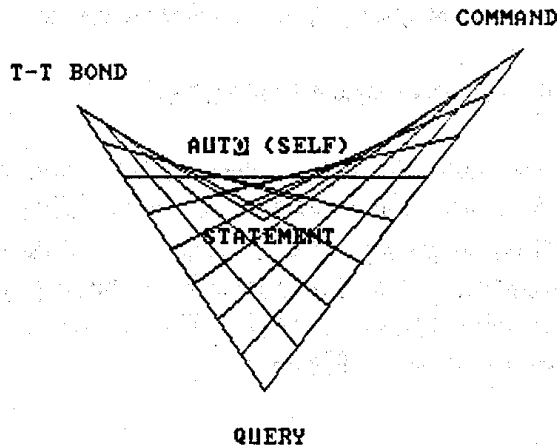


Figure 1: Four Programming Forces

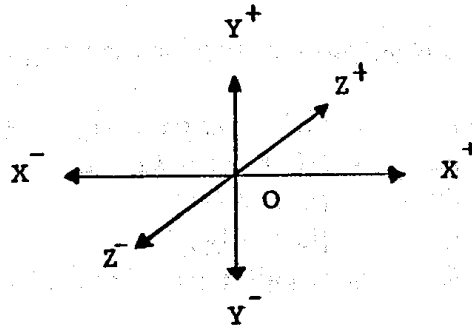
The curve "auto (self)" is automatically formed by the interaction of the four driving forces which then shape a distinctive "personality" or "ideology." The command can be reinterpreted into an executive language used by an information manager/specialist, while the statement relates to the measurement of a supportive reference angle, term-term bond handles chain reactions in an information system/organization and query assesses readers'/users' questions or needs.

4. **Multidisciplinary Coordination: The Core of Information Science**

Information science, by the author's definition, is a discipline which studies the bonding structures, relations and effects between a rigid self-discipline and multiple flexible disciplines. One of the goals of information science is to find a common bond that can unite and coordinate a self-discipline with multidisciplinary. The benefits from these information studies are enormous. They can improve research and educational communications, information resource-sharing, exchange of information technology, and above all, multi-cultural understanding. The study of the dynamics and effects of communication networks is particularly useful. Through long-term observation, it is possible to configure behavioral patterns within an organization. A "conditional logic" is used to monitor the polymorphological (logic flows of many interactive forms) development of information in an organization. Patterns can be recognized and usually can be interpreted by the Population Growth Model (Stage-Period Formation).⁵ Three components of conditional logic are then developed: a) Virtual Informetric Space Exploration, b) Fuzzy Commonality Process and c) Intelligence Circuitry and Strategic Mapping. They are further discussed as follows.

4.1 **Virtual Informetric Space Exploration**

There are eight informetric components for recognizing, controlling and orienting a virtual subject knowledge field. They are scale, locus, bondage, direction, frequency, relative distance, boundary and threshold.⁶ There are eight basic directions for instructions to be projected from the core (0) of this virtual subject knowledge field. They are in three dimensions and can be coordinated as shown in Figure 2.



$$\begin{array}{cccc}
 X^+ Y^+ Z^+, & X^- Y^+ Z^+, & X^- Y^+ Z^-, & X^+ Y^+ Z^- \\
 X^+ Y^- Z^+, & X^- Y^- Z^+, & X^- Y^- Z^-, & X^+ Y^- Z^-
 \end{array}$$

Figure 2: Representation of Virtual Informetric Space

The sense of direction, the measurement of reference angles, the magnitude of projections and the performance of dynamics are our concern. Here is the question: what are the ultimate driving and computing forces that make the final decisions? To answer this question, we need to scrutinize the Fuzzy Commonality Process for "a continuous and connected map on a very large and expanding plane," or "a series of onion-like spherical shells expanding out from" an original instruction generator.⁷

4.2 Fuzzy Commonality Process

For any effective communication, it is essential to identify the commonality among various fuzzy information channels. The following formulas interpreting the Fuzzy Commonality Process are based on a continuous observation of the instruction bonding process.

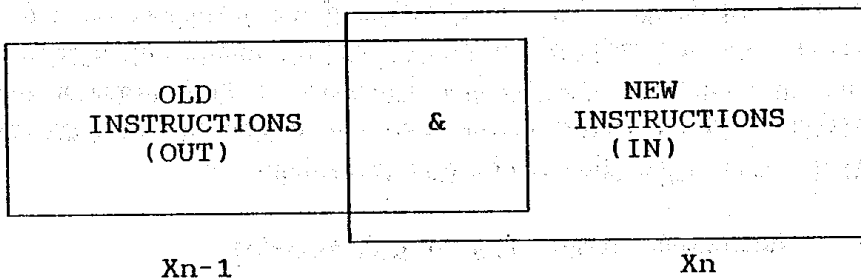


Figure 3: Instructional Bonding Process

The instructional relation can be represented mathematically:⁸

$$\begin{aligned} U &= \text{OUT} + \& \text{IN} + X_{n-1} + X_n - \& \\ dX &= \text{IN} - \text{OUT} = X_n - X_{n-1} \\ \text{OUT} &= (U - \& - dX)/2 \\ \text{IN} &= (U - \& + dX)/2 \\ \& &= U + dX - 2 * \text{IN} = U - dX - 2 * \text{OUT} \end{aligned}$$

Where,

U denotes the number of the union of the two encountered party instructions;

X_{n-1} and X_n denote the two consecutive sets of instruction within a special subject field;

OUT denotes the number of the old (forgotten/outdated) instructions;

IN denotes the number of the new (fresh/updated) instructions;

& denotes the number of the intersection or the conservation (retaining) of the instructions; and

dX denotes the number of change of instructions.

Our emphases are on the balance between INs and OUTs, and the common bond "&." This common bond is the intersection or potential commonality of the two opposite parties. Therefore, it becomes the most valuable "gravitational force." The common bond will continue dynamic shifting and changing. The task for the information science profession is to monitor this bond and try to configure the orbit it pursues. Overall, it is the intelligent point which serves as a filtering lens that converges and diverges the protected images. The identification of this intelligent bond for the harmonization of a series of convergence and divergence thus becomes one of the most important missions and challenges for the information science profession. This is similar to the control of flexible multifold systems in advanced space application and for robotic manipulators.⁹

4.3 Intelligence Circuitry and Strategic Mapping

The construction of a term-term matrix serves the purpose of identifying and controlling a vocabulary pool which is to be used for

information searching. Figure 4 is a conceptual model that shows the finding of the pathways of intelligent circuits.

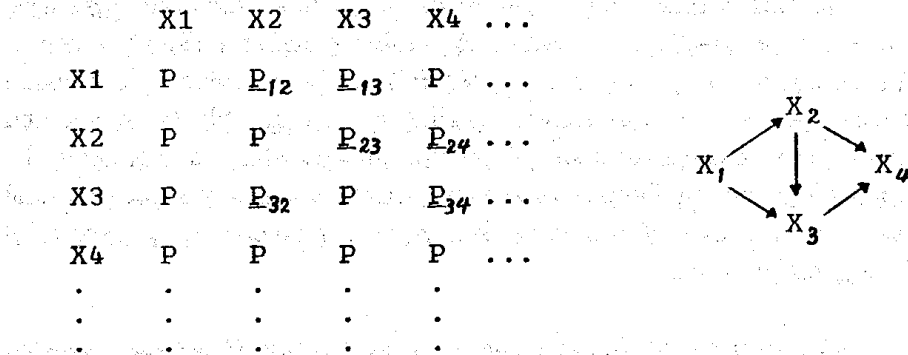


Figure 4: Conceptual Model of Intelligent Circuits Pathways

Xs are controlled terms/instructions used for information searching. Ps are the conditional probabilities defined by files used in the commonality measure between the two related terms/instructions. Let P_c (critical probability) be the gatekeeper for filtering unqualified Ps. Consequently, if each individual P (in this example, P_{12} , P_{13} , P_{23} , P_{24} , P_{32} , and P_{34} respectively) is greater than or equal to P_c , then a cluster with interconnected members can be strategically mapped out. The circuits for transferring intelligence can be defined as well. The flows can be bi-directional, thus resulting in more alternatives and conversions.

4.4 Coordination in Information Processing and Communication

Kenneth M. King, president of EDUCOM, described his vision of National Research and Education Network (NREN) by embodying four objectives: 1) connect every scholar in the world to every other scholar and thus reduce the barriers to scholarly interaction of space, time and cultures, 2) connect to the network all important information sources, specialized instruments and computing resources worth sharing, 3) build databases that are collaboratively and dynamically maintained and that contain all that is known on a particular subject, and 4) create a knowledge management system on the network that will enable scholars to navigate through these resources in a standard, intuitive and consistent way.¹⁰

Following his vision, particularly with the third and fourth objectives, the above information coordination theory is progressively practiced by way of constructing an Information Coordination System designed by the author.

In this system, local navigation programs, software packages, databases, local On/Off-line Public Accessing Catalog (OPAC) systems, multimedia and E-mail system (e.g., PROFS) can be coordinated, processed and communicated in harmonious parallelism. Being able to understand many different information systems' operational procedures and locating the commonalities among different media currently in use and with the potential to be used are two of the most important ingredients to a successful technological marriage.

4.5 Comparison of Information Communication Processes Between Humans and Machines

The "principal of responsibility" derived from the understanding of the six components as the INPUT-CPU-OUTPUT hierarchy clearly states the Garbage In, Garbage Out (GIGO) cause-effect relation. A better relation in human communications can be achieved by carefully reviewing these six parts in our daily life. Similarly, each one of the four forces (command, statement, term-term bond and query) discussed in the previous section on self-cognition can be related to our everyday activities as well. For example, in BASIC programming language, the *commands* used (such as CHAIN, DELETE, DIR/FILES, ERASE/KILL, LIST, LOAD, MERGE, NEW, PRINT, RUN, SAVE, SHELL, SYSTEM, etc.) can help us understand the computer's simulation of neuronic information processing in a human. This applies to the statements used in BASIC (such as BEEP, CHR\$, CLS, COLOR, DRAW, FOR-NEXT, GOSUB-RETURN, GOTO, IF-THEN, INPUT, KEY ON/OFF, LINE, LOCATE, PLAY, PRINT, READ-DATA, REM, SCALE, SCREEN, SOUND, TAB, etc.) as well. The importance of the structural analyses in term-term relation and query language is obvious because the latter two forces (term-term bond and query) are driven by the needs for interpreting or compiling. They are weaker than command and statement because they are less clearly defined.

The above functions illustrate the strengths of a "virtual machine"--a "cognitive simulation" -- operation for a computer to simulate human information processing and "a mapping of neural states onto symbolic expressions" for humans to instruct machines.¹¹ But they also expose a weak link between computer programming language and operating language of the

brain, namely, the semantic interpreting and converting problem. This is a puzzling zone urgently waiting for the information discipline to explore.

5. Multiplicity, Diversity and Stability

It is important to find out the original source that can stabilize the multiplied and diversified directions and situations when they occur. Therefore, the first thing which needs to be studied is the orientation of multiplicity and diversity.

5.1 Multiplicity

Multiplicity has two meanings: a) it indicates the relationship among several single but parallel projections (denoted as Xs) and images (denoted as Ys) which are produced by these single but parallel projections and b) it is the result of the power struggle among the parties involved in the power restructuring processes. The mathematical representation for (a) is: $A \cdot X + B \cdot Y = C$, which implies $Y = -(A/B) \cdot X + (C/B)$, where " \cdot " is the symbol of multiplication and "/" is the symbol of division. This equation implies that $\tan T = -(A/B) = dY/dX$ is the slope, or growth rate, and d denotes the difference of distance between the two pairs of coordinates (X1, Y1) and (X2, Y2). For (b), the simultaneous mathematical equations are represented as $A1 \cdot X + B1 \cdot Y = C1$ and $A2 \cdot X + B2 \cdot Y = C2$. The solution of the simultaneous equations reveals that $X = (B2 \cdot C1 - B1 \cdot C2) / (A1 \cdot B2 - A2 \cdot B1)$ and $Y = -(A2 \cdot C1 - A1 \cdot C2) / (A1 \cdot B2 - A2 \cdot B1)$.

The meanings of the two groups of mathematical operations are: a) it is possible to identify who the projector is and what image or effect is the result, and b) the common denominator is identifiable, in this case, $(A1 \cdot B2 - A2 \cdot B1)$ is the multiplicity effect caused by the difference among the reference factors involved in the operation. This is similar to the term "full information," which is frequently used to narrate "a hypothetical equilibrium state of full coordination, in which all exogenous variables and parameters assume their actual values but agents have managed to learn all that can be (profitably) learned about their environment and about each others' behavior."¹²

5.2 Diversity

"Diversity" indicates the variety of differences that co-exist in a population. Diversity also implies the dynamic changing patterns among different organizations. The measurement of dynamics may be achieved from the calculations through comparisons of movements between two consecutive products. Mathematically, it is represented as $dX/dt = B \cdot X \cdot Y - r \cdot X$, where d denotes a function for dynamic measure, t is for time, B is for reproduction rate and r represents retiring rate. The X denotes the projection while the Y denotes the image produced through the contact between two encountered parties. The function of dX/dt would demonstrate the waves resulted from the continuous intercommunication activities among the parties involved.¹³

5.3 Stability

Stability is the basic necessity for growth. To maintain stability, it is important to harmonize (not to remove) the elements that caused instability. The detection of these instable elements could apply entropy measurement. Fractal geometry, one important branch of chaos science, has shown that there are orders within disorders. The microanalysis of a chaotic image would allow the detector to spot patterns with similar shapes and/or in regular repetitions. A true harmony cannot be reached through forceful removal of the instable elements but through proper allocation, retraining and relocation of these elements. Most information researchers' tasks involve dealing with these uncertain factors and finding a proper configuration that will allow the energy level of each less desired element to "co-shell" with and contribute to the major operating system. To achieve stability, sharing of both resources and ideologies becomes important. An agreeable common denominator for all involved parties must be defined first.

6. Automatic Instruction and Harmonious Coordination

The difficulties in coordinating conflicting polyrhythms has made multiple resource theory more popular than integrated perceptions, due to "noninterference of separate resources." Yet, it was suggested that "when integrated perceptions and actions are possible, the recommendations of multiple resource theory may actually be counterproductive because integrated perception is less likely to develop."¹⁴ Gordon R. Willey has

hypothesized that "an alternation between horizontal integration and regional diversification is a potent, or even necessary, process in the rise of civilization...."¹⁵ What then is the wisdom?

It is believed that performance showing levels of intelligence is determined by ability in terms of harmonious coordination among multiple channels. Although it is impossible to retain absolute harmony, it is possible to maintain relative harmonies among differentiations. To preserve relative harmony, it would be helpful if we understand the aforementioned diversity and parallel projection models:

$$dX/dt = B \cdot X \cdot Y - rX, \text{ and } X = (B_2 \cdot C_1 - B_1 \cdot C_2) / (A_1 \cdot B_2 - A_2 \cdot B_1),$$

$$\text{and } Y = -(A_2 \cdot C_1 - A_1 \cdot C_2) / (A_1 \cdot B_2 - A_2 \cdot B_1).$$

When the state of dX/dt has reached stability, namely, zero dynamics, then $Y = r/B$ implies that the potential competitive market place has maintained a balanced trading relation. In other words, there may exist an automatic controlling algorithm (automaticity) that intuitively offsets compromises on both sides of the equation. The intelligent point (X, Y) , namely, the coordinator, is defined as the solution (or the intersection) of the two co-existing and confronting lines. If this special coordinate (X, Y) could continue its influence in bonding the two lines, the harmonious coordination relationships would persist.

7. Epilogue: World Citizenry

To harmonize conflicts it takes intelligence and wisdom, which are great gifts in the universe. A person cannot be trained to become talented, but intelligence can be transferred to help a person think more logically. More precisely, an already open and revealing intelligence can enlighten a potentially hidden intelligence through educational, social, cultural, economic, political and legal communication channels. This intelligence transferring and sharing is the ultimate goal for world citizenry. It also serves as the fundamental principle for information coordination. After all, any information coordination system will try to help an organization manage its "diversified instructional operations in greatest harmony." This is exactly what in Chinese reads, 禮運大同

NOTES

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