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博士論文

2×2 成就目標之因素結構與預測效用研究

The Factor Structure and Predictive Utility of the 2 × 2 Achievement Goal Framework

研究生：江羽慈

指導教授：林珊如　教授

中華民國九十九年十一月

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研 究 生：江羽慈　　Student：Yu-Tzu Chiang

指導教授：林珊如　　Advisor：Sunny S. J. Lin

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摘　要

就學習動機的階層而言，成就目標是較具體的動機變項，也是與學習行為最接近、且最直接的影響變項。過去的研究多以西方學生在數學、自然或歐美語言等領域的成就目標對學習的影響為研究主題，較少的研究關注我國學生學習國語文的成就動機。

本研究以台灣國小到高中的學生為樣本，探討 2x2 成就目標(Elliot & McGregor, 2001)之因素結構、跨一年的測量穩定度及成就目標在國語文學習歷程的預測效用。首先，以 2007 年的橫斷資料進行驗證性因素分析，檢驗一階四因素結構適配度是否優於各種選替模式(二、三向度)，結果支持 2x2 成就目標模式的四個因素（趨向精熟、趨向表現、逃避精熟與逃避表現)是個別存在的。橫斷資料的二階因素結構適配度也優於各種選替模式，證實 2x2 成就目標符合理論的兩軸因素結構：第一軸為兩個對能力的定義因素(精熟與表現)，第二軸為兩個對能力的定價因素(趨向與逃避)，且此二軸彼此相交，2x2 理論的測量模式受到支持。總之，本研究修訂的成就目標量表(AGQ-C)在我國國小到高中學生群中具有良好的信度與效度，亦即 2x2 成就目標模式能描述我國學生的學習目標。此外，研究結果顯示:四個二階因素個別指向其對應的兩個一階因素的徑路係數值大小相差很多，經由路徑係數的恆等分析檢驗，發現每一對的一階目標對於相對應的二階目標因素有不相同的效果，亦即每一個二階因素(如：表現)受到特定的一階成就目標(趨向表現)所反映。進一步檢驗 2x2 成就目標在 2007、2008 兩個時段的測量穩定度，指標檢驗指標包括結構穩定度、差異連續性、平均數穩定度。測量穩定度檢驗結果顯示，兩個時段測量模式的形貌恆等，而模式弱恆等(因素負荷量恆等)、強恆等(截距恆等)模式也都成立，顯示我國學生的成就目標間隔一年後雖然有所變化，但具有合理的連續性與穩定度，而且兩個時段的目標均達正相關、只有趨向表現目標平均數有顯著增加，另三個目標則無顯著差異。預測效用的檢驗以 2007 年的橫斷資料進行共變結構分析，檢驗成就目標是否能中介國語文自我效能及成績，本研究選擇自我效能，乃因其為社會認知論中重要且穩固的學習動機指標，長久的國語文學習使自我效能內化為近似於內在穩定的特質，而成就目標與外在情境的連結較為密切。結果顯示：趨向精熟、趨向表現、逃避表現三個目標可以中介國文自我效能與國文成績，呼應成就目標理論:成就目標是中介抽象的學習動機與學習行為間的心理建構。同時，成就目標的定價面向(趨向和逃避因素)之中介效果優於成就目標的定義面向(精熟和表現因素)，比起定義面向，成就目標的定價面向:趨向與逃避因素較能反映台灣學生的成就目標；趨向型的目標是預測台灣學生國文成績的最有效因子。本研究發現台灣國小到高中學生的實證資料支持 2x2 成就目標模式可以描述國語文學習目標，具有跨年的測量穩定性，成就目標對國文自我效能與國文成績具有中介效用。本研究提出未來研究的建議及教室教學的實務建議。

關鍵詞:成就目標、成就動機、自我效能、國文成績。

The Factor Structure and Predictive Utility of the 2 × 2 Achievement Goal Framework

Student：Yu-Tzu Chiang　　Advisor：Dr. Sunny S. J. Lin

Institute of Education
National Chiao Tung University

ABSTRACT

In terms of hierarchical models of motivation, achievement goals are conceptualized as concrete representations of more abstract motivation dispositions and as the proximal, direct regulators of learning behaviors. The major of research have studied achievement goal endorsement in math, science and language subjects among western students. Unfortunately, little research has been published on Taiwanese students' adoption of achievement goals in their Chinese language class. The aims of the dissertation were to investigate the measurement structure, cross-year goal-pursuit stability and predictive utility of the 2 × 2 achievement goal model (Elliot & McGregor, 2001) in Taiwanese pre-university students while learning Chinese. Factorial/dimensional structures and internal consistencies provided support for the 2 × 2 achievement goal framework. The 2 × 2 achievement goal structure of the achievement goal items was confirmed, and the four-factor goal structure was found to be a better fit to the data than a series of alternative models with dichotomous/trichotomous goal structures. The results further offered evidence for the two-dimensional structure posited by the 2 (definition) × 2 (valence) achievement goal model. Path coefficient invariance of the dimensional model indicated that each pairs of goal has nonequivalent contribution to correspondent achievement goal dimensional factor: each dimensional factor was mainly derived from different achievement goals. No significant decreases in model-fits (compared to the weak invariant model) when constraints were added to various invariant models. Three stability indexes (structural, differential continuity, and mean-level stability) provided evidence for the stability of achievement goal endorsement over time in a panel sample of Taiwan pre-university students. In terms of predictive utility, three of four achievement goals: mastery-approach, performance-approach, and performance-avoidance were found to be effective mediators between Chinese self-efficacy and Chinese performance. The findings support the rationale that achievement goals are viewed as a direct, proximal influence on achievement-relevant behavior and motives are portrayed as direct antecedents of achievement goals (Elliot & Church 1997). Results of dimensional factor predictive utility, the approach-avoidance factors along the valence dimension seemed to be more successful than the mastery-performance factors along the definition dimension. Approach-based goals were observed for significant predictors of Chinese grades in Taiwanese students. Taken together, my data strongly supports that the 2 × 2 achievement goal framework appears to be empirically as well as conceptually sound for Taiwanese students and have mediating utility on self-efficacy and Chinese grades.

Keywords: achievement goals, self-efficacy, achievement, motivation, Taiwanese students.

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羽慈

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Chapter 1 Introduction

In the areas of student competence and motivation in academic settings, the dominant research interest in the past three decades has been achievement goal theory (Elliot & Church, 1997; Elliot & Murayama, 2008; Middleton & Midgley, 1997; Nicholls, 1984; Pintrich, 2000a). Achievement goals are viewed in terms of the purpose or cognitive-dynamic focus of task engagement and competence-relevant behavior (Elliot & Church, 1997). The specific goal type is thought to establish a framework for how learners interpret and experience achievement settings. Several different achievement goal models have been posited, including dichotomous (e.g., Ames & Archer, 1988; Dweck, 1986), trichotomous (e.g., Elliot & Church, 1997; Middleton & Midgley, 1997), and Elliot and McGregor's (2001) four-goal model.

Elliot and Church (1997) are among those researchers who have adopted a trichotomous achievement goal model to examine associations among different types of achievement goals, motivational antecedents (e.g., achievement motivation), and learning outcomes (e.g., graded performance). Their model has been extended to associate with antecedents such as self-efficacy (Liem, Lau & Nie, 2008; Pajares, Britner & Valiante, 2000) and outcomes such as task scores (Tanaka, Murakami, Okuno & Yamauchi, 2006; Shih, 2005a). Their works support many important assertions about connections between general motivation, achievement goals, and learning behaviors within different educational contexts.

Revising Elliot and Church's trichotomous model, Elliot and McGregor (2001) developed an extended framework known as the 2 × 2 achievement goal framework, expressed as mastery-approach, performance-approach, mastery-avoidance, and performance-avoidance goals. They examined the feasibility of the four-goal model and used exploratory and confirmatory factor analyses to find empirical supports for goal differentiation. The four-goal model has also been tested with antecedents such as implicit theories of ability (Cury, Elliot, Fonseca & Moller, 2006) and outcomes such as task scores (Elliot & Murayama, 2008). Conroy, Elliot and Hofer (2003), Fryer and Elliot (2007), and Muis and Edwards (2009) offer evidence in support of the trichotomous/2 × 2 achievement goal model stability and change over time.

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However, research on how the 2 × 2 achievement goal model influences academic performance is still deficient in several aspects. First, factor analyses have validated the independence of the four-goal construct and the stability of the 2 × 2 achievement goal model over time in western educational contexts. However, to my knowledge the factor structure and stability of the 2 × 2 achievement goal model have not been confirmed in an eastern/Asian context. Second, research in this area has generally used samples of university students (e.g., Elliot & McGregor, 2001; Elliot & Murayama, 2008; Murayama, Zhou & Nesbit, 2009) and overlooked all other students.

Research Aims

Containing four studies, this dissertation uses Taiwanese elementary and secondary school student samples to examine (a) the first- and second-order factor structure of Elliot and McGregor's (2001) 2 × 2 achievement goal questionnaires (b) the stability of 2 × 2 achievement goal endorsement in a panel sample, and (c) the predictive utility of the 2 × 2 achievement goal framework.

In studies 1 and 2, factor analytic work was performed to validate the independence of the first- and second-order factorial structure of the 2 × 2 achievement goal construct and to make comparisons with several alternative models. In the current dissertation, I applied the 2 × 2 achievement goal framework to Taiwan educational context. The related issues of Chinese achievement motivation and Confucian goals (Chen, 2005; Hwang, 2008) will be explored later.

In study 3, the stability (change) of the 2 × 2 achievement goal endorsement was examined over a two-year period. Fryer and Elliot (2007) provide empirical evidence in support of trichotomous and 2 × 2 achievement goal model stability in college classroom settings, and they acknowledge that their findings may not be generalizable to students at other grade levels. Following up on their research, study 3 used a panel sample of Taiwanese students to focus on the stability of the 2 × 2 achievement goal model. This study is an initial attempt to analyze pre-university students' stability of achievement goal endorsement across a whole year in which the fast cumulating knowledge is a hallmark for this learning period. The issue of cross-lag/casual associations between achievement goals and related variables will be the focus of a future investigation.

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The focus of study 4 was to test the mediating effects of 2 × 2 achievement goals (with first- and second-order factorial structures) between a motive (self-efficacy in learning Chinese) and a learning outcome (performance in Chinese classes). The purpose was to determine whether this framework could be applied to a sample of Taiwanese students learning Chinese—an important functional domain for these students. The study results contribute to the achievement goal literature and make the 2 × 2 achievement goal framework more generalizable.

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Chapter 2 Literature Review

In achievement motivation theory, achievement goals represent subjective purposes (Pintrich, 2000a) or cognitive-dynamic focuses (Elliot & Church 1997) of competence-relevant behaviors for executing tasks. Portrayed as concrete representations of more abstract achievement motivational constructs, achievement goals are conceptualized as midlevel constructs situated between global motivational dispositions (antecedents of achievement goals) and specific behaviors (consequences of achievement goals) (Elliot & Church 1997).

Over the past three decades, approaches to achievement goals have undergone considerable development toward understanding motivated behavior in achievement settings. Using undergraduate samples, Elliot and Church (1997), Elliot and McGregor (2001), and Elliot and Murayama (2008) provide their own evidence for the location of achievement goals between global motivational dispositions such as fear of failure or need for achievement, and specific academic behaviors such as study strategies. Other researchers have identified such factors as classroom social environment (e.g., goal structure emphasized in a class, Wolters, 2004), general motives (e.g., need for achievement, Zusho, Pintrich, & Cortina, 2005) and competency expectancies (e.g., self-efficacy, Liem, Lau, & Nie, 2008; Vrugt, Oort, & Zeeberg, 2002) as direct antecedents of achievement goal adoption, with achievement goals directly and proximally influencing achievement-relevant consequences such as task scores, help-seeking behaviors, and self-regulation strategies, among others (Cury et al., 2006; Elliot & McGregor, 2001; Pintrich, Conley, & Kempler, 2003).

The dissertation attempted to examine the factor structure of the 2 × 2 achievement goal framework (Elliot & McGregor, 2001), the stability of achievement goal endorsement, and an achievement goal model with self-efficacy as an antecedent of achievement goals and Chinese performance as a consequence. In the following section I review related studies on (1) achievement goal theory, (2) the stability of achievement goal endorsement (3) achievement goals and self-efficacy, as well as (4) achievement goals and academic performance.

Achievement goal theory

Dichotomous goal model

Various two goal models have been described and established by achievement goal theorists such as Ames and Archer (1988), Elliott and Dweck (1988), and Nicholls (1984). Ames and Archer (1988) emphasize mastery (i.e., the development of ability through task mastery) and performance goals (i.e., demonstrating ability relative to others). Elliott and Dweck (1988) distinguish between learning and performance goals. They suggest that learning goals, in which one seeks to develop competence, facilitate challenge-seeking and mastery-oriented responses to failure regardless of perceived ability. In contrast, performance goals (in which one seeks to gain favorable judgment for competence or avoid negative judgments) are described as causing challenge-avoidance and learned helplessness. Nicholls (1984) emphasizes task goals (developing ability in reference to one's past performance or knowledge) versus ego goals (demonstrating ability as capacity relative to those of others). Pintrich et al. (2003) suggest that despite differences among the dichotomous goal models behind these various terms, the concepts of mastery and performance have become the most commonly used labels in achievement goal research.

When clarifying and integrating mastery versus performance goal definitions, Pintrich et al.(2003) note that mastery goals emphasize competence, learning, and understanding tasks according to self-referenced standards of improvement, while performance goals focus on demonstrating competence and superiority according to comparative or normative standards. Researchers such as Ames and Archer (1988), Elliott and Dweck (1988), and Nicholls (1984) describe mastery goals in terms of adaptive motivational patterns characterized by persistence in the face of failure, the use of increasingly complex learning strategies, and the pursuit of difficult and challenging tasks. Performance goals, however, are viewed as maladaptive motivational patterns characterized by greater propensity to withdraw from tasks, less interest in difficult tasks, and a tendency to seek less challenging tasks for which there is a greater likelihood of success.

In contrast, Harackiewicz, Barron and Elliot (1998) and Pintrich et al. (2003) do not view mastery and performance goals as opposite ends of a continuum, or as mutually exclusive in terms of their original concept formulations. Both research teams have reported Western-based research findings suggesting that mastery goals and performance goals are either unrelated (Ames & Archer, 1988) or positively correlated (Pintrich & Schunk, 2002) in support of a multiple goal

perspective in which individuals pursue either a single predominant goal or multiple goals.

Similarly, Chan (2008) and Ng (2000) found statistically significant and positive correlations between mastery and performance goals in non-Western samples consisting of Hong Kong students aged 9 to 17 and Mainland Chinese secondary school students. Both researchers suggest that social endeavor in Chinese culture connects the two concepts, since the social goals of bringing honor to one's family by working or studying hard can shape both mastery and performance goals.

Later, goal theorists (Elliot & Church 1997; Middleton & Midgley, 1997) criticize dichotomous goal perspectives and extend them to a trichotomous achievement goal framework. According to Elliot and Church (1997), it may be unproductive to view all performance goals as maladaptive or in opposition to mastery goals. Middleton and Midgley (1997) also point out that dichotomous goals, mastery and performance, are commonly conceptualized as "approach" motivational tendencies rather than "avoidance" motivational tendencies. These goal theorists, as well as Elliot (1997) and Elliot and Church (1997), note that activities in achievement settings may be either directed toward the attainment of success or the avoidance of failure. When reviewing the histories of approach and avoidance motivation theory, Elliot (1999; 2006) found that approach motivation is behavior directed by positive stimuli, whereas avoidance motivation is regarded as behavior directed by negative stimuli; in both cases the stimuli take the form of objects, events, or possibilities.

Trichotomous goal model

Elliot (1999), Elliot and Church (1997), and Middleton and Midgley (1997) all suggest that performance goals should be divided into two categories—approach performance goals and avoidance performance goals—because they have different effects on outcomes, and because some of them are not less adaptive, as predicted by traditional goal theory. This finding leads Elliot and Church (1997) to propose a trichotomous achievement goal framework, which they tested in the context of college classrooms. Their results provide strong support for the framework with three achievement goals: mastery, performance-approach, and performance-avoidance. Mastery goals are emphasized in the development of competence and task mastery, performance-approach goals are oriented toward the attainment of favorable

judgments of competence, and performance-avoidance goals emphasize the avoidance of unfavorable judgments of competence.

Middleton and Midgley (1997) tested their proposed trichotomous achievement goal model in the context of a middle school mathematics classroom. Their results give support to their model with three goals: task (developing ability), performance-approach (demonstrating ability), and performance-avoidance (avoiding demonstrations of lack of ability). Elliot (1999), Middleton and Midgley (1997), and Pintrich (2000a) are among researchers who believe that compared to dichotomous or oppositional goal categories, trichotomous achievement goal models reflect complex goal constructs more precisely.

2 x 2 achievement goal model

Following the logic of separating approach and avoidance performance goals, Pintrich (2000a) suggests that both versions of mastery goals may exist concurrently. He offers a 2×2 matrix that combines mastery and performance goals with approach and avoidance states. He defines two general aspects of achievement goals: general purpose or reason for engaging in a task, and standards or criteria that individuals use to judge their performance. His list of four goals consists of mastery approach, mastery avoidance, performance approach, and performance avoidance.

Based on Elliot and Church's (1997) trichotomous achievement goal framework, Elliot and McGregor (2001) developed an advanced revision and extension known as the 2 × 2 achievement goal framework. It consists of two pairs of goals crossing over each other to form four achievement goals: mastery-approach, performance-approach, mastery-avoidance, and performance-avoidance. The feasibility of this model was examined by exploratory and confirmatory factor analyses and found empirical support for the differentiation among the four goals.

Elliot and McGregor (2001) and Elliot and Murayama (2008) posit that achievement goals contain components from two independent competence dimensions. The first, mastery versus performance, refers to competence as defined in terms of the standard used to evaluate it (Dweck, 1986; Elliot & Church, 1997; Nicholls, 1984; Pintrich, 2000a; Pintrich et al., 2003). Mastery-based goals reflect a concern for developing competency and the use of self-referential

improvement standards, while performance-based goals reflect a concern for demonstrating competency in terms of social comparisons. The second dimension, approach versus avoidance, indicates how competence can be valenced. Approach-based goals focus on a movement toward positive stimuli such as competence and success, while avoidance-based goals focus on a movement toward negative stimuli such as incompetence and failure.

As Elliot and Church (1997) and Elliot and McGregor (2001) note in their trichotomous achievement goal and 2 × 2 frameworks, performance-approach goals emphasize demonstrations of skill and the attainment of favorable judgments of competency in relation to others. Performance-avoidance goals focus on avoiding unfavorable judgments of competency and poor performance when compared to others. Mastery-approach goals focus on developing knowledge and skills, as well as enhancing competency and mastery in the form of intrapersonal or task-based criteria. Mastery-avoidance goals, which are the least studied in the achievement goal literature (Elliot, 1999; Pintrich, 2000a), focus on avoiding the loss of skills, abilities, or knowledge (and sometimes on avoiding misunderstanding), thus failing in terms of learning or task mastery. Elliot and McGregor (2001) provide two examples of mastery avoidance goals: perfectionists who try to avoid making any mistakes whatsoever, and individuals in the latter parts of their careers (e.g., athletes and businesspersons) or lives (e.g., the elderly) who focus on not losing their skills, abilities, or memory. Elliot and Murayama (2008) suggest that mastery-avoidance goals emerge from both positive (the need for achievement) and negative sources of motivation (fear of failure), and note that the overall effect of mastery-avoidance goals remains unclear.

Under a multiple goal perspective (e.g., Pintrich, 2000b; Elliot & McGregor, 2001), goal theorists note that people often hold multiple goals simultaneously and so four goals are not independent. They therefore examine the intercorrelations among achievement goals. The empirical evidence on zero-order correlations among the four achievement goals is mixed. Results from two Western-based research findings—using samples of American university students (Elliot & McGregor, 2001) and French secondary school students (Cury et al., 2006)—suggested that mastery-avoidance goals were positively associated with mastery-approach and performance-avoidance goals. They also showed positive associations between performance-avoidance goals and mastery-avoidance and performance-approach goals, but no association between mastery-approach goals and performance-approach goals. Using a sample of

Taiwanese junior high school students, Cherng (2003) found positive associations between performance-approach and performance-avoidance goals, as well as between mastery-avoidance goals and both mastery-approach and performance-approach goals. He failed to find any association between mastery-approach and performance-approach goals and between mastery-avoidance and performance-avoidance goals, but did observe a negative association between mastery-approach and performance-avoidance goals (Cherng, 2003).

Mastery-avoidance goals and their related variables

Mastery-avoidance goals represent a fairly new construct to achievement goal theory. Some researchers (e.g., Ciani & Sheldon, 2010; Sideridis & Mouratidis, 2008) suggest that it may be still a conceptually problematic and somewhat controversial construct. In a sample of university baseball players, Ciani and Sheldon (2010) found mastery-avoidance goals were uncommon, and that high ratings may indicate misinterpretation of the items rather than actual mastery-avoidance goals. Sideridis and Mouratidis (2008) investigated nearly 400 elementary to middle school students selecting their most prominent achievement goal. Only 14 students chose mastery-avoidance goals as their primary goal. These results led Sideridis and Mouratidis (2008) to question the existence of mastery-avoidance goals in young students. The debate is likely because of ambiguity and counterintuitive nature of the mastery-avoidance goals (Elliot & McGregor, 2001).

Pintrich (2000a) defines the mastery-avoidance goals as the reasons for engaging in tasks, as well as the standards or criteria that individuals use to judge their performance. The mastery-avoidance goals focus on avoiding misunderstanding, not learning or mastering tasks, and criteria for not doing things incorrectly relative to a task. Elliot and McGregor (2001) transform the definition of the mastery-avoidance goal to a construct in experiencing competence—defined as the absolute requirement of a task or one's own attainment. Incompetence is the central point of regulatory attention, with the main focus being on avoidance of negative possibilities. Elliot and McGregor (2001) provide examples which individuals are striving to avoid misunderstanding and so failing to learn course materials, striving to not make errors in business transactions, making a free throw in a basketball game, not leaving an incomplete crossword puzzle (i.e. someone dislikes/rejects to play a crossword puzzle because he

believe that he may be incapable of completing crossword puzzle to leave an incomplete one), not forgetting what one has learned (i.e., someone refuse to learn something new because he believes it may interfere/confuse what he has learned), and striving not to lose one's physical or intellectual capabilities (i.e., someone rejects to develop new capabilities because he believes these new capabilities may not performing as well as pervious excellent records and even damage or lose his existing capabilities). Pintrich (2000a) offers a prototypical exemplar, perfectionists who struggle to avoid making any mistakes whatsoever and individuals in the latter part of their careers or lives who focus on not performing worse than in the past, not stagnating, and not losing their skills, abilities, or memory.

While Elliot and McGregor (2001) examined the antecedents and consequences of the mastery-avoidance goals in an attempt to develop empirical profiles, their findings indicated mixed mastery-avoidance goal profiles. The results yielded that the mastery-avoidance goals were grounded in the fear of failure, low self-determination, perceived classroom engagement, entity (instead of incremental) view of competence, parental person-focused negative feedback, parental worry induction, and competence valuation. College students' endorsement of the mastery-avoidance goals has precedent influences from parental socialization. Comparatively, parental socialization was not related to the endorsement of the mastery-approach goals.

The mastery-avoidance goals are associated with adaptive and maladaptive learning consequences. Elliot and McGregor (2001) show they are positive predictors of disorganized study habits, test anxiety, and subsequent mastery-avoidance, mastery-approach, and performance-approach goals. In a group of Taiwanese junior high school students, Cherng (2003) found that mastery-avoidance goals were positive predictors of self-handicapping, help-seeking, effort, persistence, and math grades. In the sport domain, mastery-avoidance goals have been linked to fear of failure (Conroy & Elliot, 2004), amotivation (Nien & Duda, 2008), and negative reactions to imperfection (Stoeber, Stoll, Pescheck & Otto, 2008). Other studies have identified positive associations between mastery-avoidance goals and perceived competence, enjoyment, effort, and physical activity (Wang, Biddle & Elliot, 2007), as well as perceptions of an enjoyable learning climate (Morris & Kavussanu, 2008).

When the mastery-avoidance goals are compared to three other goals, mastery- avoidance goals differ conceptually from mastery-approach goals regarding the valence of competence, from performance-avoidance goals regarding the definition of competence, and from

performance-approach goals regarding both the definition and valence of competence (Elliot & McGregor, 2001). Empirical findings of Elliot and McGregor and Cherng (2003) revealed that mastery-avoidance goals were more negative than the mastery-approach goals, and more positive than the performance-avoidance goals. Mastery-avoidance and performance-avoidance goals have very similar antecedent profiles in terms of non-optimal variables—for example, fear of failure (Conroy & Elliot, 2004) and amotivation (Nien & Duda, 2008). Unlike performance-avoidance goals, and similar to mastery-approach goals, mastery-avoidance goals emerge from individual perceptions that a class (or some other scenario) is engaging and interesting (Elliot & McGregor, 2001). The mastery-avoidance goals share some negative characteristics with the performance-avoidance goals, but they differ from the performance-avoidance goals in that they are neither negative predictors of performance achievement (Cherng, 2003; Elliot & McGregor, 2001) nor positive predictors of health center utilization (Elliot & McGregor, 2001).

Elliot and McGregor (2001) attribute the mixed conceptual profiles of the mastery-avoidance goals to the combination of optimal (mastery) and non-optimal components (avoidance). Mastery has been always viewed as adaptive by educational psychologists (Dweck, 1986; Pintrich, 2000a; Pintrich et al., 2003) while avoidance maladaptive and how do we categorize the combination? Elliot and McGregor (2001) suggest that the adoption of these goals is most likely among individuals with non-optimal motivational dispositions in optimally structured achievement settings that challenge pursuit and foster intrinsic interest. They also suggest that empirical predictions regarding the mastery-avoidance goal antecedents and consequences are difficult to generate for two reasons. First, the mastery component likely results from optimal antecedents and the desire to foster positive consequences (similar to the mastery-approach goals), but the avoidance component likely results from non-optimal antecedents and causes negative consequences (similar to the performance-avoidance goals). Second, it is hard to determine the relative strengths of the two components when combined, or the accurate manner in which each component functions in combination with the other.

Finally, optimal motivation and performance may require combinational types of goals. Empirical evidence has indicated that pursuing one type of goal does not necessarily exclude pursuit of the other (Ames & Archer, 1988; Bouffard-Bouchard, Boisvert, Vezeau, & Larouche, 1995; Harackiewicz et al., 1997; Middleton & Midgley, 1997). Based on a multiple goal

perspective Shih (2005b) found that a group of Taiwanese elementary students who maintained high-mastery/high-performance-approach goals showed more adaptive learning patterns than students who maintained other types of multiple goals.

Measurement for the 2 x 2 achievement goals

Elliot and McGregor (2001) developed an achievement goal questionnaire (AGQ) to measure four goals in the 2 × 2 achievement goal framework. Item pools for mastery-approach goals, performance-approach goals, and performance-avoidance goals were chosen from their previous instruments (Elliot & Church, 1997); new items were designed for mastery-avoidance goals. Three items were generated to represent each of the four achievement goal constructs. In the questionnaires, 3 items in each subscale assessed mastery–approach goals (e.g., "It is important for me to understand the content of this course as thoroughly as possible."), mastery–avoidance goals (e.g., "I am often concerned that I may not learn all that there is to learn in this class."), performance–approach goals (e.g., "It is important for me to do well compared to others in this class."), and performance–avoidance goals (e.g., "My goal in this class is to avoid performing poorly."). Participants responded to the extent which they believed ranged from 1 (not at all true of me) to 7 (very true of me). AGQ was tested in introductory-level undergraduates' psychology classes in series of studies. The results of exploratory factor analysis (EFA), confirmatory factor analysis (CFA) empirically supported the separable and internally consistent achievement goal constructs; Cronbach alpha coefficients evidenced good reliability. AGQ was translated into Chinese version and used as the main measurement tool in my dissertation.

Stability of achievement goal endorsement

Do learners endorse the same goals or do they change goal adoption across time? In a review of theoretical perspectives regarding stability in achievement goal adoption over time, Fryer and Elliot (2007) note that achievement goals emerge from stable factors (e.g., personality traits such as achievement motives and temperaments) and remain grounded in these factors throughout goal pursuit and regulation processes. In addition, they claim that goal stability lies in the nature of the goal construct. When individuals face achievement tasks, they adopt goals and

develop cognitive frameworks for interpreting those tasks, experience task involvement, and react to competence-relevant information (Ames, 1992; Dweck, 1986). This framework can result in directional or biased perceptual–cognitive processes that foster subsequent goal seeking behaviors in a self-fulfilling way (Elliot & Harackiewicz, 1996).

Only a few articles focusing on this critical issue of goal stability and change have been available. Of these, some have addressed change in achievement goals across a sequence of similar tasks during several weeks of college classes (Senko & Harackiewicz, 2005; Fryer & Elliot, 2007); some have examined shifts in goal endorsement for school within a school year (e.g., Bong, 2005; Seifert, 1996); still others have examined shifts in goal endorsement for school across the elementary to middle school transition (e.g., Anderman & Midgley, 1997). To my knowledge, there is still short of research about stability of achievement goal endorsement in Asian population.

My question of whether achievement goal endorsement changes in learning Chinese across secondary school year or whether it remains stable can be answered in several ways, depending on what type of change (or stability) one focuses on. Typical parameters are means, variances, and covariances, all of which may be subject to remain stable over time. There are at least three types of stability that can be examined in sample levels using longitudinal panel data: structural stability (or change), differential stability, and mean-level stability. Structural stability refers to the constancy of covariances among a set of constructs across time. In my case, structural change addresses the issue of changing associations among four achievement goals over time. However, this requires that goal constructs are measured in the same way on two measurement occasions. In order to guarantee this, several degrees of measurement invariance must be examined (Meredith, 1993). Configural invariance demands that the number of factors and according significant and non-significant loadings are equal over time, which guarantees that the dimensionality of the goals is identical. For weak measurement invariance (MI) to hold, factor loadings in two measurement occasions must be equal. If so, factor variances and covariances can be compared. If in addition, the intercepts of the observed indicators are equal, strong MI is given, which allows comparing factor means. Moreover, if residual variances are also equal, strict MI holds, implying that all interindividual differences in observed variables stem from the underlying factors (Bollen, 1989; Meredith & Horn, 2001).

Fryer and Elliot (2007) conducted confirmatory factor analysis to compare college students'

achievement goal MI within several weeks. They empirically tested fit indexes in a series of four nested models by increasing constraints: configural invariance (constraints equal only on the factor variances), weak MI (additional constraints equal on the item–factor regression coefficients), strong MI (additional constraints equal on the item intercepts), and strict MI (additional constraints on uniquenesses across measurement occasions). Fit indexes were compared between models, and a significant decrease in model fit suggests that the model with fewer constraints should be chosen (Conroy et al., 2003). Strong MI is considered to be sufficient for the comparison of scores across time points (Sayer & Cumsille, 2001; Zimprich & Mascherek, 2010). Fryer and Elliot (2007) found no significant fits decrease when the constraints were added to form the weak and the strong MIs. However, there was a significant fit reduction when the constraints added to form the strict MI. In their case, changes in achievement goals over time can be explained as true change instead of measurement errors because the strong MI was ensured.

Differential stability (or change) concerns the preservation of an individual's relative placement (rank order) within a group across time. It is the consistency of individual differences in terms of a particular attribute amongst each other's attributes in a group of people over time. Different people may change to a different degree across time. Achievement goal researchers have examined the differential stability with the Pearson product–moment correlation (e.g., Fryer & Elliot, 2007; Anderman & Midgley, 1997). Fryer and Elliot (2007) found the intercorrelations among four goals are from .57 to .75. Correlation coefficients reported in their studies were significant and positive with moderate to high magnitudes. In other words, moderate-to-high correlations suggest consistency in individual-related position (goal endorsement) over a relative short period of learning time when college students facing a sequence of similar tasks.

Mean-level stability (or change) describes the extent to which the average amount of a construct changes over time within a sample (Fryer & Elliot, 2007). It refers to sample level change in achievement goal endorsement for the two time points and is typically examined with a paired-samples t test. This index provides information regarding the absolute amount of change in a construct. Fryer and Elliot (2007) provided evidence of mean level stability for the performance–approach and the mastery–avoidance goals but significant shifts for the mastery–approach and the performance–avoidance goals across three time points.

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Self-efficacy and achievement goals

Bandura (1986) defines self-efficacy as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (p. 391). In another article he asserts that

> *self-efficacy contributes to motivation in several ways: determining the goals people set for themselves, how long they persevere in the face of difficulties, and their resilience to failures. Self-efficacy operates personal cognized goals which motivate and guide the present behaviors.* (Bandura 1993, p. 131)

Pintrich and DeGroot (1990) and Schunk (1981) postulate that self-efficacy has motivational effects that are especially germane to student achievement. Social cognitive theorists such as Bandura (1986) and Shunk (1990) claim that students who have low self-efficacy for learning a certain subject are more likely to form avoidance goals and make limited effort, while those who perceive themselves as efficacious tend to form approach goals and participate in tasks at which they can succeed. In accordance with this assertion, Elliot's (1999) hierarchical model of achievement motivation suggests that self- and competence-based variables such as self-efficacy exert a direct effect on achievement goals, which in turn serve as a proximal precursor to achievement-related processes and outcomes. With regard to associations between dichotomous achievement goals and self-efficacy, most findings indicate that mastery (learning) goals are positively associated with self-efficacy (see, for example, Bell & Kozlowski, 2002; Kaplan & Midgley, 1999; Middleton & Midgley, 1997). However, results for any association between performance goals and self-efficacy are mixed. Some findings indicated that performance goals were negatively associated with self-efficacy (Bell & Kozlowski, 2002; Kaplan, & Midgley, 1999; Middleton & Midgley, 1997), while others indicated positive relationships (Daniels et al., 2008; Wolters, Yu & Pintrich, 1996).

Regarding the effects of self-efficacy on trichotomous achievement goals, Pajares et al. (2000) provides empirical evidence from elementary, middle school, and high school writing and science courses with students raging from 9 to 17 year-old. They found a strong positive association between self-efficacy and mastery goals across three school levels, a weak positive association between self-efficacy and performance-approach goals at the middle and high school

levels, and a negative association between self-efficacy and performance-avoidance goals at all levels. A consistent result have been reported for samples of Singaporean adolescents (Liem et al., 2008), Australian high school students (Smith, Sinclair & Chapman, 2002), Korean middle/senior high school students (Bong, 2001), and American junior high school students (Wolters, 2004). To my knowledge, little research have examined the relationship between self-efficacy and 2 × 2 achievement goals. Accordingly, one of my aims was to examine relationships between self-efficacy and 2×2 achievement goals.

Achievement goals and academic performance

In terms of the effects of dichotomous achievement goals on outcome performance, research results are inconsistent. Bell and Kozlowski (2002) found that for American university students, mastery/learning goals were positive predictors and performance goals were negative predictors of course performance. Daniels et al. (2008) found that both mastery goals and performance goals were positively correlated with final grades in Canadian university students. Kozlowski et al. (2001), who observed American undergraduate psychology course students, suggest that performance goals and mastery goals are not related to outcome performance.

Regarding the effects of trichotomous achievement goals on academic performance, several research groups have found that the performance-approach goals are positive predictors of undergraduate course grades and the performance-avoidance goals are negative predictors; null results were observed for mastery goals (Elliot & Church, 1997; Elliot, McGregor & Gable,1999; Harackiewicz et al., 1998; Zusho et al., 2005). Observing Hong Kong secondary school students, Chan and Lai (2007) found that performance-approach goals were positive predictors of grades, while performance-avoidance goals were negative predictors; null results were observed for mastery goals. Although Chan and Lai's data are in agreement with findings for undergraduates, other data for various samples of pre-university students are mixed. Lopez (1999) investigated middle school students in South America, and found that three goals were not significant predictors of grades. Tanaka et al. (2006) examined associations between trichotomous achievement goals and task performance for a group of Japanese junior high school students. Mastery goals were the only possible predictors of task scores.

Chan (2008) reported positive relationships between mastery goals and overall performance

in academic subjects for a group of gifted Hong Kong students ranging from ages 9 to 17. Using a sample of American junior high school students, Wolters (2004) found that mastery goals and the performance-approach goals were positively associated with math course grades, and performance-avoidance goals were negatively associated. Shih (2005a) found that mastery goals and performance-approach goals exerted positive effects on academic performance for Taiwanese sixth grade students, but performance-avoidance goals exerted no effects.

Regarding effects of 2 × 2 achievement goals on academic performance, Elliot and McGregor (2001) and Elliot and Murayama (2008) observed American undergraduates and found that performance-approach goals were positive predictors of course grades and performance-avoidance goals were negative predictors; null results were observed for mastery-approach and mastery-avoidance goals. For a sample of French secondary school students, Cury et al. (2006) found that mastery-approach goals and performance-approach goals were positively correlated with math grades, and performance-avoidance goals were negatively correlated with math grades; no significant correlation was noted for mastery-avoidance goals. Kaplan, Lichtinger and Gorodetsky (2009) reported a positive association between mastery-approach goals and writing achievement among a group of Israeli ninth graders (most 14 years of age). In sum, although past research on trichotomous achievement goals suggest that performance-approach goals are positive predictors and performance-avoidance goals are negative predictors of undergraduate course grades, results for pre-university students are mixed; in both cases null results have been observed for mastery goals. Thus, patterns regarding the effects of 2 × 2 achievement goals on academic performance are yet unclear.

Culture effects on achievement goals and academic performance

Lu, et al. (2001) and Hwang (2008) suggest that achievement goals have cultural roots—for example, Confucian principles in Chinese populations. Hwang observes that achievement motivation among Taiwanese students is significantly influenced by Confucian cultural traditions: adolescents in Taiwan are expected to study hard to develop knowledge and skills as a means of fulfilling social and family obligations (see also Shih, 2005b). Hwang also notes that hard work and good performance are accepted indicators of fulfilled filial responsibility in Confucian terms, which also emphasizes a personal obligation to make an effort toward success. Thus, Taiwanese

students are socialized to value effort—an "effort-as-virtue" model—and to believe that hard work facilitates attainment (Chen, 2005; Hwang, 2008; Shih, 2005b).

Taiwanese students are also taught that their competence will improve as long as they study hard enough (Hwang, 2008). Accordingly, they may view incremental competence in academic tasks in terms of mastery goals, and positive social evaluation in terms of performance goals, and therefore adopt mastery-oriented behaviors. In contrast, goal theorists such as Harackiewicz and Elliot (1998) and Kaplan and Middleton (2002) note that the performance-approach goal endorsement is generally reflected in competitive learning environments and Taiwanese schools are notorious for a highly competitive atmosphere resulting from the national system of entrance examinations (Shih, 2005a; Yang, 1988). Accordingly, many Taiwanese students feel compelled to pursue performance-approach goals and to struggle for achievement relative to others. According to Confucian thought, learners must try their best to achieve mastery through persistence and comprehensive knowledge of a subject, with the hope of eventually demonstrating performance in a manner that brings them wealth (Ho, 1994; Xiang, Lee & Solmon, 1997; Yang, 1988).

This competitive context, influenced by cultural values, likely supports the development of an achievement motivation based on simultaneously studying hard for higher achievement (task mastery) and outperforming others (a performance approach) (Shih & Alexander, 2000). Shih (2005a) reported that Taiwanese sixth graders maintained performance-approach and mastery goals concurrently, and also reported her observations of more adaptive learning patterns relative to students with other goal profiles. In a sample of Taiwan junior high school students, Cherng (2003) found that mastery-approach, mastery-avoidance, and performance-approach goals were all positive predictors of math grades, and that the performance-avoidance goals were negative predictors—evidence that the mastery-approach and performance-approach goals have positive effects on grades (Barron & Harackiewicz, 2001; Pintrich, 2000a; Shih, 2005a). Among trichotomous goals, mastery goals are the most adaptive for evoking beneficial learning patterns (Shih, 2005a). In accordance with mastery goals, Shih also reported that the performance-approach goals positively predicted Taiwanese students' strategies and intrinsic motivation, and negatively predicted test anxiety. She attributes the positive effects of the performance-approach goals to Taiwanese students' motivation and strategy, both of which are good matches with goals associated with an intensely competitive learning environment

(Harackiewicz & Elliot, 1998). The pursuit of the performance-approach goals in such performance-oriented and competitive context likely leads to adaptive learning behaviors. Shih's (2005a) findings imply that stress on competition and/or performance does not necessarily undermine learning, as long as students are oriented to the approach and not to avoidance.

Overview of the present research and hypotheses

This dissertation is a collection of five studies I worked on between 2009 and 2010.

In Study 1, I tested Chinese translation of Elliot and McGregor's (2001) Achievement Goal Questionnaire (AGQ-C) to determine whether it displayed a first-order factor structure of 2 × 2 goal framework in a Taiwanese student sample. A confirmatory factor analytic technique was used to examine the proposed factorial structure consisting of four first-order factors (Fig. 2-1), and to compare it with a series of alternative three- and two-factor models.

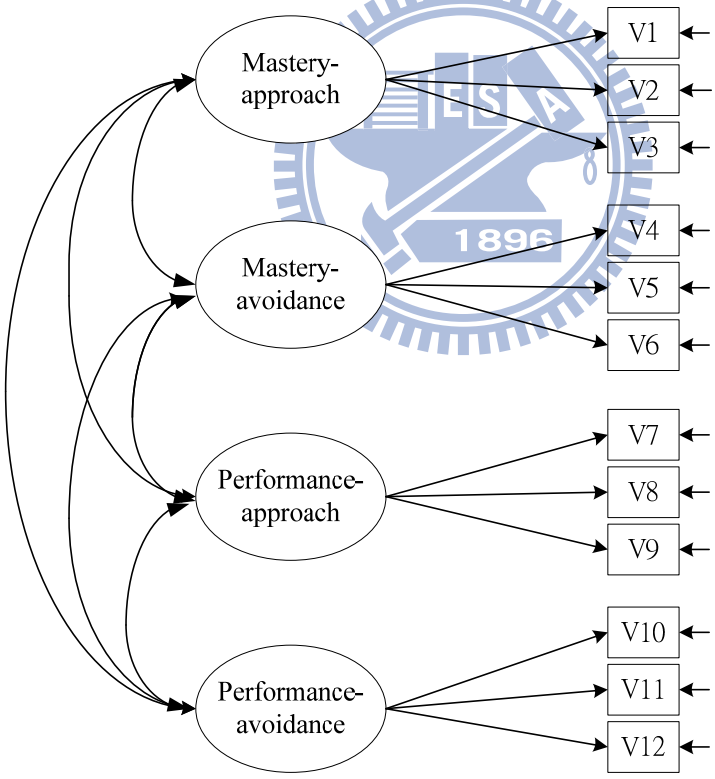


Figure 2-1 The hypothetical measurement model of first-order achievement goal structure.

According to Elliot and Murayama (2008) and Elliot and McGregor (2001), it was

reasonable to expect that none of the alternative models would provide a better fit. In addition, maximum-likelihood ratio test results would indicate that the hypothetical first-order model provide a good fit—better than the alternative models.

In Study 2, I used a Confirmatory factor analysis (CFA) process to analyze, namely, the dimensional structure. First-order latent variables in this model were four achievement goals (from mastery-approach goals to performance-avoidance goals), and second-order latent variables were four factors associated with two competence dimensions (from mastery-based goals to avoidance-based goals) (Fig. 2-2). While factors within each dimension (e.g. approach versus avoidance) were assumed as correlated, factors across dimensions (e.g., approach versus mastery) were assumed as not being correlated. The hypothetical model was compared to alternative second-order models. As a new application of the AGQ-C, it was predicted that maximum-likelihood ratio tests would reveal that the hypothetical second-order model provided a better data fit than other alternative models.

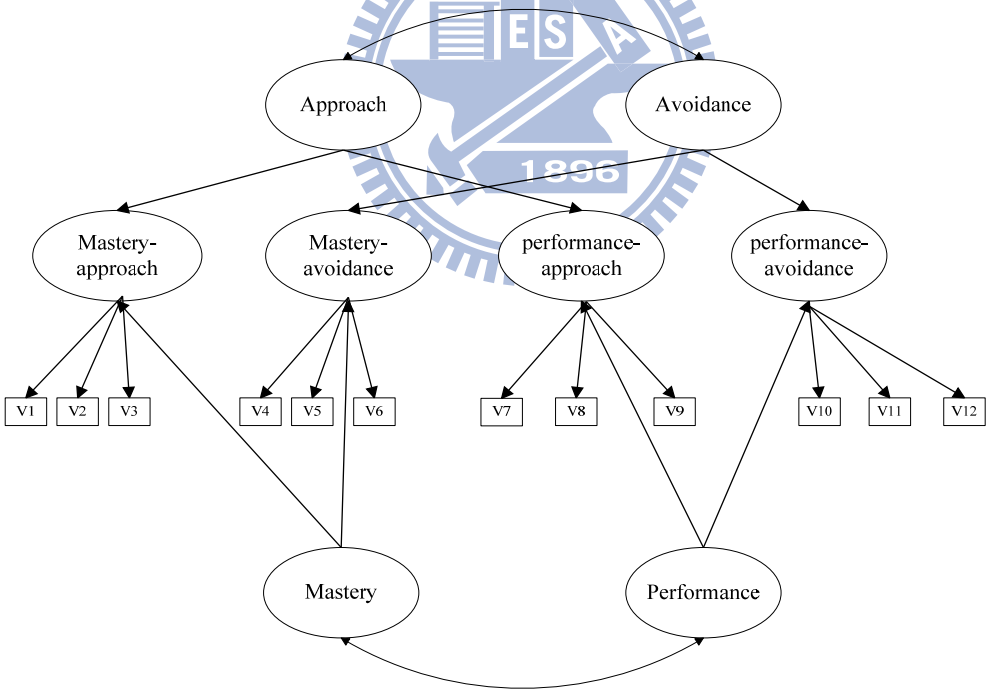


Figure 2-2 The hypothetical path diagram of second-order measurement model of achievement goal dimensional structure.

In Study 3, I examined the stability of the 2 × 2 achievement goal endorsement in a Taiwanese student panel sample. I examined the stability of achievement goal endorsement with three indexes, structural stability, differential stability and mean-level stability. It was expected the AGQ-C could demonstrate measurement invariance, at least to hold strong measurement invariance and the structural stability of achievement goal could be confirmed. No significant decreases in model-fits when constraints were gradually added to various invariance models. Moderate to high correlations were expected to indicate the differential stability over time. It was also expected that the mean-level stability could be confirmed so that paired t tests would show no significant differences of four achievement goals measured over two time points.

The predictive validity of the AGQ-C was the major concern in study 4, with performance of Chinese language arts as the consequence of 2 × 2 achievement goals. This decision was made because Chinese is the official medium of instruction in Taiwan, as well as the country's official language. Taiwanese students are repeatedly told that Chinese language mastery is important in itself, and has instrumental value for passing senior high school and university entrance exams (short-term goals) and for getting good jobs and enhancing social status (long-term goals). Chinese is the only subject course taken by every Taiwanese student from primary through high school. Taiwanese students spend more than four hours weekly on Chinese reading, essay writing, grammar, rhetorical, and other skills in preparation for entrance exams. Students have various learning experiences with this subject and so they could have formed their achievement goals.

In Study 4, I analyzed the mediating effects of achievement goals between self-efficacy and Chinese performance. Specifically, I investigated a structural model based on first-order achievement goals, and assumed that the four goals acting as mediators between Chinese self-efficacy and Chinese performance (Fig. 2-3). It was expected that Chinese self-efficacy would have positive effects both on the mastery-approach goals and the performance-approach goals, which in turn would be positive predictors of Chinese performance. Chinese self-efficacy would have negative effects on the performance-avoidance goals that in turn would be negative predictors of Chinese performance. Considering the lack of research on the mastery-avoidance goals in Asian samples, I established a tentative hypothesis that Chinese self-efficacy would negatively affect the mastery-avoidance goals, which in turn would be negative predictors of Chinese performance.

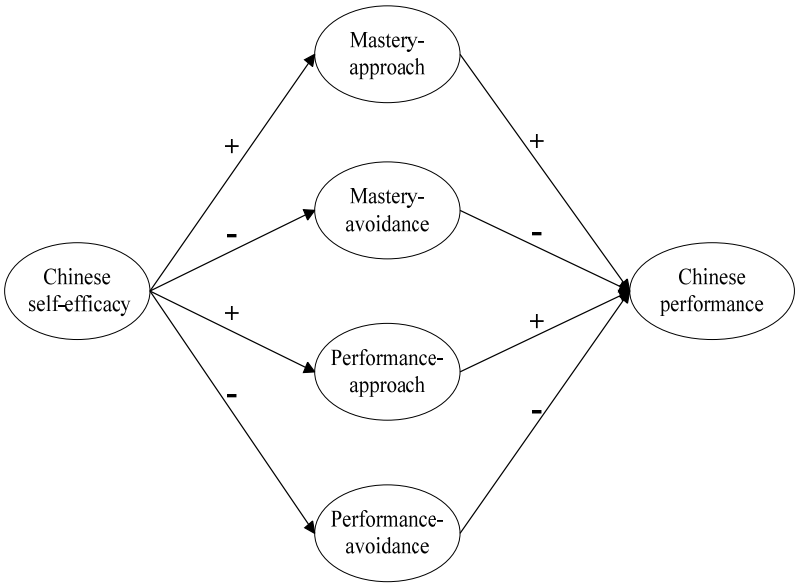


Figure 2-3 The hypothetical path diagram of antecedents and outcomes of four achievement goals (with factorial structure).

Also in Study 4, I investigated a structural model based on second-order achievement goals, predicting that four factors associated with valence and definition dimensions were mediators between Chinese self-efficacy and Chinese performance (Fig. 2-4). Elliot (2006) provides an overview of approach-avoidance distinctions based on a collection of psychology studies. He notes that positively evaluated stimuli are inherently correlated with an approach orientation that moves the direction of behavior toward it. In contrast, negatively evaluated stimuli are inherently correlated with an avoidance orientation that moves the direction of behavior away from it. It was therefore expected that Chinese self-efficacy would have a positive effect on the approach factor but a negative effect on the avoidance factor. Consequently, the approach factor would have a positive effect on Chinese performance, while the avoidance factor would have a negative effect on Chinese performance. In addition, empirical findings on the association between performance/mastery goals and self-efficacy have been mixed. As stated above, mastery goals focus on the development of ability through task mastery, while performance goals focus on demonstration of ability relative to others. However, Shih (2005a) and Shih and Alexander (2000) found that Taiwanese students are encouraged to endorse performance and mastery goals simultaneously, and that the two goals both facilitate academic performance. It was therefore predicted that Chinese self-efficacy would have positive effects on mastery and performance

factors, and that mastery factor and performance factors would have positive effects on Chinese performance.

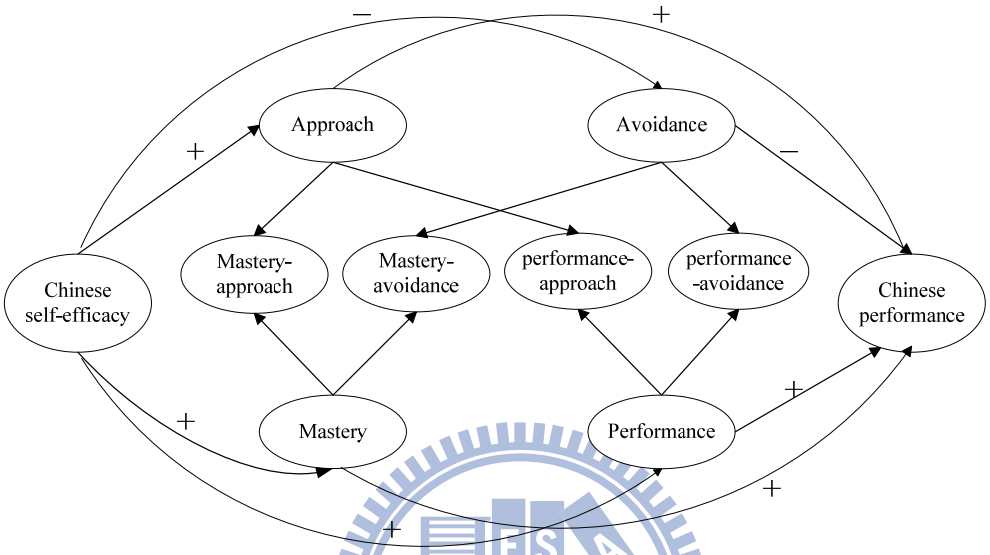


Figure 2-4 The hypothetical structural model of dimensional achievement goals with Chinese self-efficacy and Chinese performance

Chapter 3 Study 1: The first-order factorial structure of the 2 × 2 achievement goal framework

The aim of study 1 was to examine the first-order factor structure of the Chinese translation of Elliot and McGregor's (2001) Achievement goal questionnaires (AGQ-C). Confirmatory factor analysis (CFA) procedures were used to validate the independence of the four achievement goals; CFA was also used to test the fit of alternative three- and two-factor models and to compare the fit of the hypothesized model to these alternatives.

Method

Participants and Procedure

Participants were drawn from the list of respondents to a 2007 national adolescent survey funded by the Taiwan National Academy for Educational Research. Survey questions were designed to collect demographic, exam performance, and physical and mental development data. Regional clusters were classified according to Taiwan official territorial divisions (northwest, midwest, southwest, and east/islands). The numbers and percentages of participating schools and students in each region were determined according to 2006 educational statistics published by the ROC Ministry of Education (n.d.). Schools were randomly selected in each region, and one class was randomly selected from each school. The sample consisted of 3,137 students (934 fifth graders, 29.8%; 1,074 seventh graders, 34.2%; and 1,129 tenth graders, 36%) who completed questionnaires assessing their achievement goals.

Instruments

Achievement Goals. Elliot and McGregor's (2001) AGQ was translated into Chinese (AGQ-C). Each achievement goal was comprised of three items (for a total of 12 items) with responses given along a 5-point checklist (1 = "not at all true of me," 5 = "very true of me"). Instead of using the 7-point Likert scale in the original questionnaire; all items in the AGQ-C are on a 5-point Likert scale because students who participated in my study were younger than the

sample in Elliot's study. For example, the statement, "I want to learn as much as possible in my Chinese language class," was used to measure mastery-approach goals. I used, "In my Chinese course, it is important for me to do better than other students," to measure performance-approach goals, and "I worry that I may not learn all that I possibly can in my Chinese language class" for mastery-avoidance goals. Finally, "My goal in Chinese classes is to avoid performing poorly" was used to measure performance-avoidance goals.

An educational measurement expert was invited to back-translate AGQ-C. The AGQ, the back translation, and AGQ-C were compared. Geisinger (1994) noted that the issue of cultural adaptation may make it difficult to directly translate and use items from some measures. Considering cultural sensitivities, the current study adopt wordings related to Chinese common phrases instead of translating items linguistically. It is believed that these procedures may improve the validation of AGQ-C. Reliability coefficients for the four achievement goal subscales were .85, .89, .85, and .81, respectively.

Results

The descriptive statistics and intercorrelations of 12 items for four achievement goals were shown in Table 3-1. The descriptive statistics, alpha coefficients of and zero order correlations of achievement goals indicators were shown in Table 3-2.

Table 3-1 Descriptive statistics and intercorrelations of 12 items for four goals. (N = 3137)

Item	M	SD	1	2	3	4	5	6	7	8	9	10	11
1.Ma1	3.62	1.08	-										
2.Ma2	3.66	1.10	.68	-									
3.Ma3	3.43	1.13	.63	.66	-								
4.Mv1	3.00	1.15	.27	.26	.24	-							
5.Mv2	3.05	1.17	.27	.24	.22	.67	-						
6.Mv3	2.99	1.18	.29	.24	.23	.60	.71	-					
7.Pa1	3.39	1.15	.44	.50	.45	.24	.21	.18	-				
8.Pa2	3.31	1.14	.46	.54	.46	.26	.21	.18	.81	-			
9.Pa3	3.23	1.14	.45	.49	.40	.24	.18	.15	.66	.70	-		
10.Pv1	2.88	1.19	.07	.05	.08	.19	.22	.22	.13	.13	.15	-	
11.Pv2	2.93	1.22	.07	.09	.07	.19	.23	.23	.14	.14	.18	.60	-
12.Pv3	2.84	1.26	.07	.08	.05	.23	.26	.27	.11	.12	.16	.50	.66

Note. All correlations were statistically significant at <.01.

Ma1-3 = Mastery-approach goal items; Mv1-3= Mastery-avoidance goal items;
Pa1-3 =Performance-approach goal items; Pv1-3 =Performance-avoidance goal items

Table 3-2 Descriptive statistics, alpha coefficients of and zero order correlations of achievement goal indicators (N = 3137)

	M	SD	1	2	3	4
1. Mastery-approach goals	3.57	.97	(.85)			
2. Mastery-avoidance goals	3.01	1.03	.33	(.85)		
3. Performance-approach goals	3.31	1.03	.59	.26	(.89)	
4. Performance-avoidance goals	2.88	1.04	.09	.30	.18	(.81)

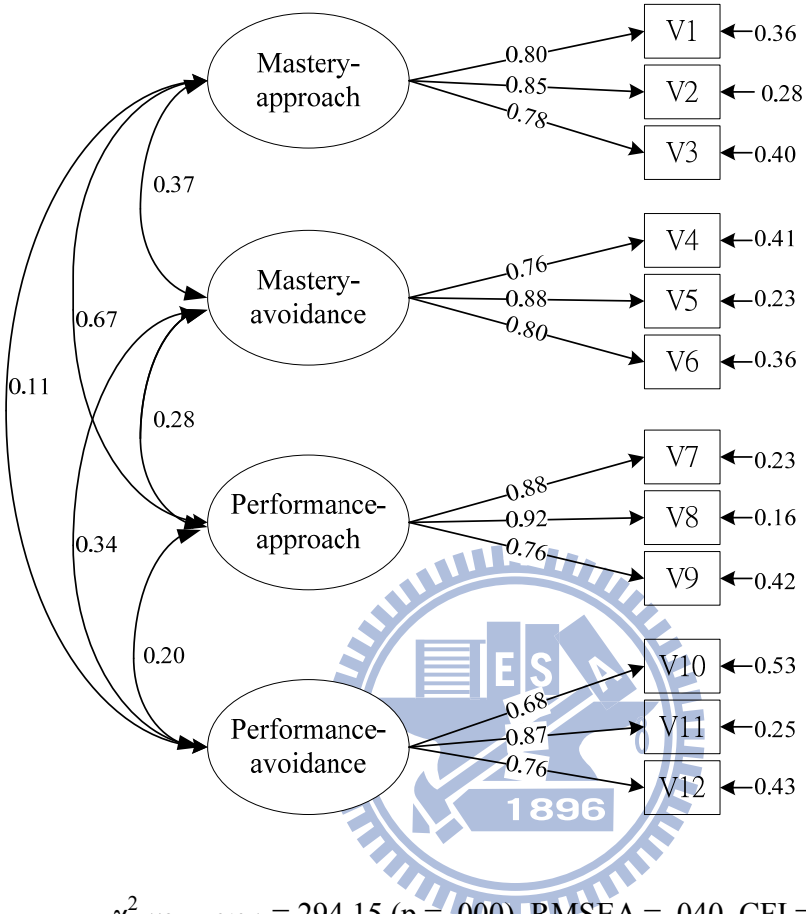
Note. All correlations were statistically significant at <.01.
( ) : alpha coefficients of internal consistency

Factorial structure of achievement goals: The first-order factor structure

Confirmatory factor analyses (CFAs) were conducted to the AGQ-C items using LISREL 8.80 according to procedures described by Jöreskog and Sörbom (1993). Five fit indices were used to assess the overall fit of the model: the chi-square statistics, the root mean square error of approximation (RMSEA), the comparative fit index (CFI), the incremental fit index (IFI), and the Akaike information criterion (AIC). The chi-square statistic provides an asymptotically valid significance test of model fit. An RMSEA of .08 or less is considered to be a reasonable fit (Steiger, 1989; Browne & Mels, 1990). The values of the CFI range from 0 to 1 with values greater than .95 indicating an acceptable model fit (Bentler, 1990; Hu & Bentler, 1995). The value of the IFI ranges from 0 to 1 with values greater than .90 (Browne & Cudeck, 1993). When multiple models were compared, the value of AIC was the lower the better.

The first CFA examined the hypothetical model with 12 items loaded on their respective first-order latent factors (Fig. 3-1): mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance goals. The results strongly supported the first-order hypothetical model (Figure 3-1) in which all factor loadings were pretty high (ranging from .68 to .92, $p < .01$) and each fit statistic met the criteria for a good fitting model: $\chi^2_{(48, N=3137)} = 294.15$ ($p = .000$); RMSEA = .040; CFI = .99. GFI=0.97. My data showed that four achievement goals were

distinctly perceived by Taiwanese students while learning Chinese.



$\chi^2_{(48,\ N=3137)} = 294.15$ ($p = .000$), RMSEA = .040, CFI = .99, GFI =.97

Figure 3-1 The first-order measurement model of achievement goal structure. Estimates are standardized.

Note. All coefficients are significant ($p < .01$). Error variables are not represented in order to simplify the presentation. V1 to V12 represent the individual items of the scale.

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Model comparison

Additional CFAs examined the fit of alternative models (all are of first-order factor structure) and compared the fit indices of the hypothesized and alternative models. Six alternative models were tested: (a) trichotomous model A in which the performance-approach and performance-avoidance items load on their respective latent variables, and the mastery-approach and mastery-avoidance items load together on a third latent variable; (b) trichotomous Model B, in which the mastery-approach and mastery-avoidance items load on their respective latent variables, and the performance-approach and performance-avoidance items load together on the third latent variable; (c) trichotomous Model C in which the mastery-approach and performance-approach items load on their respective latent variables, and the mastery-avoidance and performance avoidance items load together on a third latent variable; (d) trichotomous Model D in which the performance-avoidance and mastery-avoidance items load on their respective latent variables, and the performance-approach and mastery-approach items load together on a third latent variable; (e) a mastery-performance model in which the mastery-approach and mastery-avoidance items load together on one latent variable, and the performance-approach and performance-avoidance items load together on another; and (f) an approach-avoidance model in which the mastery-approach and performance-approach items load together on one latent variable, and the mastery-avoidance and performance-avoidance items load together on another.

As displayed in Table 3-3, the results of these analyses indicated that none of the alternative dichotomous or trichotomous models provided a good fit to the data, and the hypothetical model displayed a far better fit than any of the alternative models. The results were accorded with findings of Elliot and McGregor (2001) and Elliot and Murayama (2008).

Table 3-3 Fit indices of factorial achievement goal model and other alternative models, all with first-order factor structure (N = 3137)

	Overall fit indices				
	χ^2/df	CFI	IFI	RMSEA	AIC
Hypothetical first-order achievement goal model	6.13	.99	.99	.040	354.15
Trichotomous model A	126.49	.83	.83	.200	6505.04
Trichotomous model B	78.47	.87	.87	.157	4055.73
Trichotomous model C	65.52	.89	.89	.143	3395.63
Trichotomous model D	59.92	.91	.91	.137	3109.96
Mastery-performance model	160.28	.74	.74	.225	8544.74
Approach-avoidance model	116.40	.81	.82	.192	6219.02
	Log-likelihood ratio test (model comparison)				
Hypothetical model versus	df	χ^2	*P*		
Trichotomous model A	3	6156.89	< .001		
Trichotomous model B	3	3707.58	< .001		
Trichotomous model C	3	3047.48	< .001		
Trichotomous model D	3	2761.81	< .001		
Mastery-performance model	5	8200.59	< .001		
Approach-avoidance model	5	5874.87	< .001		

Note. CFI = comparative fit index; IFI = incremental fit index;
RMSEA = root-mean-square error of approximation;
AIC = Akaike information criterion.

Chapter 4 Study 2: The second-order factorial structure of the 2 × 2 goal framework

Study 2 moved beyond the analysis of factor structure to an analysis of the dimensional structure, testing for four achievement goals as the first-order latent variables and four factors of two competence dimensions as the second-order latent variables. The hypothetical dimensional structure model was compared to other alternative second-order models.

Method

The Participants and Procedure were the same with Study 1.

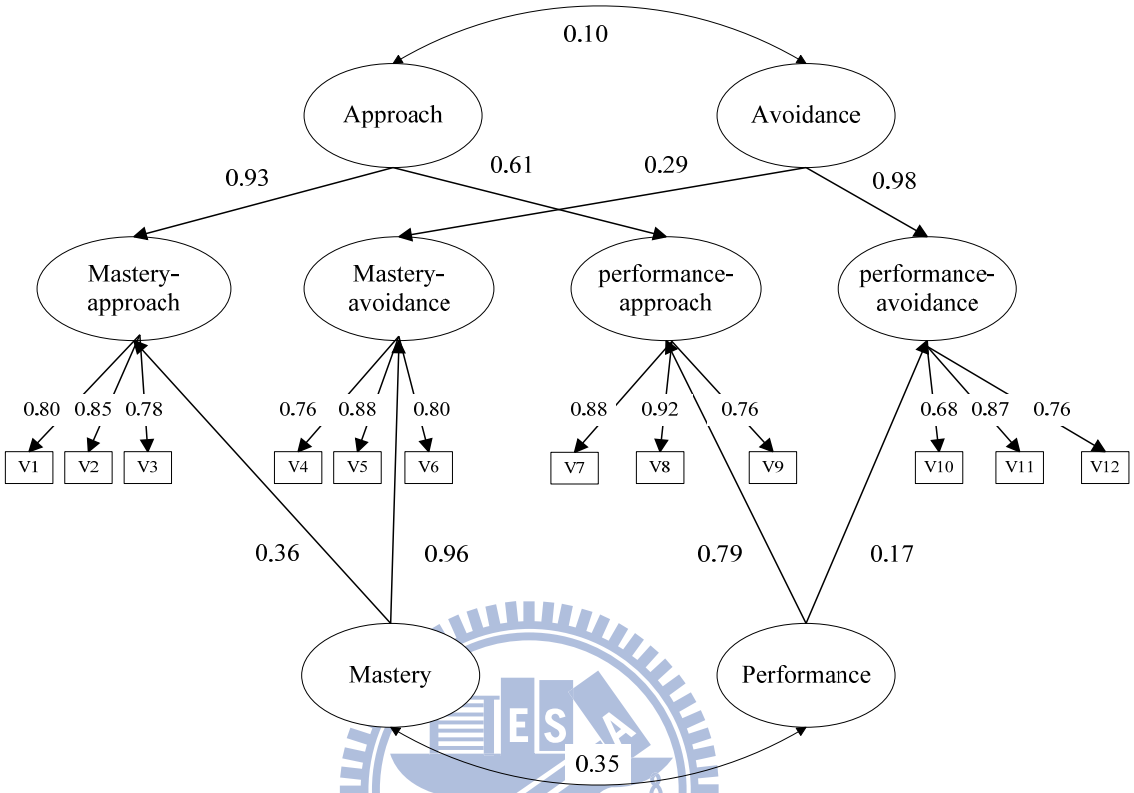
Results

Dimensional structures of achievement goals: The second-order factor structure

The support of first-order achievement goal structure as a good fit and far better fit than other alternatives does not necessarily guarantee 2 × 2 nature of achievement goal framework. To examine the dimensional nature of the achievement goal model, I further tested the AGQ-C by conducting a second-order factor analysis. The hypothetical model specified that the first-order latent variables were the four achievement goals and the second-order latent variables were four of two competence dimensions (Fig. 4-1).

The results showed that 12 items loaded on their respective first-order latent goals that in turn loaded on the designated second-order factors as I expected. The path coefficients from the second-order factors to the first-order goals ranged from small (.29) to large (.98); all reached the .05 significant levels. As expected, factors within each dimension were found to correlate with each other. The correlation between the approach and avoidance factor was significant though rather small (φ= .10, $p < .05$); the correlation between the mastery and performance factor was comparatively lager (φ= .35, $p < .05$). Factors across dimensions (e.g., the approach factor and the mastery factor) were not correlated. The results from the analysis strongly supported the hypothetical second-order model because each fit statistic met the criteria for a good fitting model: $\chi^2_{(48, N=3137)} = 294.15$ ($p = .000$); RMSEA = .040; CFI = .99; GFI= .97. The dimensional

nature of a 2 × 2 achievement goal model was confirmed.



$\chi^2_{(48,\ N=3137)} = 294.15$ ($p = .000$), RMSEA = .040, CFI = .99, IFI =.99, GFI= .97.

Figure 4-1 The second-order measurement model of achievement goals-dimensional structure. Estimates are standardized.

Note. All coefficients are significant ($p < .01$). Error variables are not represented in order to simplify the presentation. V1 to V12 represent the individual items of the scale.

Model comparison

The hypothetical model was further compared to two alternatives. The first was a second-order mastery-performance model where the first-order goals respectively load on only two second-order latent factors: mastery and performance. The second was a second-order approach-avoidance model where the first-order goals respectively load on two other second-order latent factors: approach and avoidance.

As displayed in Table 4-1, the results from these analyses indicated that both alternative models provided good fits to the data; however, the hypothetical model displayed a far better fit than any of the alternative models. In sum, the dimensional nature of the 2 × 2 achievement goal

framework, assuming that the valence dimension was crossed with the definition dimension, was confirmed in the Taiwanese student sample.

Table 4-1 Fit indices of dimensional achievement goal model and other alternative models, all with second-order factor structure (N = 3137)

Variable	Overall fit indices				
	χ^2/df	CFI	IFI	RMSEA	AIC
Hypothetical second-order model	6.13	.99	.99	.040	354.15
Mastery–performance second-order model	10.41	.98	.98	.055	568.04
Approach–avoidance second-order model	6.73	.99	.99	.043	387.93
	Log-likelihood ratio test (model comparison)				
	df	χ^2	*p*		
Second-order achievement goal model vs.					
Mastery–performance second-order model	1	215.89	< .001		
Approach–avoidance second-order model	1	35.78	< .001		

Note. CFI = comparative fit index; IFI = incremental fit index;
RMSEA = root-mean-square error of approximation;
AIC = Akaike information criterion.

Testing path coefficient invariance

In a closer look at the results of the hypothetical second-order model, it was found that in each pair of paths from a second-order latent factor to the respective first-order goals the path coefficient disparity within the pair was very large. For example, the path coefficient of the avoidance factor to mastery-avoidance goals (lambda = 0.29, in Figure 4-1) was obviously less than the path coefficient of the avoidance factor to performance-avoidance goals (lambda = 0.98). Accordingly, further examinations of path coefficient invariance by setting the paths from a second-order factor to its two respective goals as equal (in Table 4-2) were conducted. To test formally the statistical significance of the difference between the two path coefficients, four alternative models were posited. This model comparison approach was appropriate when 4 factors of the valence and definition dimensions were scaled to have a variance of 1 so that their effects are in relation to a standardized metric.

In the constrained model 1, the approach-to-mastery-approach path was constrained to be equal to the approach-to-performance-approach path. If two paths really do differ significantly, then the hypothetical second-order model (two paths are freely estimated) would fit the data significantly better than the constrained model 1. Because the constrained model 1 is nested under the hypothetical second-order model, the chi-square test statistic for the constrained model 1 cannot be any better than that of the hypothetical model. However, if the fit of the constrained model 1 approaches that of the hypothetical model, then two paths do not differ in their contribution to the approach factor. The rest of the path invariance tests followed the same procedure. In the constrained model 2, the avoidance-to-mastery-avoidance was constrained to be equal to the avoidance-to-performance-avoidance path. In the constrained model 3, the mastery-to-mastery-approach path was constrained to be equal to the mastery-to-mastery-avoidance path. In the constrained model 4, the performance-to-performance-approach path was constrained to be equal to the performance-to-performance-avoidance path.

The results (in Table 4-2) showed that the difference in chi-squares for the two models ($\Delta\chi^2_{(\Delta df=1)} = 537.82$, $p < .001$) was statistically significant. It revealed that the fit of the hypothetical model was better than that of the constrained mode 1. Two path coefficients (approach-to-mastery-approach path and approach-to-performance-approach path) freely estimated by the hypothetical model were not equal (.61 < .93). In the constrained model 2, the coefficients of avoidance-to-mastery-avoidance path and avoidance-to-performance- avoidance path did differ (.29 < .98, $\Delta\chi^2_{(\Delta df=1)} = 1868.82$, $p < .001$). In the constrained model 3, the coefficients of mastery-to-mastery-approach path and mastery-to-mastery- avoidance path were not equal (.36 < .96, $\Delta\chi^2_{(\Delta df=1)} = 780.15$, $p < .001$). Finally, in the constrained model 4, the coefficient of performance-to-performance-approach path was not equal to that of performance-to-performance-avoidance path (.17 < .79, $\Delta\chi^2_{(\Delta df=1)} = 1688.82$, $p < .001$).

It revealed that, in the Taiwanese student sample, each pair of goals has nonequivalent contributions to the correspondent factors. For the valence dimension, the approach factor was mainly derived from the variance of mastery-approach goals (instead of from that of performance-approach goals) while the avoidance factor was mainly derived from the variance of performance-avoidance goals (instead of from that of mastery-avoidance goals). For the

definition dimension, the mastery factor was principally derived from the variance of mastery-avoidance goals (instead of from that of mastery-approach goals); and the performance factor was mostly derived from the performance-approach goals (instead of from that of performance-avoidance goals).

Table 4-2 Path coefficient invariance analyses of the constrained models nested under hypothetical second-order achievement goal model

	χ^2 (*df*) p	$\Delta\chi^2$ (Δdf) p
The hypothetical second-order achievement goal model	294.15 (48) p = .000	--
Constrained model 1 Set path $_{\text{(approach to mastery-approach goals)}}$ = path $_{\text{(approach to performance-approach goals)}}$	831.97 (49) p = .000	537.82 (1) p < 0.001
Constrained model 2 Set path $_{\text{(avoidance to mastery-avoidance goals)}}$ = path $_{\text{(avoidance to performance-avoidance goals)}}$	2162.23 (49) p = .000	1868.08 (1) p<0.001
Constrained model 3 Set path$_{\text{(mastery to mastery-approach goals)}}$ = path$_{\text{(mastery to mastery-avoidance goals)}}$	1074.30 (49) p = .000	780.15 (1) p<0.001
Constrained model 4 Set path$_{\text{(performance to performance-approach goals)}}$ = path$_{\text{(mastery to performance-avoidance goals)}}$	1982.71 (49) p = .000	1688.56 (1) p<0.001

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Chapter 5 Study 3: The stability of the 2 × 2 goal endorsement in a panel sample

The aim of Study 3 was to examine stability in 2 × 2 achievement goal endorsement over time in a Taiwanese student panel sample.

Method

Participants and Procedure

This study included only secondary students drawn on from the sample of Study1. 784 students (378 middle school students and 405 high school students) participated in two consecutive years. They attended the seventh and tenth grades in 2007; one academic year later, they attended the eighth and eleventh grades. The students were instructed to complete the AGQ-C at mid-spring semester 2007 (Time 1). Again, they were instructed to complete AGQ-C at mid-spring semester 2008 (Time 2).

Measures

The AGQ-C was again used to investigate the participating students' achievement goals in their Chinese language course. Reliability coefficients in the present data for the four achievement goal subscales were .88/.88, .85/.88, .91/.92, and .83/.87 at Time 1 and Time 2, respectively.

Statistics Analysis

The structural stability, differential stability and mean-level stability of secondary students' goal endorsements were examined. Confirmatory factor analysis was used to compare the fit indexes for a series of nested models with increasing constraints. I conducted Pearson product–moment correlations to examine differential continuity in achievement goal endorsement across the two time points. Descriptive statistics for each achievement goal were computed for data collection periods, and paired t tests were computed to test mean-level stability.

Results

Descriptive statistics and intercorrelations of achievement goal items across Time 1 and Time 2 are presented in Table 5-1. Table 5-2 offers descriptive statistics, alpha coefficients of and zero order correlations of indicators of achievement goals over Time 1 and Time 2.

Table 5-1 Descriptive statistics and intercorrelations of achievement goal items across Time 1 and Time 2.

Item	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Time1																									
1.Ma1	3.65	1.06	-																						
2.Ma2	3.70	1.10	.70	-																					
3.Ma3	3.46	1.11	.66	.65	-																				
4.Mv1	3.00	1.14	.22	.23	.20	-																			
5.Mv2	3.03	1.18	.26	.22	.18	.67	-																		
6.Mv3	3.00	1.16	.29	.24	.21	.60	.71	-																	
7.Pa1	3.42	1.14	.47	.52	.49	.25	.20	.18	-																
8.Pa2	3.35	1.14	.51	.58	.50	.27	.22	.19	.82	-															
9.Pa3	3.27	1.13	.47	.51	.50	.20	.15	.15	.67	.72	-														
10.Pv1	2.80	1.19	.07	.06	.05	.16	.25	.24	.15	.17	.15	-													
11.Pv2	2.91	1.22	.09	.12	.05	.21	.28	.27	.14	.15	.15	.61	-												
12.Pv3	2.82	1.27	.07	.10	.03	.21	.25	.26	.13	.14	.15	.53	.69	-											
Time 2																									
13.Ma1	3.60	.97	.39	.36	.36	.05	.03	.08	.30	.32	.31	-.02	-.01	-.05	-										
14.Ma2	3.64	1.01	.37	.43	.38	.08	.06	.09	.33	.35	.32	-.02	-.01	-.05	.71	-									
15.Ma3	3.48	1.04	.34	.35	.41	.13	.09	.11	.27	.29	.30	-.08	-.03	-.08	.65	.69	-								
16.Mv1	3.01	1.08	.12	.14	.11	.21	.22	.22	.10	.13	.09	.10	.10	.11	.25	.26	.25	-							
17.Mv2	3.08	1.08	.12	.10	.12	.18	.22	.23	.10	.09	.07	.10	.10	.12	.22	.23	.24	.73	-						
18.Mv3	3.02	1.12	.09	.12	.13	.18	.22	.25	.10	.12	.08	.09	.10	.14	.25	.23	.24	.62	.72	-					
19.Pa1	3.41	1.06	.33	.37	.35	.14	.09	.11	.43	.47	.42	.03	.03	.03	.52	.59	.50	.25	.22	.21	-				
20.Pa2	3.34	1.06	.31	.36	.35	.14	.11	.10	.44	.47	.42	.02	.01	.00	.51	.60	.53	.28	.25	.22	.84	-			
21.Pa3	3.26	1.07	.32	.35	.34	.12	.06	.07	.42	.46	.43	.04	.05	.04	.48	.51	.46	.24	.20	.17	.71	.74	-		
22.Pv1	2.94	1.14	-.05	.01	.00	.09	.12	.12	.01	.02	.05	.22	.27	.24	.07	.04	.10	.28	.29	.29	.09	.12	.14	-	
23.Pv2	2.92	1.16	-.04	-.01	-.01	.08	.07	.10	.01	.02	.03	.20	.27	.25	.06	.02	.09	.24	.27	.29	.09	.11	.11	.66	-
24.Pv3	2.83	1.20	-.04	-.01	-.01	.13	.11	.14	.03	.01	.04	.22	.25	.26	.05	.04	.09	.27	.30	.32	.10	.11	.12	.58	.74

Note. When the correlation coefficients were above .06, they were statistically significant at .05.
Ma1-3 = Mastery-approach goal items; Mv1-3= Mastery-avoidance goal items;
Pa1-3 =Performance-approach goal items; Pv1-3 =Performance-avoidance goal items

Table 5-2 Descriptive statistics, alpha coefficients of and zero order correlations of indicators of achievement goals over Time 1 and Time 2 (N = 784)

		M	SD	1	2	3	4	5	6	7	8
T1	1. Ma	3.48	.944	(.88)							
	2. Mv	3.05	.942	.35**	(.85)						
	3. Pa	3.22	.998	.63**	.25**	(.91)					
	4. Pv	2.81	.975	.08*	.28**	.14**	(.83)				
T2	5. Ma	3.50	.875	.49**	.15**	.44**	-.06	(.88)			
	6. Mv	3.07	.932	.21**	.29**	.20**	.16**	.37**	(.88)		
	7. Pa	3.29	.950	.45**	.14**	.58**	-.02	.67**	.34**	(.92)	
	8. Pv	2.88	.993	-.01	.13**	.03	.37**	.06	.35**	.10**	(.87)

Note. ( ) : alpha coefficients of internal consistency
Ma = Mastery-approach goal indicator; Mv= Mastery-avoidance goal indicator;
Pa =Performance-approach goal indicator; Pv =Performance-avoidance goal indicator

Structural stability

Confirmatory factor analyses were used to compare the fit indexes for a series of four nested models with increasing constraints: configural invariance (Model 1), weak measurement invariance (Model 2), strong MI (Model 3), and strict MI (Model 4). As can be seen from Table 5-3, model 1 achieved an acceptable fit according to the GFI, CFI, and IFI; although the chi-square-test indicated significant departures of the model from the data—which is also owed to the high power of this test in conjunction with many degrees of freedom. As a consequence, I considered the configural invariance model as adequately describing the data.

Subsequently, weak MI (model 2) was imposed by requiring the factor loadings to be equal at Time 1 and Time 2. Doing so did not significantly reduce model fit ($\Delta\chi^2_{(8)} = 17.83$, $p = .023$), implying that weak measurement invariance holds. The scaling of the latent variables was equal, which allows variance and covariance comparisons of the factors across time. In model 3 (Strong MI), intercepts of the observed indicators were constrained to be equal across time, thus imposing strong MI. According

to Table 5-3, the fit of this model was not statistically inferior to that of the previous one ($\Delta\chi^2_{(12)}$ = 21.40, p = .045), from which one might conclude that strong MI holds across Time 1 and Time 2. Consequently, factor mean differences can be calculated across time, because all mean differences of the indicators are due to differences in latent variable means in the strong invariance model.

Finally, strict MI (Model 4) was imposed by requiring residual variances of the 12 indicators to be equal at Time 1 and Time 2. As Table 5-3 shows, model fit decreased significantly compared to the previous model ($\Delta\chi^2_{(12)}$ = 97.71, p < .005). Hence, it appeared as if at least some of the residual variances were different at the two measurement occasions. However, according to the GFI, CFI and IFI, these differences did not seem to be very pronounced. I thus concluded that strict measurement invariance did not hold, which implied that not all differences in the variances of the observed indicators were due to differences in factor variances. Note that for examining the three different types of stability, strict MI does not represent a prerequisite. It is sufficient to establish strong MI (Meredith, 1993; Meredith & Horn, 2001) for other stability examinations.

Table 5-3 Invariance analyses of four measurement invariance models over time

Model	*df*	χ^2	GFI	CFI	IFI	$\Delta\chi^2$	Δdf	p	$\Delta\chi^2/\Delta df$
Model 1 Configural invariance	212	437.72	0.955	0.990	0.990			---	
Model 2 weak factorial invariance	220	455.55	0.954	0.989	0.989	17.83	8	0.02254	2.229
Model 3 strong factorial invariance	232	476.95	0.954	0.989	0.989	21.40	12	0.04482	1.783
Model 4 strict factorial invariance	244	574.66	0.944	0.985	0.985	97.71	12	0.00000*	8.143

****P<0.005*

Differential stability

Cross time Pearson product–moment correlations were calculated to examine differential stability. Table 5-4 showed that 4 latent achievement goals at Time 1 were significantly positive related to their

respective goals at Time 2. The correlation coefficients 0.579 (performance-approach), .489 (performance-approach), .373 (performance-avoidance) to 0.291 (mastery-avoidance) are relative of middle to small magnitude. This implies that the rank order of secondary students changed profoundly in two avoidance-goal endorsement across a year. By contrast, it appears as if two approach-goal endorsements were more stable with regard to interindividual differences across time.

Mean-level stability

Table 5-4 also shows means and standard deviations for each latent achievement goals. Paired t tests were performed to test cross time differences of means for each achievement goal. Three of four latent factor means (in the sample level) remained quite stable across a year; only performance-approach goals increased significantly from Time 1 to Time 2.

Table 5-4 Descriptive Statistics, mean-level stability (paired t test), and differential stability

	T1		T2		T1 to T2	
Achievement goals	M	SD	M	SD	t	r
Mastery-approach goals	3.48	.944	3.50	.875	-.504	.489**
Mastery-avoidance goals	3.05	.942	3.07	.932	-.491	.291**
Performance-approach goals	3.22	.998	3.29	.950	-2.302*	.579**
Performance-avoidance goals	2.81	.975	2.88	.993	-1.804	.373**

* p< .05; ** p < .01.

Chapter 6 Study 4: The predictive utility of the 2 × 2 achievement goal framework

In terms of the predictive utility, the current study investigated a structural model based on first-order achievement goals assuming that four goals are mediators between Chinese self-efficacy and Chinese performance. Moreover, the current study also conducted a structural model based on second-order achievement goals assuming that the four factors of the valence and definition dimensions are mediators between Chinese self-efficacy and Chinese performance.

Method

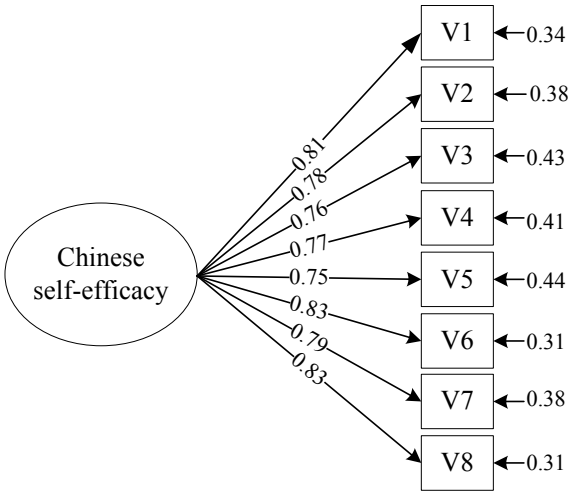
Participants and Procedure

Participants were the same with Study1. Totally 3,137 students (934 fifth graders, 29.8%; 1,074 seventh graders, 34.2%; and 1,129 tenth graders, 36%) completed questionnaires assessing self-efficacy and achievement goals in year 2007. The self-efficacy questionnaire was administered in large group sessions during the first week (middle of the semester), and the achievement goal questionnaire was administered approximately two weeks later. Chinese grades were obtained at the end of the semester.

Instruments

*Achievement Goals***.** Elliot and McGregor's (2001) AGQ was translated into Chinese (AGQ-C).

Chinese Self-efficacy. The current study both translated and modified the self-efficacy subscale in Pintrich and DeGroot's (1990) Motivated Strategies for Learning Questionnaire (MSLQ). Students were instructed to describe whether or not they were confidently mastering the lessons taught in their Chinese language classes. A 5-point scale was used to measure responses. An example item is "I am sure that I can do an excellent job in my Chinese class." The validity of self-efficacy scale using CFA showed that all factor loadings ranged from .75 to .83 ($p < .01$) and each fit statistic were: $\chi^2_{(20, N=3137)} = 511.03$ (p = .000); RMSEA = .08; CFI = .99; GFI=0.96 (Figure 6). Figure 6-1 provides the measurement model of Chinese self-efficacy. Cronbach's alpha for this scale was .90.



$\chi^2_{(48, N=3137)} = 511.03$ ($p = .000$), RMSEA = .080, CFI = .99, GFI =.96

Figure 6-1 The measurement model of Chinese self-efficacy.

Note. Estimates are standardized. All coefficients are significant ($p < .01$).

V1 to V8 represent the individual items of the scale.

Chinese Performance. Grades (representing overall performance in Chinese) were requested from the school districts' official student record storage system. Students' grades were converted into T scores based on each class norm.

Results

Descriptive analyses and zero-order correlations

Descriptive statistics and correlations among Chinese self-efficacy, four achievement goals, and Chinese performance are presented in Table 6-1. As shown in Table 6-1, the mean rating of Chinese self-efficacy was 3.05 and for four achievement goals the means ranged from 2.88 to 3.57 respectively. The internal consistencies for the four goals were rather high. The intercorrelations between four goals were all significantly positive.The largest zero order correlation was between mastery-approach goals and performance-approach goals (r = .59, $p < .01$). Correlations between mastery-approach goals and mastery-avoidance goals (r = .33, $p < .01$) as well as between mastery-avoidance goals and performance-avoidance goals (r = .30, $p < .01$) were also high. Performance-approach goals were positively associated with mastery-avoidance goals (r = .26, $p < .01$). Except mastery-avoidance goals, the other three achievement goals were associated with Chinese self-efficacy and Chinese performance, respectively.

Table 6-1 Descriptive statistics, alpha coefficients of and zero order correlations among Chinese self-efficacy, achievement goals, and Chinese performance (N = 3137)

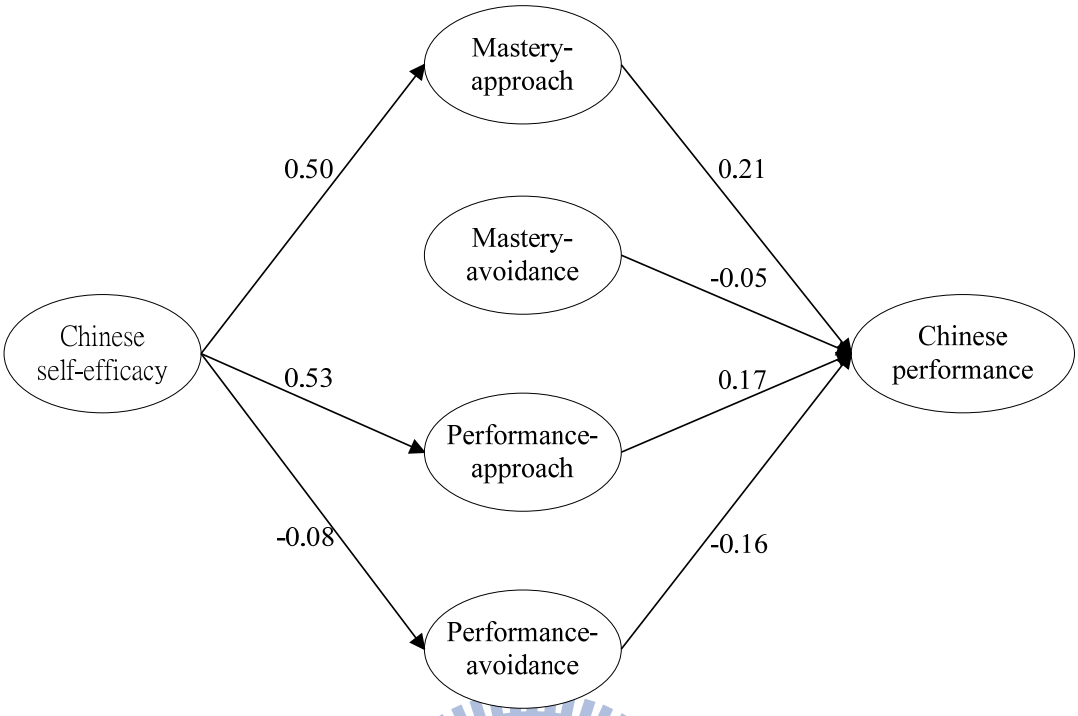
	M	SD	1	2	3	4	5	6
1.Chinese self-efficacy	3.05	.89	(.90)					
2.Mastery-approach goals	3.57	.97	.44**	(.85)				
3.Mastery-avoidance goals	3.01	1.03	- .02	.33**	(.85)			
4.Performance-approach goals	3.31	1.03	.47**	.59**	.26**	(.89)		
5.Performance-avoidance goals	2.88	1.04	-.08**	.09**	.30**	.18**	(.81)	
6.Chinese performance	50.00	9.84	.32**	.27**	.02	.26**	-.11**	--

* $p < .05$; ** $p < .01$ ( ) : alpha coefficients of internal consistency

Testing structural model of first-order achievement goals

The proposed structural model of first-order achievement goals speculated that four achievement goals would be effective mediators between Chinese self-efficacy and Chinese performance. The fit indices were $\chi^2_{(125, N=3137)} = 1452.63$ ($p = .000$); RMSEA = .058; CFI = .98; IFI = .98; GFI=0.97 -- all demonstrating a good fit between the model and data (Figure 6-2).

Chinese self-efficacy was a positive predictor of mastery-approach goals (beta = .50, $p < .01$) that was in turn a positive predictor of Chinese performance (beta = .21, $p < .01$). Chinese self-efficacy was a positive predictor of performance-approach goals (beta = .53, $p < .01$) that was consecutively a positive predictor of Chinese performance (beta = .17, $p < .01$). Chinese self-efficacy was a negative predictor of performance-avoidance goals (beta = -.08, $p < .01$) that was then a negative predictor of Chinese performance (beta = -.16, $p < .01$). Unexpectedly, no association was found between Chinese self-efficacy and mastery-avoidance goals while mastery-avoidance goals were negative predictors of Chinese performance (beta = -.05, $p < .01$). Partially supporting my hypotheses, three of the four achievement goals – mastery-approach, performance-approach, and performance-avoidance – were mediators between Chinese self-efficacy and Chinese performance in the Taiwanese student sample.



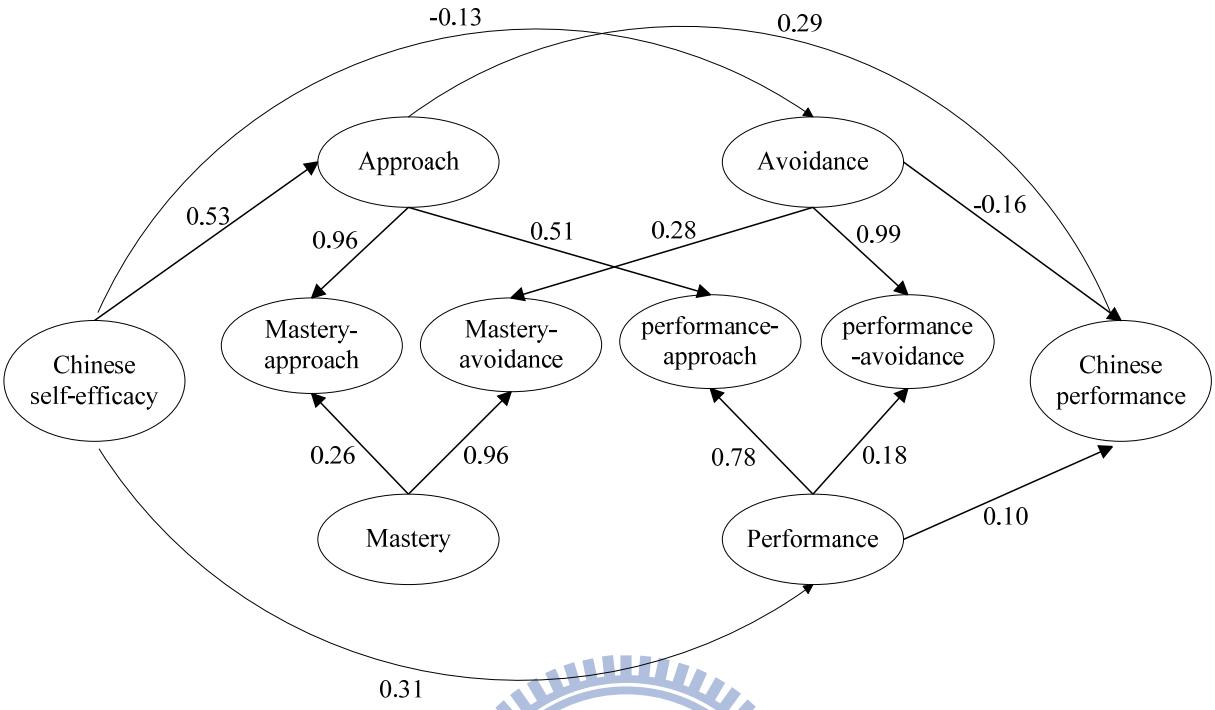
$\chi^2_{(125, N=3137)}$ = 1452.63 (p = .000), RMSEA = .058, CFI = .98, IFI =.98, GFI= .97.

Figure 6-2 The structural model of factorial achievement goals with Chinese self-efficacy and Chinese performance.

Note. Estimates are standardized. All coefficients presented in the figure are significant (p< .01). Indicator variables and error variables are not represented in order to simplify the presentation.

Testing structural model of second-order achievement goals

Because of the observation of nonequivalent effects from the approach, avoidance, mastery, and performance factors (of the valance and definition dimensions) on their respective 2 × 2 achievement goals, it may be necessary to adopt a second-order achievement goal structure to examine how such a goal structure mediated the effect of the antecedent and its effect on learning. This model posited that the second-order factors would be successful mediators between Chinese self-efficacy and Chinese performance. As shown in Figure 6-3, the model fit indices were $\chi^2_{(124, N=3137)}$ = 1005.74 (p = .000), RMSEA = .048, and CFI = .98; GFI=0.96-- all demonstrating a good fit between the model and data.



$\chi^2_{(124, N=3137)} = 1005.74$ ($p = .000$), RMSEA = .048, CFI = .98, IFI = .98, GFI= .96.

Figure 6-3 The structural model of dimensional achievement goals with Chinese self-efficacy) and Chinese performance.

Note. Estimates are standardized. All coefficients presented in the figure are significant ($p < .01$). Error variables are not represented in order to simplify the presentation.

Chinese self-efficacy was a positive predictor of the approach factor (beta = .53, $p < .01$) that was mainly derived from mastery-approach goals (lambda = .96), and the approach factor was in turn a positive predictor of Chinese performance (beta = .29, $p < .01$). Chinese self-efficacy was a negative predictor of the avoidance factor (beta = -.13, $p < .01$) that was primarily derived from performance-avoidance goals (lambda = .99), and the avoidance goals were sequentially a negative predictor of Chinese performance (beta = -.16, $p < .01$). Chinese self-efficacy was a positive predictor of the performance factor (beta = .31, $p < .01$) that was primarily derived from performance-approach goals (lambda = .78), and the performance factor was in turn a positive predictor of Chinese performance (beta = .10, $p < .01$). Finally, Chinese self-efficacy was not an effective predictor of the mastery factor that was mainly derived from mastery-avoidance goals (lambda = .96); in turn the mastery factor was not associated with Chinese performance. In sum, three of the four factors,

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approach, avoidance, and performance, were effective mediators between Chinese self-efficacy and Chinese performance in the Taiwanese student sample.

Chapter 7 General discussions, implications and limitations

General discussions

The aims of the present study were to investigate the measurement structure, predictive utility of the 2 × 2 achievement goal model with the AGQ Chinese version, and cross year stability of goal pursuit and in Taiwanese pre-university students learning Chinese. To my knowledge, this exploration of achievement goal pursuit in learning Chinese language arts is an initial attempt compared with the majority of previous studies were for university students and in math, science and English domains. The general discussion is presented in the following.

The factorial and dimensional structures of AGQ-C

I examined the factorial structure of AGQ-C and found that four goals, mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance goals were distinct, perceived by Taiwanese students while learning Chinese. The factorial structure with four achievement goals had better-fit with the data than various dichotomous or trichotomous models.

Then I moved further toward an analysis of dimensional structure of AGQ-C. This attempt produced empirical evidence supports that four achievement goals indeed represents a combination of two underlying competence dimensions, valence and definition. As anticipated, the 12 items comprising AGQ-C largely reflect the conceptualization of the 2 × 2 achievement goal framework. Every item contains two sources of achievement goals, one from the valence dimension (approach or avoidance) and the other from the definition dimension (mastery or performance). The dimensional goal structure, fitting the data and superior to other alternatives, posited that the valence of competence was crossed with the definition of competence, resulting in four separate goals. The valence dimension consisted of an approach factor and an avoidance factor only one of which was applicable to any given goal. Likewise, the definition dimension consisted of a mastery factor and a performance factor only one of which is applicable to any given goal. Taken together, the above factor analytic results and the internal consistencies provided strong support for AGQ-C.

The results of the second-order confirmatory factor analysis corroborated my expectation that factors within each dimension correlated with each other (approach correlated with avoidance; mastery

correlated with performance), whereas factors across dimensions were uncorrelated. It is also worth noting that Pearson correlations between some pairs of goal subscales were rather high (i.e., mastery-approach and performance-approach, mastery-approach and mastery-avoidance, mastery-avoidance and performance-avoidance). A consistent observation on the pattern of correlations shown in the Pearson correlation matrix and the second-order factor analysis is that goals sharing a common definition dimension appear to be more closely related than goals sharing a common valence dimension. These findings are in accordance with those of Elliot and McGregor (2001) based on AGQ. The close relationship between mastery and performance was likely influenced by the fact that grades can be applicable to either mastery-based or performance-based goals depending on the nature of performance evaluation in the achievement setting (Elliot & McGregor, 2001), e.g., a task-based or normative grading structure. Most achievement goal theorists agree that mastery-based and performance-based goals focus on different types of competence (Dweck, 1986), but measures commonly contain content that seems applicable to both types of competence (Elliot & Murayama, 2008).

The current results were accorded with the Asian research findings of significantly positive correlations between mastery and performance goals in samples of Hong Kong (Chan, 2008) and Mainland China (Ng, 2000). These results bring out an issue that achievement goals may has a cultural root. It is plausible that a social endeavor emphasis in Chinese culture mingles the performance goals with master goals in which Confucius's teachings encourage social goals of bringing honor, wealth, and status to one's family by studying hard and obtaining professional knowledge. The enjoyment of learning is not contradictory to obtaining earthy goods, rather they are complementary.

The path coefficient invariance of the dimensional model

The results of path coefficient invariance showed that Taiwanese students seem to instantly perceive the "approach" end of the valence dimension as mastery-approach goals rather than as performance-approach goals. In other words, students predominantly consider that "approach" as to maintain a purpose of develop knowledge and skills, and the evaluation of success is linked to intrapersonal or task based criteria. A possible reason was that Taiwanese students are socialized to value effort (effort model) and to believe that hard-working facilitates outstanding attainment (Shih, 2005b; Chen, 2005; Hwang, 2008). They are encouraged to believe that as long as they study hard enough, their personal competence will certainly be improved (Hwang, 2008). In other words, they seem to be encouraged to endorse mastery-based goals and approach-based goals simultaneously. In 2

× 2 achievement goal model, presumably the mastery-approach and the performance-approach factors contribute equally to form the approach factor. However, it was less likely that Taiwan students automatically evoke approach-based processing toward performance-approach goals.

For the other end of valence dimension, "avoidance," Taiwanese students seem to instantly recognize it as performance-avoidance goals rather than mastery-avoidance goals. Performance-avoidance goals define competence in normative terms and are negatively valenced. The focus is on avoiding unfavorable judgments of competency and poor performance compared to others (Elliot & Church, 1997). There appears to be widespread agreement that performance-avoidance goals are deleterious forms of regulation (Elliot & McGregor, 2001). When considering the influence of Confucian cultural tradition, Taiwan students seemed to internalize a personal duty of making effort (mastery-based goals) for attaining achievement success (approach-based goals) to glory family and provide affluence life for family. In addition, I observe that Taiwanese parents may allow children to avoid comparing with peers (performance-avoidance orientation) instead of avoiding mastery lessons (mastery-avoidance orientation). It may be possible that the internalization lead Taiwanese students to recognize the avoidance dimension as performance-avoidance goals rather than mastery-avoidance goals.

Besides, Taiwanese students seem to immediately perceive the "performance" end of the definition dimension as performance-approach goals rather than performance-avoidance goals. They predominantly consider "performance" as positively valenced as individuals actively trying to outperform others and demonstrating their competence. Goal theorists (Harackiewicz & Elliot, 1998; Kaplan & Middleton, 2002) have noted that the performance-based goal endorsement tends to be reflected in a competitive learning environment. Taiwanese education has been well known for the highly competitive atmosphere that results from the system of school entrance examinations (Shih, 2005a; Yang, 1988). In order to apply school entrance permission, Taiwanese students have to strive for outstanding achievement relative to others. Accordingly, Taiwanese students may regard the performance dimension as performance-approach goals rather than performance-avoidance goals in this performance oriented, competitive context.

In contrast, Taiwanese students surprisingly appear to instantly recognize "mastery" as mastery-avoidance goals rather than mastery-approach goals. In statistic terms, mastery-approach goals were connected with performance-approach goals to form a latent approach factor, but the variance of mastery-approach goals dominantly contribute to the approach factor. Therefore, little variance of mastery-approach goals was left to couple with mastery-avoidance goals for the formation of the latent

mastery factor. However, in previous dichotomous or trichotomous models, mastery-based goals are reviewed as the more adaptive one (Pintrich et al., 2003) and was applauded by motivation researchers. For example, Elliot and Church (1997) stated, "*The adoption of a mastery goal is presumed to lead to a mastery motivational pattern (e.g., a preference for moderately challenging tasks, persistence in the face of failure, and enhanced task enjoyment)*." My findings suggest that in the sample of Taiwanese students, the concept of mastery could not be assumed to tend toward a positive valence. The results seemed to imply that students may be lack of intrinsic motivation to strive for personal competence development. As the result, I examined the profile of mastery-avoidance goals for a better clarification about this surprising result.

The stability in 2 × 2 achievement goal endorsement over time

I have conducted a longitudinal analysis of panel data and provided evidence for stability in each achievement goal over time. In terms of the structural stability, no significant decreases in model fit were observed when the weak invariance model constraints or the strong invariance model were added to configural invariance. In this study, a significant decrease in model fits was found when the strict invariance model constraints were added. Actually, strong measurement invariance is considered to be sufficient for the comparison of scores across time points (Sayer & Cumsille, 2001; Zimprich & Mascherek, 2010). The results seemed consistent along with the findings of Fryer and Elliot (2007) and Conroy et al. (2003).

I have examined differential stability that concerns the preservation of an individual's relative placement (rank order) within a group across time. Previously in a sample of American university students, Fryer and Elliot (2007) found the intercorrelations among four goals ranged from .57 to .75 across three time points (approximately 5 weeks apart in dealing with a sequence of tasks). In contrast, my results with Taiwan pre-university students showed that the intercorrelations among four goals ranged from .29 to .58 across one year. The low to middle magnitude of intercorrelations suggest relative placements of many students did change across one year, from 7th to 8th grade and from 10th to 11th grade. The mastery-avoidance goals seem to be the least stable than other three goals in the 2 × 2 framework. I attributed this to the considerable changing phase of life for pre-university students; also the time interval in my study is much longer (tasks variety thus larger) than that in Fryer and Elliot (2007).

From the findings of mean-level stability, only performance-approach goals increased significantly

from Time 1 to Time 2 in Taiwan pre-university students. Fry and Elliot's (2007) results revealed the stability for performance–approach and mastery–avoidance goals but significant shifts over time for mastery–approach and performance–avoidance goals. In contrast, the current results indicated stability for mastery-approach, mastery-avoidance, and mastery–avoidance goals, but significant increases over time for performance–approach goals. This result seemed to reflect the high pressure influence in Taiwanese competitive education context in which the 7th-grade participants have to apply high schools and 9th grade, universities.

The predictive utility of the 2 × 2 achievement goal model

In the examination of the predictive utility of the 2 × 2 achievement goal model, Chinese self-efficacy was regarded as the antecedent of achievement goals, which in turn were the proximal predictors of Chinese performance. I examined the mediating effect of achievement goals based on the factor and dimensional structures. When the factorial structure was applied, Chinese self-efficacy had strong positive effects both on mastery-approach goals and performance-approach goals while it exerted a weak negative effect on performance-avoidance goals. The result was in line with previous studies on the effects of self-efficacy and achievement goals in trichotomous model (e.g., Liem, Lau, & Nie, 2008; Pajares et al., 2000; Pintrich et al., 2003). Chinese self-efficacy (as a belief about an individual's capacity to understand and perform well in Chinese language acquisition) had no effect on mastery-avoidance goals (focusing on avoiding task-based or intrapersonal incompetence). Elliot and McGregor (2001) found that the pattern for mastery-avoidance goals was more negative than that for mastery-approach goals and more positive than that for performance-avoidance goals. Researchers (Bandura, 1986; Shunk, 1990) indicate that students with low subject self-efficacy tend to adopt avoidance goals while those who perceived themselves efficacious tend to adopt approach goals and participate in tasks at which they can succeed. Accordingly, self-efficacy had positive effects on two approach-based goals (mastery-approach and performance-approach), but had negative effects on performance-avoidance goals. The results seemed to reveal students with high/low self-efficacy do not tend to adopt mastery-avoidance goals. Elliot and McGregor (2001) attribute them to mixed conceptual profiles of mastery-avoidance goals, a combination of optimal and nonoptimal components: mastery and avoidance. Self-efficacy, one's competence expectancies, may not evoke significant effects on mastery-avoidance because of the mixed conceptual profiles of mastery-avoidance goals per se. In addition, Taiwanese students no matter with high or low self-efficacy are encouraged to value effort

(mastering lessons as possible as they can). Therefore, the effects of self-efficacy on mastery-avoidance goals were not observed in my data. I suspects that mastery-avoidance goals may be impacted by some powerful external sources such as a classroom's goal structure (Kaplan & Middleton, 2002; Urdan, 2004) or significant others' expectations to students' achievement success. Because mastery-avoidance goals are new additions to the model (Elliot & McGregor, 2001), further clarification of its conceptual definition and mediating effects between the other antecedents and various learning outcomes is indeed necessary.

Regarding the predictive utility of the factorial goal structure on Chinese performance, mastery-approach and performance-approach goals were positive predictors of Chinese performance while mastery-avoidance goals and performance-avoidance goals were negative predictors. The results of Cury et al. (2006) and Chan (2008) investigation of the achievement goals of younger students (from primary to high school) were consistent with the results that suggested both mastery-approach goals and performance-approach goals were positive predictors of grades while performance-avoidance goals, negative predictors. The results are also similar to Shih's (2005a) findings in a sample of Taiwan elementary school students indicating that both mastery goals and performance-approach goals had positive impacts on grades. However, these results were in partial conflict with the findings of Elliot and McGregor (2001) and Elliot and Murayama (2008) in samples of American university students. They found that either mastery-approach or mastery-avoidance goals had significant effect on academic performance in western college students. It is likely that Taiwanese pre-university school students' achievement motivation influenced significantly by Confucian cultural tradition and education context. They are expected to maintain approach-based goals to study hard for higher achievement (task mastery) and outperforming others (performance approach). Taiwanese students facing the competitive education context are expected to strive for success by simultaneously endorsing approach-based goals regardless of mastery or performance goals maintained. Accordingly, two approach-based goals (mastery-approach goals and performance approach goals) were positive predictors of Chinese performance. Besides, the findings from American university student data showed that mastery-based goals were not predictors of academic attainment. Compared to Taiwanese students facing the achievement competition, American university students have more self-determination to achievement attainment (mastery or performance), so their mastery goals reflect competence develop rather than competence demonstration.

When the dimensional goal structure was applied to the examination of the mediating effect of four factors along two competence dimensions, the data showed that Chinese self-efficacy had strong

positive effects on both the approach factor and the performance factor that in turn had positive proximal effects on Chinese performance. Chinese self-efficacy had a negative effect on the avoidance factor that in turn had a negative effect on Chinese performance. These findings are in accordance with the claims of social cognitive theorists (Bandura, 1986, 1993, 1997; Bandura, & Cervone, 1993; Shunk, 1981, 1990) that learners with high self-efficacy are more likely to form adaptive goals and consequently perform better, whereas learners with low self-efficacy tend to set maladaptive goals and perform poorly. However, self-efficacy could not predict the mastery factor that in turn had no impact on Chinese performance possibly because the mastery factor was actually mildly negatively valanced in my sample. Another probable reason was that Taiwanese students with high/ low academic self-efficacy may be impacted by Confucius thinking and significant others' expectancies to value effort and strive for lesson mastery. Accordingly, the mastery factor (mostly reflected by mastery-avoidance goals) may not exert mediating effects between self-efficacy and Chinese performance. In terms of their mediating roles between motivational antecedent and learning performance, approach-avoidance factors along the valence dimension seem to be more successful than mastery-performance factors along the definition dimension with regard to Chinese language acquisition. The findings seemed to suggested that Taiwanese students tend to regard achievement goals as the valence orientation of competence (approach-avoidance dimensions) rather than the definition orientation of competence (mastery-performance dimensions).

Conclusions

To conclude, the analyses of factorial/dimensional structures and internal consistencies provided strong support for the 2 × 2 achievement goal framework in a sample of Taiwan pre-university school students. The 2 × 2 achievement goal structure of the achievement goal items was confirmed, and the four-factor goal structure was found to be a better fit to the data than a series of alternative models with dichotomous/trichotomous goal structures. The results further offered evidence for the two-dimensional structure posited by the 2 (definition) × 2 (valence) achievement goal model. With regard to the path coefficient invariance of the dimensional model, each pairs of goal has nonequivalent contribution to correspondent achievement goal dimensional factor. In other words, each dimensional factor was mainly derived from different achievement goals.

Measures of three stability indexes (structural, differential continuity, and mean-level stability) provided evidence for the stability of achievement goal endorsement over time in a panel sample of

Taiwan pre-university students. In terms of predictive utility, three of four achievement goals: mastery-approach, performance-approach, and performance-avoidance were found to be effective mediators between Chinese self-efficacy and Chinese grades. When examining the mediating effects of the dimensional goal structure, the approach-avoidance factors along the valence dimension seemed to be more successful than the mastery-performance factors along the definition dimension. Approach-based goals were observed for significant predictors of Chinese grades in Taiwanese students. Taken together, my data strongly supports that the 2 × 2 achievement goal framework appears to be empirically as well as conceptually sound for Taiwanese students and have mediating utility on self-efficacy and Chinese grades.

Implications

My findings provide implications for achievement goal researchers and teachers in Taiwan context. The results of the structural validity, stability and predictive utility yielded strong support for the AGQ-C, and the measure appears to be empirically as well as conceptually sound for Taiwanese students. For achievement goal researchers, the results demonstrated cross-cultural generalizability of the 2 × 2 achievement goal framework to Taiwanese pre-university students in learning Chinese while cultural differences have impacts on how students conceptualize approach-avoidance and mastery-performance. The results implied that approach-based goals (mastery-approach and performance-approach) and the approach factor were significant predictors of Chinese performance. Self-efficacy had no effects on the mastery (dimensional) factor, which in turn had no effects on Chinese performance because the mastery factor was principally derived from the variance of mastery-avoidance goals. The existence of mastery-avoidance goals was confirmed by Taiwan primary to high school students though it is not associated with the precedent reason, Chinese self efficacy, and the outcome, Chinese performance.

Teachers are encouraged to emphasize approach-based goals in classes to facilitate adaptive learning behaviors and outcomes. This is because that the results showed that approach-based goals (mastery-approach and performance-approach) had positive effects on academic success. In order to improve students' performance, teachers may inspire them to approach task mastery and good grade in supportive classrooms. The example statement to encourage the mastery-approach goals could be: "You could improve. You have potential to reach the highest level of reading comprehension" or "You

can improve to reach the peak writing level of your record." The typical statement to promote the performance-approach goals could be "You have language potential to rank the first in the class (or to win all peers)." Besides, teachers have to notice the maladaptive statements uttered by students. Such as, the performance-avoidance tendency "I just want to prevent my score to rank the last in the language class" and the mastery-avoidance tendency "I don't want to study at all. I only aim to prevent the fail from my previous reading level." Or, "I just want to do minimum works to finish the writing or reading assignments. My goal is to hang in the lowest level."

Self-efficacy was found to have positive effects on adaptive goal endorsement (mastery-approach and performance-approach goals) and in turn have positive effects on learning performance. Accordingly, helping students to develop self-efficacy may facilitate students to maintain adaptive goals and in turn make students' achievement success possible. Teachers may provide various tasks for students to obtain success experiences and develop class self-efficacy. Students with low self-efficacy should receive more attention and support.

Self-efficacy had no effects on the mastery (dimensional) factor, which in turn had no effects on learning performance because the mastery factor was principally derived from the variance of mastery-avoidance goals. Elliot and McGregor (2001) suggest that when the students adopting mastery-avoidance goals may be influenced by their nonoptimal motivational dispositions in optimally structured achievement settings, the adoption of mastery-based goals may still foster intrinsic interest and the pursuit of challenge, not impacting academic attainment. Teachers may not overemphasize mastery-based goals but instead offer students optimally structured achievement settings to foster their intrinsic motivation and the pursuit of challenge.

Finally, teachers could use AGQ-C to filter students who adopt performance-avoidance goals and mastery-avoidance goals. Providing case stories (from peers or from news reports) highlight the association between adaptive achievement goals and successful learning outcomes.

Limitation

Seven limitations to the present study should be noted. Firstly, although goal researchers have agreed on the multiple goal perspective, I set independence relationships among four goals in my model to examine whether they are empirically separable and possess differential predictive utility. Actually, students may endorsement multiple goals and strategically adopt them to face academic context. Future research is therefore necessary to determine with the mediating role of multiple goals

between their antecedences and consequences.

Secondly, based on the theory on achievement goals (Elliot & Church, 1997) and self-efficacy (Bandura,1986; Shunk, 1990), I examined the mediating role of achievement goals between their self-efficacy and Chinese performance in a cross-sectional data. Future studies may test the casual relationships among variables in a panel data to determine the antecedence, consequence, and mediating role in the model.

Thirdly, Elliot and Murayama (2008) note problems in original achievement goal measures (Elliot & McGregor 2001), such as failing to assess goals, collapsing together the goal and the motivation underlying the goal, item content applicable to both mastery-based and performance-based goals, and so on. It is believed that these concerns are equally important for the present sample. The potential usage of AGQ-Revised in Taiwan educational context clearly needs further exploration.

Fourthly, the purposes of this study are to test the structure and predictive validity of AGQ-C in Taiwan pre-university students. To prevent the distraction of my original purposes of this study, I provided merely brief post hoc explanation of the findings based on Confusion principals. Further researchers need to adopt an "emic approach" advocated by cultural psychologists (Berry, 1989) to clarify cross cultural effects.

Fifthly, studies have found classroom social environment (e.g., goal structure emphasized in a class, Wolters, 2004) and significant others' expectation (e.g., teachers or parents, Lin, 2007) would had effects on learners' achievement goals, which in turn had effects on learning outcomes. Detail research may explore the hierarchical relationships among students' achievement goals, the social environment (school or classroom structures) and parents' expectation with hierarchical linear modeling.

Sixthly, researchers question the existence of mastery-avoidance goals in young students (Sideridis & Mouratidis, 2008) and found university elite baseball players' misinterpretation of the mastery-approach items. Elliot and McGregor (2001) and Pintrich (2000a) offer prototypical examples, including perfectionists and individuals in the latter part of their careers. I believe that mastery-avoidance goals may be common adopt by elder or experienced learners. Young learners tend to adopt other three intuitive goals rather than mastery-avoidance goals. When future researchers measure younger learners' mastery-avoidance goals, the possibility of misinterpretation of the mastery-approach items should be taken into consideration.

Seventhly, Elliot and McGregor (2001) regard competence as the conceptual core of the achievement goal construct and differentiate it into definition and valence dimensions. However, Lu, et al. (2001) and Hwang (2008) suggest that achievement goals have cultural roots—for example,

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Confucian principles in Chinese populations. Taiwanese students are socialized to value effort—an "effort-as-virtue" model—and to believe that hard work facilitates attainment (Chen, 2005; Hwang, 2008; Shih, 2005b). The effort model is different from Elliot and McGregor (2001)'s competence perspective. Accordingly, the predictive utility of Taiwanese students' achievement goals was not completely accorded to Western-based data. Besides, mastery-avoidance goals may contradict the effort-as-virtue model and fail to reflect Confucian goals. I believe the trichotomous achievement goal model also seems to describe Taiwanese students' achievement goal endorsement precisely. Future work may examine the culture effects on the development of Taiwanese students' achievement goals in greater detail.

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Appendix 1: Questionnaires

以下詢問您在國文學習時的想法，請依據實際想法勾選。(自我效能問卷)

	非常不符合	不符合	部分符合	符合	非常符合
1.我相信我在國文方面可以得到優異的成績。	1	2	3	4	5
2.我相信在國文方面連最難的部分我也可以讀得懂。	1	2	3	4	5
3.我有自信我能理解國文這門課所教的基本觀念。	1	2	3	4	5
4.我有自信我能理解國文課中，老師所教最複雜的內容。	1	2	3	4	5
5.我有自信我能把國文的指定作業和測驗做得非常好。	1	2	3	4	5
6.我預期在國文部份會拿高分。	1	2	3	4	5
7.我確信我能精通國文課所教的方法技能。	1	2	3	4	5
8.考量國文課的困難度、老師和自己的能力，我覺得可以在這門課拿高分。	1	2	3	4	5

以下是您國文的學習動機，請依實際想法勾選。(成就目標問卷)

	非常不符合	不符合	部分符合	符合	非常符合
1.比其他人表現得更好對我是很重要的事。	1	2	3	4	5
2.在國文課表現得比別人好，對我是很重要。	1	2	3	4	5
3.我在國文課的目標就是得到比班上大部分同學都要好的成績。	1	2	3	4	5
4.我擔心在國文課或許無法學到我可以學到的所有的教學內容。	1	2	3	4	5
5.有時候會害怕自己沒辦法如我所願的完整理解國文課的內容。	1	2	3	4	5
6.我常常在意自己可能無法學會國文課應該要學習內容。	1	2	3	4	5
7.我想要在國文課上盡可能的學到所有的教學內容。	1	2	3	4	5
8.完全理解國文課的內容對我是很重要。	1	2	3	4	5
9.我渴望能完全掌握國文課所呈現的所有教材。	1	2	3	4	5
10.我只是想要避免在國文課中表現的很差。	1	2	3	4	5
11.我在國文課的目標就是避免自己的成績太難看。	1	2	3	4	5
12.激勵我學國文的理由就是我害怕國文課的成績很差。	1	2	3	4	5

Appendix 2: Back translation for AGQ-C

We invited an education measurement expert to do back translation for AGQ-C. The comparison of AGQ, the back translation, and AGQ-C and the discussion are shown in the following section.

AGQ	Back translation	AGQ-C
1. It is important for me to do better than other students.	1. It is important for me to perform better than others.	1.比其他人表現得更好對我是很重要的事。
2. It is important for me to do well compared to others in this class.	2. It is important for me to perform better than others in the Chinese class.	2.在國語課表現得比別人好，對我是很重要。
3. My goal in this class is to get a better grade than most of the other students.	3. My goal in the Chinese class is to obtain higher grades than most of my classmates.	3.我在國語課的目標就是得到比班上大部分同學都要好的成績。
4. I worry that I may not learn all that I possibly could in this class.	4. I worry about not being able to get all the content that I should learn in the Chinese class.	4.我擔心在國語課或許無法學到我可以學到的所有的教學內容。
5. Sometimes I'm afraid that I may not understand the content of this class as thoroughly as I'd like.	5. Sometimes, I am afraid to be unable to completely understand the content in the Chinese lesson as I wish.	5. 有時候會害怕自己沒辦法如我所願的完整理解國語課的內容。
6. I am often concerned that I may not learn all that there is to learn in this class.	6. I often worry about that I might not be able to get the content in the Chinese lesson that I should learn.	6. 我常常在意自己可能無法學會國語課應該要學習內容。
7. I want to learn as much as possible from this class.	7. I would like to learn as much as possible of all the content taught in the Chinese class	7. 我想要在國語課上盡可能的學到所有的教學內容。

8. It is important for me to understand the content of this course as thoroughly as possible.	8. It is important for me to completely understand the content of the Chinese lessons.	8. 完全理解國語課的內容對我是很重要。
9. I desire to completely master the material presented in this class.	9. I hope to completely handle all the teaching materials presented in the Chinese class.	9.我渴望能完全掌握國語課所呈現的所有教材。
10. I just want to avoid doing poorly in this class.	10. I just want to avoid performing poorly in the Chinese class.	10. 我只是想要避免在國語課中表現的很差。
11. My goal in this class is to avoid performing poorly.	11. My goal in the Chinese class is to avoid terrible grades.	11. 我在國語課的目標就是避免自己的成績太難看。
12. My fear of performing poorly in this class is often what motivates me.	12. The reason that motivates me to learn Chinese is that I am afraid of bad grades in the Chinese class.	12. 激勵我學國語的理由就是我害怕國語課的成績很差。

Discussion

Geisinger (1994) provided suggestions for some issues affecting measures that are translated and/or adapted from an original language and culture to a new one. He noted that the issue of cultural adaptation may make it difficult to directly translate and use items from some measures. In AGQ, six performance-based goal items use verbs “performance” or “do”. In the back-translation, six performance-based goal items only use verbs “performance”. In Chinese languages, the meaning of “performance” is not similar to the meaning of “do”. “Performance”(表現) refers to comparison and show. “Do”(做) refers to produce and task. I believe “performance” can capture the concepts of performance-based goal better than “do”. Accordingly, I use the verb “performance” in the performance-based goal items rather than “do”. In AGQ, performance- based goal items uses one sentence “get a better grade” and three sentences “performing poorly/better”. In the back-translation, performance- based goal items uses three sentence “get better/bad grades” and one sentences

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“performing poorly” In Chinese, “Performance” both refers to compare with others or self. We believe use “get better/bad grades” capture the concepts of normative comparison standard (performance-based goals) better than “performing poorly/better”. Hence, I use the verb “get better/bad grades” in the performance-based goal items more than “performing poorly/better”. Besides, little different wording was found between AGQ and the back-translation (e.g., “mastery” versus “handle”). I believe these differences will not damage the validation of AGQ.

Appendix 3: The invariance across three school levels

The model consistent across different school levels is critical especially when the researcher aims to address developmental issues of achievement goals. Before I treated three school level groups as a pooled sample, model invariance across three school levels was conducted with multi-group analysis of SEM. Measurement invariance may be defined with varying degrees of stringency, depending on which parameters are constrained to be equal. The examination procedure I adopted was of soft stringency. The results yielded that the full model in Figure 2-4 was invariant across three school levels. In this procedure, the hypothetical model was the full model in Figure 2-4, where Chinese self efficacy is predictive of second order 2×2 achievement goals and in turn achievement goals are predictive of Chinese performance. Tests for the overall quality of achievement goal and the predictive utility, for its invariance across 5^{th}, 7^{th}, and 10^{th} levels and for the latent mean differences were based on the analysis of mean and covariance structures.

A baseline chi-square value is derived by computing model fit for the pooled sample of all three levels with all parameters unconstrained. If this test for the pooled sample is acceptable, then, the general procedure is to test for invariance between the unconstrained model for the pooled sample of all subgroups and models of specific groups where certain parameters are constrained to be equal. I first tested measurement invariance and so constrained lambda coefficients as equal across three school levels; then I tested regression path invariance and set path coefficients as constrained.

The model fit indices of CFI and NNFI were recommended by Cheung & Rensvold (2002) and Chen, Sousa, & West (2009) because these measures were independent of model complexity and sample size and were not correlated with chi-square value. A difference of larger than .01 in the CFI and NNFI would indicate a meaningful change in model fit for testing measurement and structural

model invariance. Based on their recommendation and because of my large sample size, I used changes in the value of the CFI and NNFI to evaluate model fit. The results presented in the following table showed that CFI and NNFI changes did not exceed .01. Therefore, the hypothetical model was found to be invariant across school levels both in the aspects of factor loadings and the regression paths.

Table: Model equivalent examinations across three age groups

Model comparison	χ2 (df)	Δχ2 (Δdf)	RMSEA	NNFI	CFI
1. Baseline (for pooled sample of three age groups where paths were unconstrained)	1384.86 (372)	----	0.05105	0.9763	0.9808
2. measurement equivalent (Lambdas were constrained to be equal across three age groups)	1460.07 (398)	75.21 * (26)	0.05054	0.9770	0.9801
3. regression path equivalent (Betas were constrained to be equal across three age groups)	1502.29 (406)	42.22 * (8)	0.05084	0.9768	0.9794

*P<0.005

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