A Tentative Model on Emotions under Various Levels of Tension in Learning: Perspectives from Chinese I-Ching

Guey, Ching-chung
Dep. of Applied English
I-Shou University
Taiwan.

Abstract

This paper proposes a prediction model on students' emotional fluctuations under different levels of pressure (from conditions of ease, and tension, to those of pressure, and over-pressure) in the course of learning. The proposed model is based mainly on principles of Chinese I-Ching, a school of thought dealing with changes. The internal attributes (Lower Gua in I-Ching) of individual learners will be defined in terms of three categories (i.e., active vs. passive (student), discovery vs. rote memory mode (materials), and aesthetic vs. knowledge level (objective), whereas the external (or situation-specific) attributes of individual learners will also be classified into three categories (i.e., process vs. product (assessment), constructivist vs. behaviorist (methodologies), and student-centered vs. teacher-centered (teacher). These six categories form a hexagram within which multi-level interactions exist. Principles of I-Ching are borrowed to interpret the uniqueness of each hexagram, and they help predict the changes (or fluctuations) of each corresponding emotional states relevant to learning under various levels of tension/pressure. Finally, this model proposes plausible measures on the bases of the dynamics involved in the hexagram to help learners' reach optimal learning outcomes.

Keywords: I-Ching, instruction, Ba-Gua, yao, yin, yang, hexagram, coordinative law, interactive law, complementary law

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Changes of learners' emotions across various tension levels

Learners of different thinking, cognitive, or learning styles may respond differently in the course of learning; some favor learning individually, or actively, while others collaboratively, or passively (i.e., Introvert vs. Extrovert, or Active vs. Passive). Teachers can best help students by understanding how they learn best or by knowing their preferred learning styles (Ellis, 1989). However, even when we understand their preferred leaning styles, we still do not know the individual learners' various emotional states under different levels of stress or tensions caused by ever changing instructional conditions, thus incapable of rendering timely instructions to optimize their learning outcomes. Further, the compatibility of a teacher's instruction style and student's learning styles determines the success of learning processes (Carrell & Monroe, 1993; Dunn & Griggs, 1995), whereas mismatch between student learning styles and teacher instruction styles may interfere with classroom learning (Felder & Henruqies, 1995; Oxford et al., 1991). However, there is still a lack of information with reference to individual differences among learners under various levels of pressure or tensions, information of which is essential to help offer constructive guidance in the course of instruction. The individual differences mainly refer to personality defined as an individual's relatively stable characteristic pattern of thoughts, feelings/emotions and behaviors (Moran, 1998). In spite that there may be certain predicted patterns between events and reactions (e.g., learners tend to react with depression to the failure of learning a lesson), variations of intensity and reaction patterns across individuals under different levels of pressure on learning conditions do exist.

In some cases, the predicted reaction does not occur, or even happen in the opposite direction. As Lazarus and Folkman (1984) pointed out, reaction differences across individuals are largely a function of individual appraisal in determining what is stressful, as sometimes referred to as the transactional model of stress; i.e., our perceptions and interpretations of events around us contribute to our experience of stress. There are extreme circumstances where the role of appraisal is severely constrained by the nature of the incident (Moran, 1998). What may actually be in effect is the resulting emotional state triggered by the immediate situations. It is essential to take into account learners' emotional states under various levels of stress, and to take appropriate measures to help them reach optimal learning outcome. This paper will first develop specific categories to define individual differences on emotional patterns, and make predictions regarding individual's reaction or coping behaviors under various pressure levels on the basis of the framework of I-Ching, a Chinese classic philosophical system of changes. Few theories, if any, in the existing literature concerning learners' emotion fluctuations in a given instructional setting manage to answer the question below:

In an instructional setting, where the teacher adopts student-centered attitude, behavioral oriented instruction skill (e.g., programmed instruction, accompanied by reinforcement, etc.), give product-oriented assessment, while students are active, receiving the learning material that focuses on remember, or rote memory, and set the aesthetic goals such as evaluation and creativity in terms of Bloom's cognitive domain. Does such a setting facilitate learners' learning? What are the Pros and Cons in such a setting? What are the students' emotional changes under conditions of various tension levels such as during learning, during quiz, during a mid-term test, or even during an Entrance Exam? And what measures can be taken to optimize learners' to optimize their efficiency? In the following, we will firstly discuss the factors involved in the course of learning, followed by the introduction of principles of I-Ching, and the emergence of the tentative model to predict emotion changes under various conditions we well as their tentative corresponding coping measures.

Components in the instructional setting

In the field of instruction, there have been a variety of instructional approaches evolved from distinct theories; for instance, *programmed instruction* [1] on behaviorism [2], *discovery learning* [3] on cognitivism [4], or *open classroom* [5] on humanism [6]. Most approaches developed from principles in behaviorism, cognitivism/consructivism, or humanism can be contributive to instruction, admitted that their effectiveness may be confined to certain circumstances. Instruction strictly adheres to any single theory cannot meet all the instructional conditions. And it is inadequate in the instructional to focus exclusively on only one single aspect of instruction. Besides, instruction must also consider all the *components* involved in the instructional settings as a whole. Fernandez and Mateo (1992) identified four factors in an instructional setting: teaching method, teacher-student relationship, text and materials, and evaluation and feedback, which can be more comprehensively categorized in pairs as *objective-assessment, teacher-student, and teaching material- teaching method.* These should all be carefully attended to and examined at the same time. Note that these three pairs of *components* must be regarded as mutually interdependent and interactive. For example, learning assessment should be implemented in correspondence with learning objectives, so is the relationship between teacher and students, and that between teaching materials and teaching methodologies. Likewise, structures of teaching materials must also correspond to teaching methods (e.g., presentation procedures and teaching skills in coordination with students' distinct learning styles).

Bloom's learning objectives

From Bloom's learning objectives, there are roughly three domains: cognitive, affective, and psycho-motor. These three domains can, to some extent, reflect or correspond to ingredients in behaviorism (psycho-motor domain), cognitivism (cognitive domain), and humanism (affective domain). The field of psychology cannot be complete if any of the three approaches (behaviorism, cognitivism, and humanism) is left unemployed or isolated, so are the learning objectives to be incomplete if one of the cognitive, affective, and psycho-motor domains is left unattended to. To make the domain fit into the model of I-Ching, we will elaborate the cognitive domain in this paper only, since the affective domain is basically conceived as dependent on the learning outcome from cognitive domain or psycho-motor domain, the latter of which is mainly dealing with task-oriented instruction.

Three ingredients in Objective-Assessment

Anderson and Krathwohl (2001) modified Bloom's original model and proposed six sub-categories of cognitive domain (from simple to complex in the hierarchy below): *remembering, understanding, applying, analyzing, evaluating, and creating.*

Note that students' creativity is the ultimate objective of instruction in cognitive domain, but in order to help students reach such a goal state, the teacher needs to lead students to go through *remember, understand, apply, analyze and evaluate* what is learnt. Further, to facilitate *remembering*, one must first seek *understanding*. And to intensify one's *understanding*, one must manage to *apply* what is learned, and to facilitate *evaluation*, one must be provided with opportunities to exert *analytic* capacity (e.g., ability of looking at things from different angles), and *creativity* is always rooted from capability of *evaluation*. On the other hand, from the sub-category hierarchy, the element of cognitivism *(understanding*, and *analyzing*), behaviorism (*remembering* and *applying*), and humanism (*evaluatin*g and *creating*) can also be detected. In the framework of I-Ching (which will be discussed later), evaluate and creating level will be conceived as aesthetic objective as yang [7], whereas remember, understanding level conceived as knowledge objective as yin. By analogy, the aesthetic objective is like the sun that stands for yang, whereas the knowledge objective like the moon for yin, and the 'apply, analyze' category is like what lies in between the sun and the moon; i.e., between the yang and the yin.

Assessment is widely regarded as contributive to learning if properly administered and handled. Assessment for each of the sub-categories of the cognitive ingredients, as indicated in the cognitive domain (remembering, understanding, application, analysis, evaluation, and creativity), can be conducted through the so-called Taxonomy Table [8], in which the items are produced on the basis of both the objective and the content combined. It is suggested that the more advanced sub-categories in the cognitive domain (such as application, analysis, evaluation, and creativity) must somehow be included in cognitive assessment via items regarding real-life problem solving. From the framework if I-Ching, assessment of the more fundamental levels of cognitive objective (e.g., remember, understanding) can be categorized as 'product' assessment as yin, whereas, the more advanced levels (e.g., evaluation, creation) as "process" assessment as yang. Process assessment can be collected through, what is called, *portfolio [9]*, which covers all that happens in the course of learning (i.e., all the constructive processes involved in learning are recorded and organized, inclusive of reflections of learning events from learners themselves, peers, teachers, and their parents)

Three ingredients in Teacher-Student

In a given instructional setting, teachers may assume the traditional roles as directors, lecturers, discussion leaders and the contemporary new roles as instructional designers, collaborators, team coordinators, or facilitators (McGhee & Kozma, 2001). In an ideal instructional setting, teachers are supposed to play all the teacher roles mentioned above with different proportions according to the situations. As John Amos Komensky (1592-1679) put it, teaching ought to be sensual (behavioral), rational (cognitive) and spiritual (humanistic). And to dichotomize these teacher roles, we categorize them into student-centered roles (facilitators) as yin and teacher-centered roles (e.g., directors) as yang. Student-centered teachers are facilitators that may do things such as giving orientations (as in Ausubel's *meaningful learning*), coaching students (as *scaffolding* in Bruner's *discovery learning* or Vygotsky's *social constructivism*), and collaborating with learners (as in constructivism), leading discussions, and coordinating the team works, whereas teacher-centered teachers are involved in designing instructional materials, specific instructional procedures or steps, curriculum or materials, and specific feedback arrangement (reinforcement schemes). However, teaching is an art, and there are a variety of instructional alternatives for teachers to help learners reach the optimal results given that all the components involved in the instruction can be coordinated and organized, and teachers may shift from student-centered roles to teacher-centered roles as the learning conditions change. In the framework of I-Ching, student-centered teacher reflects 'yang', whereas teacher-centered teacher reflects 'yin.'

As to the student component, **w**hat students should do in a given instruction setting depends on the nature of the other five components (i.e., *objective, assessment, teacher, materials and methodology*). First, as teachers may be directors (teacher-centered), so may the students be passive learners, listen to instructions and follow the orders. Next, students shall also be explorers (active) when teachers are facilitators. This can best be demonstrated in *discovery learning* where teachers offer students necessary learning material or information to facilitate students' discovery. Students are active; they are allowed to display or act out their uniqueness and individual needs, which may include intelligence, motivation, aspiration, values, learning styles, learning strategies, temperaments, personalities, and among others. In the framework of I-Ching, students' being active reflects 'yang' nature, whereas their being passive reflects 'yin.' In view of the teacher-student ingredient, the optimal results can be achieved if both the teacher roles (student-centered, teacher-centered) and student attitudes (active, passive) are consistent.

However, there is few, if any, study in the instruction literature, which mainly explore the effects of all the possible teacher-student combinations (i.e., student-centered + active, student-centered + passive, teacher-centered + active, teacher-centered + passive). There are occasions when any of the four combinations appears, and the variations can be explored in terms of the principles of I-Ching, which will be discussed in greater details later.

Three ingredients in Material-Method

The design of teaching materials may cover two distinct versions: materials organized based on the principles of behaviorism, and those based on cognitive principles. Specifically, the main text of teaching material can be presented from simple to complex, from easy to difficult, and from concrete to abstract on the basis of behavioral principles (i.e., programmed instruction initiated by Skinner), which focus on the lower level of cognitive objectives (i.e., remember, understanding). On the other extreme, the main text of teaching material can be presented in a way that could facilitate learners' discovery (i.e., Susubel's advanced organizer, or Brunner's discovery learning); that is, teaching material is replete with tasks or problems that require application of what is learned, and that the *evaluation* and *creativity* are the focus, which is also consistent with the principles of constructivism, the purpose of which is to create or construct knowledge. In the framework of I-Ching, materials that feature the higher level (*evaluation* and *creativity)* represent 'yang,' whereas those of lower level of cognitive objectives (i.e., remember, understanding) reflect 'yin.'

On *teaching methods*, **t**he universal rule for effective instruction is: to help students combine what is old with what is new, which is the common doctrine of cognitivism/constructivism, or even behaviorism and humanism, but with different implications. Firstly, in the behavioral instruction, most notably, the *programmed instruction* stresses the use of rewards and punishments, operant conditioning, reinforcement schedules for the learning materials arranged in terms of successive approximations of the learning units from easy to difficult, and from simple to complex. Such behavioral mode is thought to be especially effective for beginners. From the cognitive perspective, teaching methodologies must be implemented on the basis of the universal rule mentioned above. *discovery learning*, as the term implies, is an inquiry-based learning approach, which has been most notably applied in problem solving situations. In *discovery learning*, students employ their own prior knowledge or experience to discover the rules or truths in what is being learned. Such an instructional process manifests a personal, internal, constructivist learning settings. As Bruner indicates, emphasis on discovery in the course of learning will lead students to be a constructionist **[10],** to help them organize what is exposed to them and to discover regularity and interrelatedness. Again, in the framework of I-Ching, instructional methodologies that feature the cognitive, constructive principles (i.e., meaningful teaching, discovery teaching) reflect 'yang', whereas, those of behavioral oriented procedures (i.e., shaping, programmed instruction) represent 'yin.'

In sum, the yin or yang attributes in each of the six variables (teacher, student, methodology, material, assessment, and objective) can be summarized as the Table 1 below:

Table 1. The features of the instructional conditions in terms of six yaos

Nnature / Factors	yang	ying
Teacher	Student-centered	Teacher-centered
Methodology	Constructivist -oriented	Behavioral -oriented
Assessment	Process –oriented	Product-oriented
Objectives	Aesthetic	Information
Material	Discovery –design	Rote learning-design
Student	Active	Passive

Introduction to I-Ching

The I-Ching, "Yì Jīng", Classic of Changes or Book of Changes, is one of the oldest Chinese classic texts. The book is a symbolic system adopted to identify underlying orders in random events. From research, I-Ching is specialized in the system that does not adhere to the law of conservation, as reflected in most hard sciences such as physics or chemistry. It is especially powerful to interpret the development of an event with qualitative changes, as found in most human interactions, on the basis of the law of equilibrium.

From the perspective of I-Ching, things in this universe are the results of combination of two complementary elements (but with opposite valences: positive vs. negative). The elements with positive energy construct the concrete world, material world (Internal Gua), whereas the elements with negative force construct the abstract world (meta-physical world), or counter-material world (External Gua). The counter-material world is the power source of self-organization and self-stabilization of the world, which can also be broadly called the "spiritual world." (Giang, 2005, P.51)

Each of the material (event) and the counter-material (event) worlds consists of three sub-structures, which can be demonstrated through the structure of the compound of two Guas [11]. The Upper (External) Gua (three yaos) stands for the structure of the counter-event, whereas the Lower (Internal) Gua (also three yaos) stands for the structure of 'Event". This can be illustrated through a hexagram (six yaos) below (0-yin, 1-yang, denoting two opposite extremes):

Upper yao	[___ ___]	or [0] to denote counter-dominant element	(e.g., teacher)
The 5th yao	[_____]	or [1] to denote counter-complementary element	(e.g., methodology)
The 4th yao	[___ ___]	or [0] to denote counter- interactive element	(e.g., assessment)
The 3rd yao	[_____]	or [1] to denote interactive element	(e.g., objective)
The 2nd yao	[___ ___]	or [0] to denote complementary element	(e.g., material)
The 1st yao	[_____]	o r [1] to denote dominant element	(e.g., student)

Firstly, it is logical to assume that Student is the dominant element in the instructional setting, whereas Teacher is the counter-dominant element, since Teacher always plays a more dominant role than Student does, though Student is the key learner. Secondly, the roles that Methodology and Material play are complementary in the instructional setting, with Methodology counteracting Material in that the former can always dominate the latter; that is, the function of Material depends on how it is taught (Methodology). Lastly, the roles that Assessment and Objective play are mainly interactive in the instructional setting, with Assessment counteracting Objective in that the former can always dominate the latter (Wash-back effect); that is, goal setting is often regulated by how it is assessed.

Defining the elements in the double Guas

One of the most important tasks involved in the application of double Guas is to define the elements in both internal and external Guas. As mentioned earlier, a double Gua consists of an internal structure (Lower Gua) and an external structure (Upper Gua), with each three yaos, and there are 6 yaos in total for a double Gua. In the field of instruction, it is logical to conceive Student, Material, and Objective as elements in the Lower Gua, since these three can be considered dominant in the course of learning, whereas Teacher, Methodology, and Assessment as elements in the Upper Gua, since these three are considered to counteract the elements in the Lower Gua. Specifically, Teacher, Methodology, and Assessment in the Upper Gua counteracts Student, Materials, and Objectives in the Lower Gua, respectively. The opposing attributes for each yao, in the Upper Gua, are student-centered vs. teacher-centered in Teacher, constructivist method vs. behavioral method in Methodology, Process vs. product in Assessment, whereas in the Lower Gua, Aesthetic level vs. knowledge level in Objective, discovery mode vs. rote-memory mode in Material, and active vs. passive in Student (See Table 1).

As mentioned previously, student-centered teacher reflects 'yang', and teacher-centered teacher reflects 'yin,' whereas students' being active reflects 'yang', and being passive reflects 'yin'; methodology that features constructivist principles reflects 'yang', and behavioral methodology represents 'yin,' whereas material that features discovery mode represents 'yang,' and the rote-memory mode reflects 'yin'; process assessment reflects 'yang,' and product assessment reflects 'yin,' whereas aesthetic objective as 'yang', and knowledge objective as 'yin.' So far, the elements of both upper and lower Guas have been mapped out on theoretic grounds as above, which, of course, requires empirical validation. Our understanding is that elements of both the Upper and Lower Guas are flexible, and thus subject to change. They are field specific; that is, elements in the double Gua may vary as fields of application differ. For example, in the field of business, the six pairs of elements in the double Gua can be monopoly-share in the wealth distribution of the counter-survival yao, innovative-conservative in the scientific knowledge of the counter-security yao, and uniqueness-coordination in the environmental protection of the counter-aesthetic yao of upper Gua. In this regard, users of this model may adopt the variables they conceive as most significant according to their expertise in a given field.

Such feature truly manifests the essence of I-Ching.

Origins of yin and yang and the resulting eight Guas

It is hypothesized, from I-Ching, that the universe starts with Tai-Chi, indicating the supreme ultimate. In Chinese philosophy, the ultimate indicates the first as well as the last. Two Primary energies are the two differentiations from Tai Chi; namely, yin and yang. When in stillness, they are integrated in Tai Chi, and when in motion, they are differentiated. After Tai Chi had differentiated into two primary energies, Heaven and Earth appeared, sun and moon came forth, and thunder and wind were stirred up. A solid line [____] (or 1) represents the yang, and a broken line [__ __] (or 0) stands for the yin (Huang, 2004). Four Primary symbols coming after two primary energies were generated, yin energy and yang energy interacted. There are four possibilities for those interactions:

The yang interacts with the yang [____] [____] (or 1, 1)
The yin interacts with the yang [__ __] [____] (or 0, 1)
The yang interacts with the yin [____] [__ __] (or 1, 0)
The yin interacts with the yin [__ __] [__ __] (or 0, 0)

Eight Primary GUAs come after the four more advanced forms of yin and yang were generated. There are eight possibilities for interactions:

Yang energy interacts with greater yang energy ☰ or (1, 1, 1)
Ying energy interacts with greater yang energy ☱ or (0, 1, 1)
Yang energy interacts with lesser yin energy ☲ or (1, 0, 1)
Yang energy interacts with lesser yin energy ☳ or (0, 0, 1)
Yin energy interacts with lesser yang energy ☴ or (1, 1, 0)
Yang energy interacts with greater yin energy ☵ or (1, 0, 0)
Yang energy interacts with greater yin energy ☶ or (0, 1, 0)
Yin energy interacts with greater yin energy ☷ or (0, 0, 0)

The names, significance, and attributes of the BA GUA (Huang, 2000, P.2-8) can be specified below:

☰ (1,1,1)-- Qian (Heaven) is the name for the symbol of initiating Heaven, with 3 lines unbroken, indicating the creative energy of the universe, initiating, active, firm, and virile,

☱ (0,1,1)-- Dui (Lake) is the name for the symbol of joyous Lake, having an open top, indicating the responsive energy of the universe, responding, quiet, yielding, docile,

☲ (1,0,1)-- Li (Fire) is the name for the symbol of clinging Fire, disconnected in the middle, indicating the symbol of heat and light, brightness, clinging, illuminating, radiating, above,

☳ (0,0,1)—Zhen (Thunder) is the name for the symbol of arousing Thunder, like a cup standing upright, indicating the arousing energy in the universe, moving, approaching, arousing, rising,

☴ (1,1,0)-- Xun (Wind) is the name for the symbol of penetrating Wind, has a cracked bottom, indicating proceeding, penetrating energy in the universe, assembling, dispersing, lying.

☵ (0,1,0)-- Kan (Water) is the name for the symbol of dangerous Water, firm in the center, indicating anything related to darkness, danger, sinking, venturing, moisturizing, and below

☶ (1,0,0)-- Gen (Mountain) is the name for the symbol of stable Mountain, like a bowl lying inverted, indicating the soothing energy in the universe, standing, accomplishing, resting, halting

☷ (0,0,0)--Kun (Earth) is the name for the symbol of Earth, the responding Earth, with3 lines broken, indicating the responsive energy of the universe, responding, quiet, yielding, docile.

To exemplify, we can classify students' personality configurations into eight types, which may be elaborated below (again, the derivation of the content will be discussed later):

Type 1: ☰ (1,1,1)-- Qian (Heaven)

→ Students of this type are active in learning, prefers discovery learning designed materials, and seeks aesthetic levels of objectives.

Type 2: ☱ (0,1,1)-- Dui (Lake)

→ Students of this type are active in learning, prefers discovery learning designed materials, and seeks knowledge level of objectives.

Type 3: ☲ (1,0,1)-- Li (Fire)

→ Students of this type are active in learning, prefers rote learning-designed materials, and seeks aesthetic levels of objectives.

Type 4: ☳ (0,0,1)-- Zhen (Thunder)

→ Students of this type are active in learning, prefers rote-memory learning designed materials, and seeks knowledge level of objectives.

Type 5: ☴ (1,1,0)-- Xun (Wind)

→ Students of this type are passive in learning, prefers discovery learning designed materials, and seeks aesthetic level of objectives.

Type 6: ☵ (0,1,0)-- Kan (Water)

→ Students of this type are passive in learning, prefers discovery learning designed materials, and seeks knowledge level of objectives.

Type 7: ☶ (1,0,0)-- Gen (Mountain)

→ Students of this type are passive in learning, prefers rote learning-designed materials, and seeks aesthetic levels of objectives

Type 8: ☷ (0,0,0)--Kun (Earth)

→ Students of this type are passive in learning, prefers rote learning-designed materials, and seeks knowledge levels of objectives

Double Guas in I-Ching

With the idea of event and counter-event, along with the three elements of each Gua and the three corresponding counter-elements, we can develop a total of 64 Guas [1]. Each of the Eight Guas can be combined of other Guas (including itself). For example, ☰ (1,1,1)-Qian (Heaven) can be combined with ☰ (1,1,1)-Qian (Heaven)，☱ (0,1,1)-Dui (Lake)，☲ (1,0,1)-Li (Fire)，☳ (0,0,1)-Zhen (Thunder)，☴ (1,1,0)-Xun (Wind)，☵ (0,1,0)-Kan (Water)，☶ (1,0,0)-Gen (Mountain)，and ☷ (0,0,0)-Kun (Earth), and results in the double Guas along with their implications below:

☰ (1,1,1) x ☰ (1,1,1) → (1,1,1) (1,1,1), implying creating force
☰ (1,1,1) x ☱ (0,1,1) → (1,1,1) (0,1,1), implying treading carefully
☰ (1,1,1) x ☲ (1,0,1) → (1,1,1) (1,0,1), implying cooperating with others
☰ (1,1,1) x ☳ (0,0,1) → (1,1,1) (0,0,1), implying avoiding complications
☰ (1,1,1) x ☴ (1,1,0) → (1,1,1) (1,1,0), implying a meeting of opposites
☰ (1,1,1) x ☵ (0,1,0) → (1,1,1) (0,1,0), implying conflict
☰ (1,1,1) x ☶ (1,0,0) → (1,1,1) (1,0,0), implying retreating
☰ (1,1,1) x ☷ (0,0,0) → (1,1,1) (0,0,0), implying stagnation

Each of the double Guas (hexagrams) above can be further defined n terms of a given learner in an instruction setting as:

1) ☰ (1,1,1) x ☰ (1,1,1): In the Lower Gua, active student (1), discovery-oriented material (1), and aesthetic level objective (1), and in the Upper Gua, process orientated assessment (1), constructivist-oriented methodology (1), and student-centered teacher (1), thus being ☰ (1,1,1) x ☰ (1,1,1), implying creating force, a learning situation where learners may experience considerable and great progress all the way.

2) ☰ (1,1,1) x ☵ (0,1,1): In the Lower Gua, active student (1), discovery-oriented material (1), and knowledge level objective (0), and in the Upper Gua, process orientated assessment (1), constructivist-oriented methodology (1), and student-centered teacher (1), thus being ☰ (1,1,1) x ☵ (0,1,1), implying treading carefully, a learning situation where learners may experience obstacles, and so must be cautious as learning moves on.

3) ☰ (1,1,1) x ☲ (1,0,1) → In the Lower Gua, active student (1), Rote learning oriented material (0), and aesthetic level objective (1), and in the Upper Gua, process orientated assessment (1), constructivist-oriented methodology (1), and student-centered teacher (1), thus being ☰ (1,1,1) x ☲ (1,0,1), implying cooperating with others, a learning situation where learners may reach their learning objectives through cooperation with others, and so learning setting of such a type facilitates learning.

4) ☰ (1,1,1) x ☷ (0,0,1): In the Lower Gua, active student (1), Rote learning oriented material (0), and knowledge level objective (0), and in the Upper Gua, process orientated assessment (1), constructivist-oriented methodology (1), and student-centered teacher (1), thus being ☰ (1,1,1) x ☷ (0,0,1), implying avoiding complications, a learning situation where learners may not make mistakes, complications encountered in learning can be neutralized by such a earning setting.

5) ☰ (1,1,1) x ☱ (1,1,0): In the Lower Gua, active student (1), discovery-oriented material (1), and knowledge level objective (0), and in the Upper Gua, process orientated assessment (1), constructivist-oriented methodology (1), and student-centered teacher (1), thus being ☰ (1,1,1) x ☱ (1,1,0), implying a meeting of opposites, a learning situation where learners may experience great difficulties, which minimizes learning effects.

6) ☰ (1,1,1) x ☱ (0,1,0): In the Lower Gua, passive student (0), discovery-oriented material (1), and knowledge level objective (0), and in the Upper Gua, process orientated assessment (1), constructivist-oriented methodology (1), and student-centered teacher (1), thus being ☰ (1,1,1) x ☱ (0,1,0), implying conflict, a learning situation where learners may suffer conflicts with other learners or with the teacher, which interferes with learning.

7) ☰ (1,1,1) x ☷ (1,0,0): In the Lower Gua, passive student (0), Rote learning oriented material (0), and aesthetic level objective (1), and in the Upper Gua, process orientated assessment (1), constructivist-oriented methodology (1), and student-centered teacher (1), thus being ☰ (1,1,1) x ☷ (1,0,0), implying retreating, a learning situation where learning does not advance, only to retreat.

8) ☰ (1,1,1) x ☷ (0,0,0): In the Lower Gua, passive student (0), Rote-memory oriented material (0), and knowledge level objective (0), and in the Upper Gua, process orientated assessment (1), constructivist-oriented methodology (1), and student-centered teacher (1), thus being ☰ (1,1,1) x ☷ (0,0,0), implying stagnation, a learning situation where no progress can be expected.

Note that the content of each hexagram is tentative, and is subject to change. The derivation of the content in each hexagram will be dealt with later in greater detail.

Dynamics of interactive laws in I-Ching

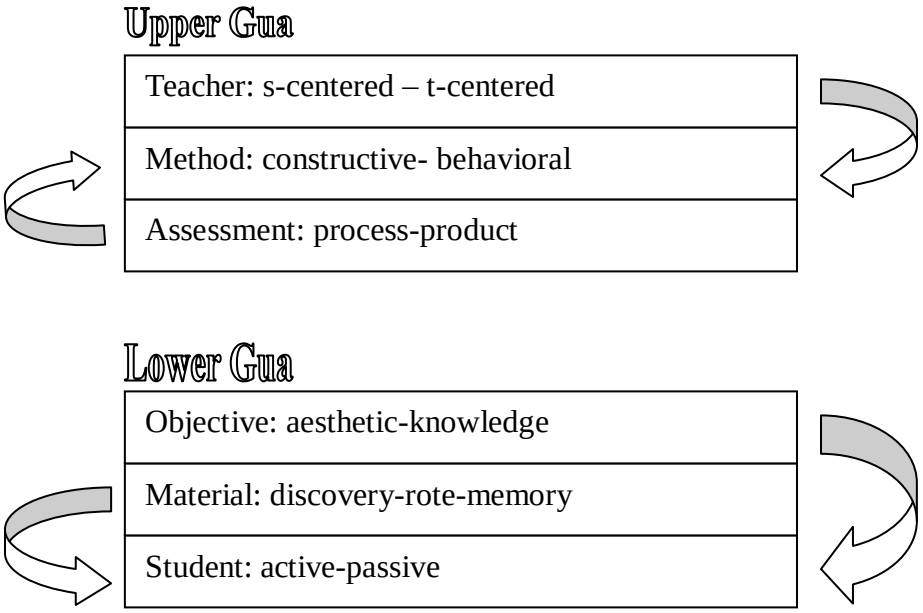
In any hexagram, there are multi-dimensional relationships between different yaos in both Upper and Lower Guas, and the yaos between Upper and Lower Guas. There are roughly three laws that govern the interrelationships among the yaos in the hexagram (Giang, 2005, P.61) :

1) Reciprocity law (advantageous vs. disadvantageous): to understand an "event," one needs to know its structures and attributes. The Reciprocity law is to disclose the relationship between the structure and its attributes.

As indicated earlier, every event or counter-event is the composite of dominant, complementary, and interactive elements. Because each element has different attributes in yin and yang, the attributes of their corresponding counter-events differ. Relationships among the three elements are reciprocal, and thus follow the law of reciprocity. Ancient Chinese people found that allies of elements of identical attributes are more powerful, and are more advantageous to attributes of events or counter-events, whereas allies of elements of opposite attributes are less powerful, and are more disadvantageous to attributes of events or counter-events. For example, in the double Guas of ☰ (1,1,1) x ☰ (1,1,1), learners of this hexagram display active attitude (1), prefer discovery-oriented material (1), and strive for aesthetic level objective (1), prefer process orientated assessment (1), benefit from constructivist-oriented methodology (1), and feels comfortable with student-centered teacher (1).

Firstly, in the Lower Guas, the attribute of being active is supported by both discovery-oriented material (1), and the aesthetic level objective, since they are all yang (1,1,1) by nature, so is the situation in the upper Guas, the attribute of constructivist methodology is reinforced by student-centered teacher, and process oriented assessment, because they are, again, all yangs (1,1,1) (Note that, in the reciprocity law, the first yao in the Lower Gua and the fifth yao in the Upper Gua are the two most important yaos in the double Gua, since if the yin/yang nature of other yaos go with these two, then the double Gua is considered positive in this regard). On the other hand, if the hexagram is☰ (1,1,1) x ☷ (1,0,0), learners of this hexagram display passive attitude (0), prefer rote-memory oriented material (0), but strive for aesthetic level objective (1), prefer process orientated assessment (1), receive constructivist-oriented methodology (1), and student-centered teacher (1). Firstly, in the lower Guas, though the attribute of being passive (0) is supported by both rote-memory oriented material (0), but not by the aesthetic level objective, since they are not all yang or yin (1, 0, 0) by nature. But in the upper Gua, the attribute of constructivist methodology is reinforced by student-centered teacher, and process oriented assessment, because they are, again, all yangs (1,1,1).

Figure 1. Reciprocity law in Upper and Lower Gua



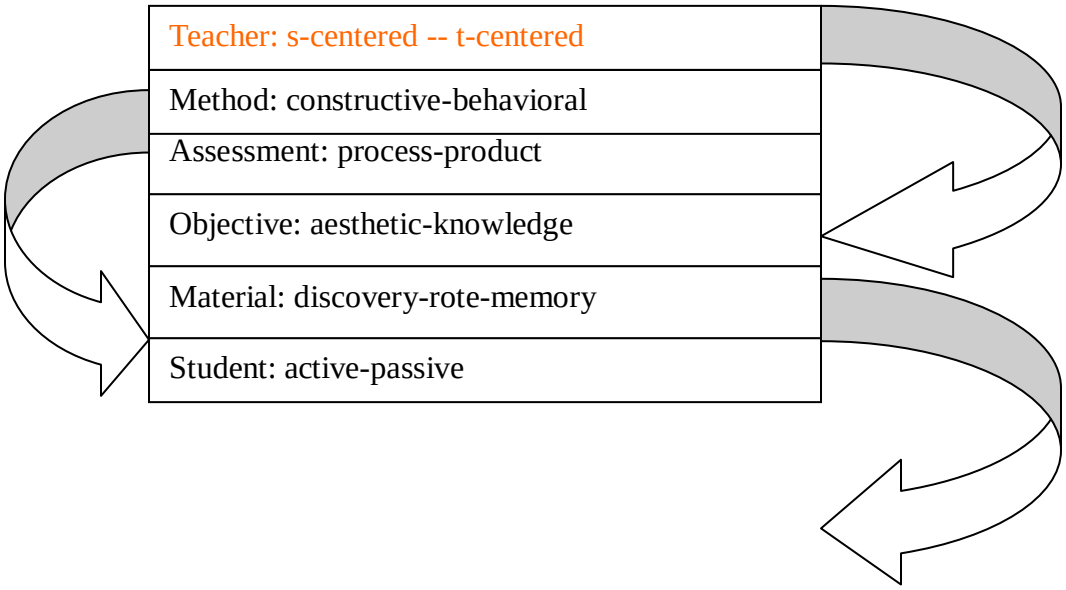
2) Interactive law (gain vs. loss): There is an interactive relationship that determines gain or loss after interaction. To specify, the 6th, 5th, and the 4th yaos in the upper gua correspond with the 3rd, 2nd, and 1st yaos, respectively. If each yao is in its proper position (or proper yin or yang; that is, 1st, 3rd , and 5th yaos for yang, and 2nd, 4th, and upper yaos for yin), then such interaction will result in gains. On the other hand, if each yao is in its wrong position (or improper yin or yang), then such interaction will result in loss (the proper positions of yin and yang in the 6 yaos being the yang in the 1st, 3rd, and 5th yaos, yin in the 2nd, 4th, and 6th yaos (姜, 2004, P.63).

A proper valence for each yao in the hexagram is, in the upper Gua, ☷ (0,1,0), and in the lower Gua, ☲ (1,0,1), and this hexagram implying 'mission accomplished.' Complementary equilibrium law is reflected in pairs:

the 4th yao (0) vs. the 1st yao (1),
the 5th yao (1) vs. the 2nd yao (0), and
the upper yao (0) vs. the 3rd yao (1).

As can be seen, each pair is complementary, and is thus dynamic. The attributes of the hexagram ☷ (0,1,0) x☲ (1,0,1), for example, are, in the upper Gua, teacher-centered, constructivist methodology, and product-oriented assessment; in the lower Gua, aesthetic-level objectives, rote-memory design materials, and active student. From the complementary equilibrium law, there is a proactive advantage on 1st yao (1, active student) in the 4th yao (0) vs. the 1st yao (1), since they are both of proper valence; that is, active student (1st yao) is reinforced product-oriented assessment (the 4th yao), so is a proactive found in the pair the 5th yao (1) vs. the 2nd yao (0), where the 2nd yao (rote-memory design material) is supported by the 5th yao (constructivist methodology), since they are both of proper valence, and so is the proactive found in the pair of the upper yao (0) vs. the 3rd yao (1), where the aesthetic level objective (3rd yao) is supported by the student-centered teacher (upper yao). The interactive effects between yaos in Upper and Lower Guas can be categorized below:

Figure 2. Interactive law in the Double Gua



(a) the 4th yao vs. the 1st yao:

(1) vs. (1) → proactive disadvantage, the 1st yao is weakened
e.g., the active (student) is weakened by process (assessment)
(1) vs. (0) → retroactive advantage, the 4th yao is reinforced
e.g., the process (assessment) is reinforced by active (student)
(0) vs. (1) → proactive advantage, the 1st yao is reinforced
e.g., the active (student) is reinforced by product (assessment)
(0) vs. (0) → retroactive disadvantage, the 4th yao is weakened
e.g., the product (assessment) is weakened by passive (student)

(b) the 5th yao vs. the 2nd yao:

(1) vs. (1) → retroactive disadvantage, the 5th yao is weakened
e.g., the constructivist (method) is weakened by the discovery mode (material)

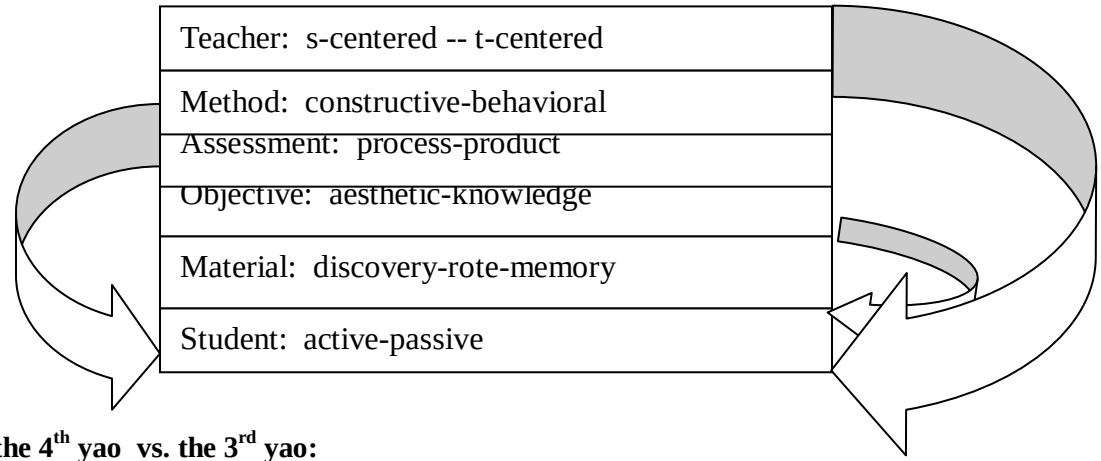
(1) vs. (0) → proactive advantage, the 2nd yao is reinforced
e.g., the rote-memory mode (material) is reinforced by the constructivist (method)
(0) vs. (1) → retroactive advantage, the 5th yao is reinforced
e.g., the behavioral (method) is reinforced by the discovery mode (material)
(0) vs. (0) → proactive disadvantage, the 2nd yao is weakened
e.g., the rote-memory mode (material) is weakened by the behavioral (method)

(c) the upper yao vs. the 3rd yao:

(1) vs. (1) → proactive disadvantage, the 3rd yao is weakened
e.g., the aesthetic (objective) is weakened by the student centered (teacher)
(1) vs. (0) → retroactive advantage, the upper yao is reinforced
e.g., the student centered (teacher) is reinforced by the knowledge (objective)
(0) vs. (1) → proactive advantage, the 3rd yao is reinforced
e.g., the aesthetic (objective) is reinforced by the teacher-centered (teacher)
(0) vs. (0) → retroactive disadvantage, the upper yao is weakened
e.g., the teacher-centered (teacher) is weakened by the knowledge (objective)

3) Complementary equilibrium law (dynamic vs. static): For every event and counter-event interaction, there is a structure balance between material and counter-material. Such equilibrium is realized by the complementary energy of opposite valence. For every complete event, the dominant, complementary, and interactive elements will be balanced by counter-dominant, counter-complementary, and counter-interactive elements of counter-events. The yin nature of element in counter-event will counteract the event, while the yang nature will promote the event. Thus the yin element in the counter-event and the yang element in the event are complementary, which is "static equilibrium." Similarly, the yang element in the counter-event and the yin element in the event are complementary, which is "dynamic equilibrium. If both yao elements in event and counter-event are of the same nature (e.g., both are ying, or both are yang), then they are disequilibrium. When in disequilibrium, the yang dominant, complementary, and interactive elements in the event will be greater than those of corresponding elements in the counter-event. (Giang, 2005, P.62) The complementary effects between yaos in upper and lower Guas can be categorized below:

Figure 3. Complementary law in the Double Gua



(a) the 4th yao vs. the 3rd yao:

(1) vs. (1) → disequilibrium, the 3rd yao is more powerful
e.g., the aesthetic (objective) is more powerful than process (assessment)
(1) vs. (0) → dynamic equilibrium, the 3rd yao yields to the 4th yao
e.g., the knowledge (objective) yields to the process (assessment)
(0) vs. (1) → static equilibrium, the 3rd yao yields to the 4th yao
e.g., the aesthetic (objective) yields to the product (assessment)
(0) vs. (0) → disequilibrium, the 4th yao is more powerful
e.g., the product (assessment) is more powerful than knowledge (objective)

(b) the 5th yao vs. the 2nd yao:

(1) vs. (1) → disequilibrium, the 5th yao is more powerful
e.g., the constructivist (method) is more powerful than discovery mode (material)

(1) vs. (0) → dynamic equilibrium, the 2nd yao yields to the 5th yao
e.g., the rote-memory- mode (material) yields to the constructivist (method)

(0) vs. (1) → static equilibrium, the 2nd yao yields to the 5th yao
e.g., the discovery mode (material) yields to the behavioral (method)

(0) vs. (0) → disequilibrium, the 2nd yao is more powerful
e.g., the rote-memory mode (material is more powerful than the behavioral mode (material)

(c) the upper yao vs. the 1st yao:

(1) vs. (1) → disequilibrium, the 1st yao is more powerful
e.g., the active (student) is more powerful than the student-centered (teacher)

(1) vs. (0) → dynamic equilibrium, the 1st yao yields to the upper yao
e.g., the passive (student) yields to the student-centered (teacher)

(0) vs. (1) → static equilibrium, the 1st yao yields to the upper yao
e.g., the active (student) yields to the teacher-centered (teacher)

(0) vs. (0) → disequilibrium, the upper yao is more powerful
e.g., the teacher-centered (teacher) is more powerful than the passive (student)

To take the hexagram ䷧ (0,1,0) x ䷀ (1,0,1) as an example, the complementary equilibrium law between 1) **the 4th yao (0) and the 3rd yao** (1) is one of static equilibrium, the 3rd yao yields to the 4th yao, meaning that the aesthetic level (objective) yields to product-oriented (assessment), between 2) **the 5th yao (1) and the 2nd yao (0)** is one of dynamic equilibrium, the 2nd yao yields to the 5th yao, meaning that rote-memory design (material) yields to constructivist (methodology), and between 3) **the upper yao (0) and the 1st yao** (1) is one of static equilibrium, the 1st yao yields to the upper yao, meaning that teacher-centered (teacher) yields to active (student).

Changes of each hexagram across various tension levels

Lower Gua may naturally change, and becomes attributes of other Guas, which is one of the features of I-Ching, the discipline dealing with changes. By analogy, when at noon, the sun is over the sky with the strongest yang (1), whereas when at midnight, the moon is over the sky with the strongest yin (0). In between yang (1) and yin (0), there are gradual development of either yang or yin, depending on the directions; the level of yang may develop gradually as the moon moves to the west, when the sun may emerge from the east, and the level of yang may decline gradually as the sun moves from over the sky to the horizon, and yin may increase gradually accordingly. To take the ䷀ (1,1,1)- Qian (Dragon) as an example, the routes of its change can be depicted as 1) ䷹ (0,1,1)-Dui (Lake), then 2) ䷜ (0,1,0)-Kan (Water), then 3) ䷁ (0,0,0)-Kun (Earth). As can be seen, the ䷀ (1,1,1)-Qian (Dragon) Gua moves gradually to the ䷁ (0,0,0)- Kun (Earth) Gua, via ䷹(0,1,1)-Dui (Lake) Gua, and ䷜ (0,1,0)-Kan (Water) Gua. Notice that the number of yin yaos increases as each Gua moves. Further, it is also sensible to regard the changing from yang yaos to yin yaos in the moving Guas as the changing from the neutral situation (where there is less yin yaos), to tension situation (with more yin yaos), to pressure situation (with even more yin yaos), and super-pressure situation (with the maximal number of yin yaos). With such logic, prediction of changes of each Gua becomes plausible and sensible. In the following, development of each Gua (8 lower Guas) in various situations can be specified below: (ID denotes the identity of the individual Gua)

Table 2: Changes of 8 Lower Guas under various conditions

8 Gguas	Id	Neutral	Tension	Pressure	Excessive-pressure
☰(1,1,1)Qian	☰(1,1,1)	☰(1,1,1)	☱(0,1,1)	☲(0,1,0)	☷ (0,0,0)
☳(0,0,1)Zhen	☱(0,1,1)	☶(1,0,0)	☷ (0,0,1)	☱(0,1,1)	☶(1,0,0) / ☱(0,1,1)
☱(0,1,1) Dui	☴(1,1,0)	☱(0,1,1)	☰(1,1,1)	☴(1,1,0)	☶(1,0,0) / ☷ (0,0,1)
☵(0,1,0) Kan	☵(0,1,0)	☵(0,1,0)	☴(1,1,0)	☰ (1,1,1)	☲ (1,0,1)
☶(1,0,0)Gen	☶(1,0,0)	☷ (0,0,1)	☶(1,0,0)	☴(1,1,0)	☱(0,1,1) / ☴(1,1,0)
☷(0,0,0)Kun	☷(0,0,0)	☷ (0,0,0)	☶(1,0,0)	☲ (1,0,1)	☰(1,1,1)
☲(1,0,1) Li	☲ (1,0,1)	☲ (1,0,1)	☷ (0,0,1)	☷ (0,0,0)	☵(0,1,0)
☴(1,1,0) Xun	☷ (0,0,1)	☴(1,1,0)	☵(0,1,0)	☱(0,1,1)	☷ (0,0,1) / ☴(1,1,0)

Note that there are some drastic changes from ID to Neutral situations in certain Guas such as ☱(0,1,1), ☴(1,1,0), ☶(1,0,0), and ☷ (0,0,1), and each of these becomes ☶(1,0,0), ☱(0,1,1), ☷ (0,0,1), and ☴(1,1,0), respectively. It is possible because these Guas (with both yang and yin yaos) are always in a state of flux. They are too ready to change into their complementary yaos. To take ☱(0,1,1) as an example, if all the yaos turn into their opposite yaos, then ☱(0,1,1) the Lake becomes ☶(1,0,0) the Mountain. As to the ☴(1,1,0), the Wind, if we reverse the order of yin and yang of this Gua, we get ☱(0,1,1) the Lake, which may be attributed to the changing nature of the Wind. (The patterns of changing summarized in the list are rooted from the cultural data of China collected in a duration of almost five thousand years though still subject to empirical validation). Specific changes of attribute of the Lower Gua in various situations can be specified below: (to take ☶(1,0,0) the Mountain as an example)

Table 3: Changes of ☶(1,0,0) Gua under various conditions

8 guas	Id	Neutral	Tension	Pressure	Excessive-pressure
☶(1,0,0)Gen	☶(1,0,0) aesthetic rote-memory passive	☷ (0,0,1) knowledge rote-memory active	☶(1,0,0) aesthetic rote-memory passive	☴(1,1,0) aesthetic discovery passive	☱(0,1,1) / ☴(1,1,0) Knowledge/ aesthetic discovery / rote memory active/ active

From Table 3, the aesthetic/knowledge level objective attribute of the people of ☶(1,0,0) Gen type may switch to other emotional states as situations change, and what is more intriguing is the active/passive attribute, which may also vary as situations change, phenomenon of which is inspiring because in educational settings some may argue that passive students will suffer from learning discovery mode material; however, from the model above, we can see that things are always changing, and the personality traits, believed to be intractable, are actually always subject to change.

The above mentioned mainly deals with the Lower Guas (the internal structure), but in real life settings, double Guas (the Upper Gua and the Lower Gua) are more common, so it is essential to map out possible dynamic configurations of them. With the development patterns of each Lower Gua mentioned above as the basis, we may thus describe the changing patterns of each double Gua (a total of 64 Guas: 8 x 8). Development pattern of each double Gua under various situations (neutral, tension, pressure, and excessive pressure) can be specified as below: (to take lower ☰(1,1,1) Qian –the Heaven as an example)

Table 4. Implications of the double Guas with lower ☰(1,1,1) Gua under various conditions

	Lower Gua ☰(1,1,1) Qian-Heaven				
Upper Gua	ID	Neutral	Tension	Pressure	Excessive pressure
☰(1,1,1) Qian-Heaven	☰(1,1,1) Initiating	☰(1,1,1) Initiating	☱(0,1,1) Treading carefully	䷅ (0,1,0) Conflict	䷇ (0,0,0) Hindrance
☷(0,0,0) Kun-Earth	☰(1,1,1) Advance	☰(1,1,1) Advance	☱(0,1,1) Approaching	䷅ (0,1,0) Multitude	䷇ (0,0,0) Responding
☱(0,1,1) Dui-Lake	☰(1,1,1) eliminating	☰(1,1,1) Eliminating	☱(0,1,1) Joyful	䷅ (0,1,0) exhausting	䷇ (0,0,0) bring together
☲(1,0,1) Li-Fire	☰(1,1,1) great harvest	☰(1,1,1) great harvest	☱(0,1,1) Diversity	䷅ (0,1,0) yet fulfilled	䷇ (0,0,0) proceeding forward
☴(1,1,0) Xun-Wind	☰(1,1,1) Little accumulation	☰(1,1,1) Little accumulation	☱(0,1,1) The Power of inner truth	䷅ (0,1,0) Dispersing	䷇ (0,0,0) Watching
☳(0,0,1) Zhen-Thunder	☰(1,1,1) great strength	☰(1,1,1) great strength	☱(0,1,1) marry-maiden	䷅ (0,1,0) relief	䷇ (0,0,0) Thinking ahead
☵(0,1,0) Kan-Water	☰(1,1,1) needing	☰(1,1,1) Needing	☱(0,1,1) Restricting	䷅ (0,1,0) darkness	䷇ (0,0,0) union
☶(1,0,0) Gen-Mountain	☰(1,1,1) Controlling your resources	☰(1,1,1) Controlling your resources	☱(0,1,1) decreasing	䷅ (0,1,0) Childhood	䷇ (0,0,0) falling away

From Table 4, we can see a few intriguing facts that underlie the fluctuations of the double Guas under different levels of pressure. Firstly, compare ☲(1,0,1) ☰(1,1,1) double Gua with ☳(0,0,1) ☰(1,1,1) double Gua under Pressure condition, emotion state of the former is something of Yet fulfilled, whereas the latter something of Relief. And when these two double Guas under extreme pressure condition, emotion of learners with ☲(1,0,1) ☰(1,1,1) double Gua features something of Proceeding forward, whereas that of ☳(0,0,1) ☰(1,1,1) double Gua is something of Thinking ahead. From another perspective, ☲(1,0,1) ☰(1,1,1) can be conceived as being ☲(1,0,1) ䷇ (0,0,0) when under the condition of extreme pressure; that is, the active - discovery- aesthetic (1, 1, 1) turns into passive – rote-memory - knowledge (0, 0, 0) in the internal structure (Lower Gua) while the external structure (Upper Gua) remains unchanged. Secondly, for learners of ☱(0,1,1) ☰(1,1,1) double Gua under tension, pressure, and extreme pressure conditions, their emotions change from ☱(0,1,1) ☱(0,1,1), meaning Joyful, ☱(0,1,1) ䷅ (0,1,0), meaning Exhausting, to ☱(0,1,1) ䷇ (0,0,0), meaning Bring together.

That is, the Lower Gua of ☱(0,1,1) ☰(1,1,1) double Gua under neutral, tension, pressure, and extreme pressure conditions changes from ☰(1,1,1), active - discovery- aesthetic, ☱ (0,1,1), passive - discovery- aesthetic, ䷅ (0,1,0), passive - discovery- knowledge, to ䷇ (0,0,0), passive – rote-memory - knowledge. Third, the Upper Gua for all the double Guas is the same ☰(1,1,1), whereas the cognitive structure (Upper Gua) varies, and these varied eight Guas determine the final emotional states. From another perspective, the external structures (Upper Gua) of each double Gua can be kept constant, while the internal structure (Lower Gua) varies (i.e., eight Guas). To take ☰(1,1,1) as the Upper Gua, and each of the eight Guas as Lower Guas, we can have 1) ☰(1,1,1) ☰(1,1,1), 2) ☰(1,1,1) ☷(0,0,0), 3) ☰(1,1,1) ☱(0,1,1), 4) ☰(1,1,1) ☲(1,0,1), 5) ☰(1,1,1) ☴(1,1,0), 6) ☰(1,1,1) ☶(0,0,1), 7) ☰(1,1,1) ䷅(0,1,0), and 8) ☰(1,1,1) ☳(1,0,0).

Answer to the question posed in the beginning

The instructional conditions of the setting in the question posed can be specified in the Table 5 below (bald faced with shade):

Table 5. The features of the instructional conditions in terms of six yaos.

Factors	Yang	ying
Teacher	**Student-centered**	Teacher-centered
Methodology	Constructivist -oriented	**Behavioral -oriented**
Assessment	Process –oriented	**Product-oriented**
Objectives	**Aesthetic**	Information
Material	Discovery –design	**Rote learning-design**
Student	**Active**	Passive

According to the Table 5, the six yaos form the double Gua ䷳(1,0,0)-Mountain x ䷝ (1,0,1)-Fire, meaning Adornment, which has negative connotation; that is, though learners may experience a slight success, the effect can not last long, much like enjoying the setting sun, though it is beautiful, and yet it will soon turn into darkness.

Table 6. Changes of ䷳(1,0,0) Gua under various conditions

8 guas	Id	Neutral	Tension	Pressure	Excessive-pressure
䷳(1,0,0)Gen	䷳(1,0,0) aesthetic rote-memory passive	䷞ (0,0,1) knowledge rote-memory active	䷳(1,0,0) aesthetic rote-memory passive	䷕(1,1,0) aesthetic discovery passive	䷢(0,1,1) / ䷕(1,1,0) Knowledge/ aesthetic discovery / rote memory active/ active

From Table 6, the aesthetic/knowledge level objective attribute of the people of ䷳(1,0,0) Gen type may switch to other emotional states as situations change, and what is more intriguing is the active/passive attribute, which may also vary as situations change, phenomenon of which is inspiring because in educational settings some may argue that passive students will suffer from learning discovery mode material; however, from the model above, we can see that things are always changing, and the personality traits, believed to be intractable, are actually always subject to change.

The above mentioned mainly deals with the Lower Guas (the internal structure), but in real life settings, double Guas (the Upper Gua and the Lower Gua) are more common, so it is essential to map out possible dynamic configurations of them.

Table 7. Implications of the double Guas with ䷳(1,0,0) x ䷝(1,0,1) Gua under various conditions

Upper Gua	ID	Neutral	Tension	Pressure	Excessive pressure
䷳(1,0,0)-Mountain	䷝ (1,0,1) Adornment	䷝ (1,0,1) Adornment	䷞ (0,0,1) Nourishing;	䷁ (0,0,0) Doing away with the old;	䷣(0,1,0) Inexperience

Secondly, for learners of ䷤(0,1,1) ䷀(1,1,1) double Gua under tension, pressure, and extreme pressure conditions, their emotions change from ䷤(0,1,1) ䷤(0,1,1), meaning Joyful, ䷤(0,1,1) ䷧ (0,1,0), meaning Exhausting, to ䷤(0,1,1) ䷁ (0,0,0), meaning Bring together. That is, the Lower Gua of ䷤(0,1,1) ䷀(1,1,1) double Gua under neutral, tension, pressure, and extreme pressure conditions changes from ䷀(1,1,1), active - discovery- aesthetic, ䷤ (0,1,1), passive - discovery- aesthetic, ䷧ (0,1,0), passive - discovery- knowledge, to ䷁ (0,0,0), passive - rote-memory - knowledge. Third, the Upper Gua for all the double Guas is the same ䷀(1,1,1), whereas the cognitive structure (Upper Gua) varies, and these varied eight Guas determine the final emotional states. From another perspective, the external structures (Upper Gua) of each double Gua can be kept constant, while the internal structure (Lower Gua) varies (i.e., eight Guas). To take ䷀(1,1,1) as the Upper Gua, and each of the eight Guas as Lower Guas, we can have 1) ䷀(1,1,1) ䷀(1,1,1), 2) ䷀(1,1,1) ䷁(0,0,0), 3) ䷀(1,1,1) ䷤(0,1,1), 4) ䷀(1,1,1) ䷥(1,0,1), 5) ䷀(1,1,1) ䷕(1,1,0), 6) ䷀(1,1,1) ䷣(0,0,1), 7) ䷀(1,1,1) ䷧(0,1,0), and 8) ䷀(1,1,1) ䷳(1,0,0).

Possible ways to improve the situation can be:

1) On Methodology (change Behavioral –oriented into Constructivist –oriented method), and thus become the double Gua ䷤(1,1,0) x ䷤ (1,0,1), meaning Household , which has positive connotation; that is, learners may benefit a great deal from Constructivist –oriented instruction and enjoy the harmonious interactions with others in the course of learning.
2) On Assessment (change Product-oriented into Process –oriented assessment), and thus become the double Gua ䷝ (1,0,1) x ䷝ (1,0,1), meaning Brightness, which has positive connotation; that is, learners may benefit a great deal from process –oriented instruction and enjoy the energetic, and highly motivated state of mind in the course of learning.
3) On Material (change Rote-learning–design into Discovery–design in material), and thus become the double Gua ䷁(1,0,0) x ䷀(1,1,1), meaning Great Accumulation, which has positive connotation; that is, learners may benefit a great deal from discovery–design material, and enjoy the harvest of learning.

Conclusion

From the perspectives of Ba Gua, I-Ching, the emotional states of learners under various levels of pressure can be predicted, and appropriate measures can be taken by teachers to help learners achieve optimal learning results. To make such a system work in the instructional setting, one must first find the appropriate variables for each yao in the double Gua. In this paper the proposed variables (teacher, methodology, assessment, objectives, materials, and students) involved in the course of learning are tentative. It is very that different teachers might have different ideas with reference to the factors. Thus, it is interesting to explore whether different learning factors will make similar predictions in terms of the I-Ching system. For example, some teachers might choose one category (e.g., student) for the internal Gua, and another category (e.g., teacher) as external Gua. And the former Gua (the student) may cover dimensions such as information gathering (extrovert vs. introvert), information perception (concrete vs. abstract), information processing (active experimenting vs. reflective observation), and the latter Gua (the teacher) may cover assessment (qualitative vs. quantitative), methodology (lecture vs. task), rapport (affective vs. cognitive). It is believed that no matter what factors one may choose to be the contents in the six yaos, he predictions made by the system can be expected to be similar if not identical if only the factor chosen actually encompasses, in each yao, two opposite traits (e.g., active vs. passive) by nature (e.g., yin and yang).

After the factors (e.g., teacher, student) along with their structural ingredients (e.g., student-centered, teacher-centered, and active, passive) involved in the course of learning are fixed, the six yaos of the Gua are determined. Then one can continue to explore the dynamics among the six yaos in terms of 1) reciprocity law (advantageous vs. disadvantageous), 2) interactive law (gain vs. loss), and 3 complementary equilibrium law (dynamic vs. static). Next, since each of the eight Guas has its own changing pattern as situation varies (from neutral, tension, pressure, to high pressure), one can make predictions of changes or developments of the double Gua with the internal Gua as the basis. For each double Gua, there is special or unique meaning or implication, being positive or negative. Lastly one can change what is negative into what is positive, to optimize the results by manipulating the valence (yin or yang) of a certain yao, to make the whole Gua positive.

Admitted that the principles of I-Ching may shed new light in the field of learning, there is necessity for empirical validation. Interested researchers may conduct either qualitative studies by using inventories or quantitative studies by doing experimental studies (e.g., manipulating certain variables to observe the results).

Bibliography

[1] Programmed Instruction or Learning, as based on Skinner's operant conditioning, is as suggested from the Triarchial Instruction Model, an indispensable design for beginners.

[2] Behaviorism originated with the work of an American psychologist, John B. Watson, and is today associated today with B.F. Skinner.

[3] Discovery Learning, proposed by a cognitive psychologist, Jerome Brunner, is an inquiry-based learning method,

[4] The cognitivistic school of thought makes mental processes the primary object of study and tried to discover and model the mental processes on the part of the learner. It is a new perspective that employs information-processing ideas.

[5] Open classroom refers to the instruction setting in which students are allowed to have more opportunity to explore the learning environment, and their social and emotional well-being is supported and nurtured in addition to academic growth and success. Such design is based on principles of humanism.

[6] Humanism is concerned about humanity, and human individuals. Instructions based on humanism features the concerns of individual needs, values, self growth, self-respect, and self actualization.

[7] This Simbol(Yin-Yang) represents the ancient Chinese understanding of how things work. The outer circle represents "everything", while the black and white shapes within the circle represent the interaction of two energies, called "yin" (black) and "yang" (white), which cause everything to happen. They are not completely black or white, just as things in life are not completely black or white, and they cannot exist without each other. While "yin" would be dark, passive, downward, cold, contracting, and weak, "yang" would be bright, active, upward, hot, expanding, and strong.

[8] Taxonomy Table is designed to help write clear, focused objectives. The Table has two dimensions: 1) The knowledge dimension, and 2) the cognitive process dimension. Please see the example below.

The Knowledge Dimension	**The Cognitive Process Dimension**					
	Remember	Understand	Apply	Analyze	Evaluate	Create
Factual Knowledge						
Conceptual Knowledge						
Procedural Knowledge						
Meta-cognitive Knowledge						

Table 1: The Revised Taxonomy Table

[9] Generally speaking, a portfolio is a systematic collection of a variety of teacher observations and student products, collected over time, that reflect a student's developmental status and progress made in learning.

[10] Constructionist learning is inspired by constructivist theories of learning that features 1) learners actively constructing mental models of the world around them, 2) what is constructed is focused on problems yet to be solved in daily life, and 3) learners' background knowledge or experience is activated to interact with what is being learned.

[11] Ba gua, a fundamental philosophical concept in ancient China. Factors such as Time, People, Environment, Property and Events are also expressed through the 64 Hexagrams, and the integration between these components is the essence of Xuan Kong Da Gua. Understanding how these Hexagrams interact with one another allows the practitioner to harness the Qi of time and space, as well as predict events and outcomes.

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Appendix 1: Implication/ meaning of the 64 double Guas

(Note that the number attached on each Gua is the natural development order, for the convenience of reference, each of the eight Guas is thus grouped together)

01. ䷀ The creative force; 10. ䷉ Treading carefully; 13. ䷌ Cooperating with others
25. ䷘ Innocence/ Avoiding Complications; 44. ䷫ A meeting of Opposites ;
06. ䷅ Conflict; 33. ䷠ Retreating ; 12. ䷋ Stagnation ;
43. ䷪ Determination; 58. ䷹ Joy in Communicating; 49. ䷰ Total transformation
17. ䷐ Being adaptable; 28. ䷛ Overload; 47. ䷮ Being restricted;
31. ䷞ Mutual Attraction; 45. ䷬ Gathering together; 14. ䷍ Great fortunes;
38. ䷥ Opposition; 30. ䷝ Shedding lights; 21. ䷔ Getting down to essentials;
50. ䷱ The Cauldron; 64. ䷿ Nearly home and dry; 56. ䷷ Stranger in a strange land;
35. ䷢ Progress 34. ䷡ Great Power; 54. ䷵ Planning a Subordinate Role;
55. ䷶ Abundance; 51. ䷲ Shock; 32. ䷟ Perseverance;
40. ䷧ Release from Obstruction; 62. ䷽ Attention to detail; 16. ䷏ Thinking ahead;
09. ䷈ Exercising Restraint; 61. ䷼ The Power of inner truth; 37. ䷤ The family;
42. ䷩ Increase; 57. ䷸ Gentle Influence; 59. ䷺ Obstacles fade away;
53. ䷴ Gradual Development; 20. ䷓ Taking an overview; 05. ䷄ Waiting;
60. ䷻ Self-Control; 63. ䷾ Mission accomplished; 03. ䷂ Difficulty in the Beginning ;
48. ䷯ The Wellsprings of Life; 29. ䷜ Danger (The Abyss); 39. ䷦ Facing Obstruction ;
08. ䷇ Joining the right group; 26. ䷙ Controlling your resources; 41. ䷨ Decrease ;
22. ䷕ Adornment; 27. ䷚ Nourishing; 18. ䷑ Dealing with decay;
04. ䷃ Inexperience; 52. ䷳ Living in the present; 23. ䷖ Doing away with the old;
11. ䷊ Overall harmony/ Advance; 19. ䷒ Moving toward your goal; 36. ䷣ Keeping a low profile;
24. ䷗ The turning point; 46. ䷭ Pushing Upward; 07. ䷆ The Army (Multitude);
15. ䷎ Modesty; 02. ䷁ Responsiveness