DAVID A. CONTRERAS

EDITOR

PSYCHOLOGY OF THINKING

Psychology of
Emotions, Motivations
and Actions

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CONTENTS

PREFACE

Psychology has long influenced our thinking about teaching and learning. However, earlier influences of psychology on education were more about not thinking than what we now consider to be the thinking processes necessary for life and work in the 21st century. The narrow boundaries of behaviorism have given way to the complexities of critical thinking, creativity, analysis, connection making and the self-management skills of decision-making, planning and self-evaluation. This book focuses on raising the awareness of scientists and other readers to a form of thinking called design thinking, as well as major findings regarding the affective, motivational and cognitive consequences of insurmountable obstacles and their impact on the thinking process.

Chapter 1- Psychology has long influenced our thinking about teaching and learning. However, earlier influences of psychology on education (Thorndike, Watson, Pavlov, and Skinner) were more about *not* thinking than what we now consider to be the thinking processes necessary for life and work in the 21st century. The narrow boundaries of behaviorism have given way to the complexities of critical thinking, creativity, analysis, connection making and the self-management skills of decision making, planning, and self-evaluation. Additionally, our 21st century world requires social-emotional skills that support collaboration, respectful communication, and an openness to diversity. These expanded skills are expected to be part of each student's education.

This new landscape of teaching and learning goes beyond traditional practice and requires different and strenuous intellectual demands. Learning new ways of thinking and teaching presents a challenge for teachers who have more traditional classroom expectations. Since few have experienced this kind

of learning in their own schooling, teachers and teacher educators need opportunities to gain understanding and mastery of these complex processes. In addition, and often more difficult, is learning to design and implement daily lesson plans and long-term units that consistently provide opportunities for students to develop complex thinking processes.

Teachers and teacher educators need a framework that clarifies the thinking and emotional components that form the infrastructure of 21st century learning and teaching. The TIEL Curriculum Design model provides such a framework making these complex thinking and emotional processes accessible to teachers and to their students. TIEL, an acronym for teaching for intellectual and emotional learning, is a synthesis of the thinking operations from Guilford's Structure of Intellect theory and Dewey's writings on qualities of character.

This chapter will address three questions: How has psychology influenced education during the last century? Why is there so little evidence of the integration of thinking and social-emotional learning into the curriculum and instruction in many classrooms? What is the TIEL model and how can it help pre-service and in-service teachers design learning experiences that integrate thinking skills and emotional learning into daily classroom curriculum?

Chapter2- I argue that policy-makers rather than using a single decision-making modle employ, depending on the situation, flexible decision strategies. The flexibility of Rational Expectations allows for the modeling of 'forward thinking', informed actors, and gives them the ability (and potential) to act strategically by modifying their policy according to the changes in the issue at hand. Incrementalism, synopsis and punctuated equilibrium can be modelled using rational expectations and policy-makers can employ them according to their needs and preferences.

Chapter3- A fundamental thinking skill is the ability to see the structure of thought. Awareness of the structure of thought begins with an intuitive description of the elements and relations that constitute a decision-making process and a description of the relationship between the structure and function of thought. Regardless of how one judges the quality of everyday decisions in light of the goals being pursued, it is useful, as a first step, to construct a structural map of everyday decision-making processes. This allows for objective analysis of everyday decisions and it enhances structural awareness in those who map the thinking process and in those who read the maps. The same applies to scientific thinking. Scientists advocate a particular position in the academic field and explicit mapping of their arguments enhances structural awareness, critical comparison and evaluation, and

communication in the field. Overall, the mapping of decision making is a worthwhile goal, a skill that is becoming increasingly prominent and even necessary as part of expert decision making in many fields of applied science. This chapter presents a case for the cultivation of graphicacy skills in this context. We describe four thought mapping techniques that offer considerable power and potential to elucidate and enhance thinking and decision making abilities. We suggest that technological advances may allow us to merge various different though mapping techniques and further enhance an interdependent set of graphicacy skills that may help to support decision making and adaptive action in context.

Chapter4- People encounter myriads of obstacles throughout their lives. Those can be big or small, such as a fallen tree blocking the road to work or life circumstances that make it hard for an adolescent to obtain a university degree. What are the effects of such obstacles? Could it be that obstacles have an impact beyond the very task or goal people with which they interfere? The present chapter reviews major findings regarding the affective, motivational, and especially cognitive consequences of insurmountable obstacles on the one hand and potentially surmountable obstacles on the other hand. It also introduces new findings that show how obstacles influence the more basic ways in which people perceive and conceptually process information from their environment. Finally, it highlights possible directions for future research and discusses the role of people's cognitive responses for dealing with life's obstacles.

Chapter5- Since the early 1990s, there has been a concentration of effort aimed at maximizing student achievement in school education and rectifying the debilitating effects of failure. In 1994, a Carnegie Corporation Taskforce on Student Achievement drew on new research in a variety of fields, including the emerging 'new neurosciences', to refute the narrow assumptions and findings of conventional educational research and to assert that effective learning requires a response that is as much about affect and social dynamics as about cognition. In so doing, it challenged the erstwhile dominant thinking about thinking and its ramifications for teaching, re-defining learning to incorporate into the notion of 'intellectual depth' matters of communicative competence, empathic character and self-reflection as being at least as significant to learning as the indisputably important technical skills of recall, description, analysis and synthesis. The chapter will explore the research findings of the new neurosciences and the implications of their new thinking about thinking for effective teaching. It will draw especially on a range of research insights into effective teaching based on application of these findings,

including drawing on data from a number of research projects from the Australian Government's Quality Outcomes and Values Education Programs.

Chapter6- This article establishes that a new way of thinking is needed in the field of social marketing and that change demands a shift from transactional to relational thinking. Social marketing is still dominated by prescriptive interventions; however, this transactional logic is incapable of responding to the complexities of contemporary multi-option, pluralist societies, in which there will be no universal agreement on a single way of life. Relational thinking can help to de-construct the taken-for-granted "truths" and fundamental contradictions in current thinking as it provides a new logic that sees consumers not as targets, but as the main drivers of the value creation process. The shift from transactional to relational thinking opens new opportunities, new challenges and has deep implications for the theory and practice of social marketing. It is a complex shift that requires fundamental changes not only in values and assumptions but also on resources, skills, competencies and organizational structures.

Chapter7- Historically, design has been viewed as an activity for design professionals. Typically, the focus of design has been the intentional creation of products, structures, or systems to address the needs of firms and individuals. Why should scientists be interested in design? One reason is an ethical one, as twenty-first century realities may require the participation of everyone to have a say in our designed world. The overall purpose of this chapter is to raise the awareness of scientists and other readers to a form of thinking called design thinking. The term has been familiar to many design disciplines and most recently has been touted by members of the business community as a mindset for an entire organization. One of the sub-disciplines of design is that of design management, providing guidance on the use of design thinking across the entire organization. The first section of this chapter will review the design thinking literature across different levels of activity, including design and society, design and organizations, design and education, and design and the designer. The second section will suggest ways to help scientists understand and use design thinking. What is a scientist to do with this information? This section will be organized in three sub-sections; namely, understanding design thinking, the relevance of design thinking, and envisioning the future.

Chapter 1

LEARNING TO TEACH THE COGNITIVE SKILLS AND EMOTIONAL DISPOSITIONS REQUIRED IN THE 21ST CENTURY

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ABSTRACT

Psychology has long influenced our thinking about teaching and learning. However, earlier influences of psychology on education (Thorndike, Watson, Pavlov, and Skinner) were more about *not* thinking than what we now consider to be the thinking processes necessary for life and work in the 21st century. The narrow boundaries of behaviorism have given way to the complexities of critical thinking, creativity, analysis, connection making and the self-management skills of decision making, planning, and self-evaluation. Additionally, our 21st century world requires social-emotional skills that support collaboration, respectful communication, and an openness to diversity. These expanded skills are expected to be part of each student's education.

This new landscape of teaching and learning goes beyond traditional practice and requires different and strenuous intellectual demands. Learning new ways of thinking and teaching presents a challenge for teachers who have more traditional classroom expectations. Since few have experienced this kind of learning in their own schooling, teachers and teacher educators need opportunities to gain understanding and mastery of these complex processes. In addition, and often more difficult, is learning to design and implement daily lesson plans and long-term units that consistently provide opportunities for students to develop complex thinking processes.

Teachers and teacher educators need a framework that clarifies the thinking and emotional components that form the infrastructure of 21st century learning and teaching. The TIEL Curriculum Design model provides such a framework making these complex thinking and emotional processes accessible to teachers and to their students. TIEL, an acronym for teaching for intellectual and emotional learning, is a synthesis of the thinking operations from Guilford's Structure of Intellect theory and Dewey's writings on qualities of character.

This chapter will address three questions: How has psychology influenced education during the last century? Why is there so little evidence of the integration of thinking and social-emotional learning into the curriculum and instruction in many classrooms? What is the TIEL model and how can it help pre-service and in-service teachers design learning experiences that integrate thinking skills and emotional learning into daily classroom curriculum?

INTRODUCTION

School reformers in the 1990s envisioned schools as

Exciting places: thoughtful, reflective, engaging, and engaged ... places where meaning is made…places that resemble workshops, studios, galleries, theaters, studies, laboratories, field research sites, and newsrooms…[places of] shared inquiry [where] students are engaged in initiating and assessing their ideas and products…feel supported in taking risks and thinking independently. (Darling-Hammond, 1997, p. xiv)

Such classrooms have thinking at the core of the curriculum and support healthy social-emotional learning as students learn rigorous content.

The field of psychology has long influenced our thinking about teaching and learning. The research of many psychologists (Gardner, 1985; Marzano, 1992; Sternberg, 1996; Torrance, 1970) address the thinking processes taking place in classrooms like the ones just described. However, earlier influences of psychology on education (Seifert & Hoffnung, 2000; Thorndike, Cunningham, Thorndike & Hagen, 1991) were often more about not thinking than what we now consider to be the thinking processes necessary for life and work in the 21st century (Darling-Hammond, 1997; Friedman, 2005; Partnership for 21st Century Skills; Pink, 2006; Wagner, 2006). The narrow boundaries of behaviorism have given way to an emphasis on the cognitive complexities of

critical thinking, creativity, analysis, connection making, and the self-management skills of decision making, planning, and self-evaluation. Additionally, our 21st century world requires social-emotional skills that support collaboration, respectful communication, ethical behavior, and an openness to diversity. These expanded skills are expected to be part of each student's education (Partnership for 21st Century Skills).

Learning new ways of thinking and teaching presents a challenge for teachers who have more traditional classroom expectations. Few teachers, teacher educators, or those who are preparing to teach, have experienced this kind of learning in their own schooling (Little, 1993; Smith & O'Day, 1991), so they need opportunities to gain understanding of and facility with these complex processes. This new landscape of teaching and learning goes beyond traditional practice and requires "different and strenuous intellectual demands" (Hammer & Schifter, 2001, p. 442) as well as attention to the moral-ethical dimension of education (Cross, 2005; Folsom, 2009b; Kohlberg, 1975; Vare, 1979).

Central in this new landscape is learning to design complex curriculum and implement daily lesson plans and long-term units that consistently provide opportunities for students to develop complex thinking processes. Complex pedagogy involves the conscious planning of curriculum and instruction that integrates the processes that facilitate the development of children's intellectual and social-emotional capacities with subject matter content. The outcome for students is complex, creative, multidimensional learning (Darling-Hammond, 1997; Torrance, 1981; Treffinger, 1980). If students are to be ready for the complex world in which we live, teaching thinking and fostering social-emotional development must become integrated into daily classroom teaching and learning.

Bruner (1965) wrote of the revolution "in our understanding of the nature of man, his intelligence, his capabilities, his passions, and the forms of his growth" (p. 114). While psychologists have been at the forefront of this revolution, the deep understandings of thinking that form the foundation of this revolution have not been made readily accessible to teachers and teacher educators (Curry, 1983; Darling-Hammond, 1997; Riding & Sadler-Smith, 1997). Therefore, many classrooms have not reaped the benefits of research in complex intellectual processes such as self-regulation (Zimmerman, 2002) and creativity (Folsom, 2009a; Guilford, 1977; Richards, 2001; Torrance, 1981; Treffinger, Isaksen & Firestein, 1983). Teachers and teacher educators need assistance in taking up arms in the needed revolution in how teachers teach and how students learn.

The TIEL Curriculum Design model, Teaching for Intellectual and Emotional Learning, is a framework that helps inservice and pre-service teachers design instruction that includes the teaching of thinking and emotional learning. In this chapter, I will share how the TIEL Curriculum Design model, helps teachers and teacher candidates who are preparing to teach create daily opportunities for students to develop their thinking processes and increase their social-emotional learning.

Three questions will be addressed: How has psychology influenced education during the last century? Why is there so little evidence of the integration of thinking and social-emotional learning into the curriculum and instruction in many classrooms? What is the TIEL model and how is it helping pre-service and in-service teachers design learning experiences that integrate thinking skills and emotional learning into daily classroom curriculum?

INFLUENCE OF PSYCHOLOGY ON EDUCATION

Everyone can think. Costa (2008) reminds us that "nobody has to 'teach us how to think' just as no one teaches us how to move or walk" (p. 20). However, researchers have shown that teaching can increase one's ability to think more clearly and insightfully (Beyer, 1991; Lewis & Smith, 1993; Marzano, 1993; Smith, 1969; Sternberg, 1982, 1997). Yet, since the development of our current school system in the early part of the 20th century, classrooms where a wide range of thinking is expected and promoted have not been the norm. Paradoxically, the early field of psychology contributed to this state of affairs.

As the new field of psychology gained traction, attention to thinking in relation to education increased. In the late 19th century, it was believed that mental ability was developed through the subjects studied in school. In the early 20th century, Thorndike determined through his research that it mattered little what was studied as those with the greatest ability would develop their thinking through any subject. Thorndike's theories, published widely and taught in textbooks, convinced many educators in the first decades of the 20th century that mental abilities were little affected by school studies, and furthermore, they did not transfer outside the narrow confines of what was studied (Ravitch, 2000). Building on the earlier work of Binet, Thorndike developed intelligence tests that were used to determine what students would learn Latin and geometry, subjects that were traditionally thought to build mental acuity and discipline. While some students needed the intellectual rigor

for college entrance, a curriculum that fostered thinking was not necessary for the others (Ravitch).

The new science of education, based on psychological research, set the stage for schooling that focused on a narrow band of thinking. In the early 20th century, schools were places to prepare a burgeoning immigrant population with basic skills and the ability to follow directions as they went to work in factories. Schools were rigid and uninviting places. Nevertheless, at the same time, educators such as Parker and Dewey advocated schools that fostered thinking through project work, real-life experiences, and attention to student interest (Cremin, 1961). In 1936, psychologist Leta Hollingworth opened a school for highly gifted children in New York City that featured a curriculum that focused on challenging students' thinking as they learned about their surroundings through investigation and research (Tannenbaum, 1983).

At the middle of the century, Guilford's Structure of Intellect theory expanded greatly on the multidimensional view of thinking that had been proposed by Thurstone (1947). Guilford's three-part theory that included operations, contents, and products provided a view of learning that involved five operations of thinking that interact with four kinds of content to result in six kinds of products. Guilford (1950) opened the way for the study of creativity, a previously neglected area for psychologists, that initiated new possibilities for both psychologists and educators (Gardner, 1985; Goleman, 1995; Sternberg, 1985; Torrance, 1981).

Over the last sixty years, the influence of research in psychology on cognition has grown, while its influence on education has fluctuated. Moseley, Elliott, Gregson and Higgins (2005) provide a brief history of this time period placing Piaget's theory of cognitive development as the most influential on education. An emphasis on cognition continued into the 1960s and 1970s, with a focus on information processing. Those in the field of special education used this research to design methodologies that addressed strengths and weaknesses in students' cognitive processing. High ability students also benefited from the research on cognition. During this "space race" period that encompassed the launching of Sputnik and landing men on the moon, high ability students benefited from new curriculum designed to foster the critical and creative thinking of America's brightest students (Guilford, 1972; Tannenbaum, 1983).

In the 1970s and 1980s, the two viewpoints overlapped. Educators, at this time, shifted their attention to behavorism with its emphasis on "clearly specified objectives and rewards" (Moseley et al., 2005, p. 368). Those in special education adapted this research to develop programmed learning and

skills training. While methodologies that focused on control and a narrower band of thinking was adopted in general education classrooms, educators concerned with narrowing learning opportunities, sought to provide intellectual nourishment for academically and intellectually gifted students. As a result, gifted education, entered its "halcyon days" (Borland, 1996) as programs with an emphasis on critical and creative thinking proliferated.

During the late 1970s and 1980s, the pendulum swung back to an emphasis on cognition. The new concepts of executive brain function and metacognition refocused attention on thinking in learning (Moseley et al., 2005). During this time, research in the social-emotional and moral aspects of teaching and learning increased (Gilligan, 1993; Hoffman, 1991; Kohlberg, 1975; Noddings, 1984). The term *learning styles*, first used by Allport in 1937, reemerged as an avalanche of research on cognitive learning styles took place during the 1980s and into the 1990s (Rayner & Riding, 1997). Again, special education and gifted education led the way in applying this new research on thinking styles to instruction. Those in special education investigated how teaching their students the self-regulatory processes of goal-setting, decision making, planning, and metacognition improved the educational achievement of children with learning disabilities (Moseley et al.). Educators of gifted children used the new research in cognition to design curriculum and instruction methodologies (Renzulli, 1977).

The research on thinking skills, thinking styles, and environments that support critical and creative thinking in classrooms has increased exponentially since Guilford's work in defining the many dimensions of thinking. While gifted education and special education embraced the research that supported methodologies grounded in intellectual processes early, the concepts and actions of thinking are now addressed in all *areas* of education—special education, gifted education, general education—and at all *levels* of education (Bransford, Brown & Cocking, 2000; Erickson, 2007; Fink, 2003; Folsom, 2009a; Handelsman, Miller & Pfund, 2007; Stang, Carter, Lane & Pierson, 2009; Tomlinson, 1999; Van-Tassel Baska, 1991; Wiggins & McTighe, 1998).

CURRICULUM AND INSTRUCTION IN CLASSROOMS

Two questions arise. With such voluminous research on thinking, thinking styles, and instructional frameworks, why is there still so little evidence of conscious attention to the teaching of thinking and social-emotional learning in

many of the classrooms where children of all abilities spend the majority of their school time? Why is there so little understanding of how to integrate the teaching of thinking and social-emotional learning into daily curriculum?

While special education and gifted education have long considered research on cognition important to educating children, general education has been slower to include much of this research into curriculum planning (Lewis & Smith, 1993; Marzano, 1993; Underbakke, Borg & Peterson, 1993; Zimmerman, 2002; Zohar, Degani & Vaaknin, 2001). It is clear that teachers begin teaching with a knowledge deficit concerning thinking processes and how to develop learning experiences that integrate the teaching of thinking with content (Ashton, 1996; Darling-Hammond, 1997; Folsom, 2009a). At least four reasons for this emerge from the research.

First, teachers lack understanding of the terms higher order thinking and critical thinking. Zohar (2004) notes that teachers are unable to define fundamental concepts in critical thinking, do not have a clear knowledge of which thinking skills students need to learn, and have difficulty explaining their own thinking. This is not surprising as Cuban (1984) noted that defining the terms used to refer to thinking is a "conceptual swamp." Kuhn and Dean (2004) acknowledge the wide range of definitions, and offer that critical thinking "entails awareness of one's own thinking and reflection on the thinking of self and others as an object of cognition" (p. 270). Underbakke et al. (1993) provide another definition. Higher order thinking is "identifying and using these operations of thinking [interrelating, selecting, and organizing]" (p. 139) with subject matter content. Marzano (1993) names three major skills involved in higher order thinking: "self-regulation, critical thinking, and creative thinking" (p. 158). Lewis and Smith (1993) combine concepts from several definitions with a focus on outcome to construct their definition,

> Higher order thinking occurs when a person takes new information and with information stored in memory interrelates and/or rearranges and extends this information to achieve a purpose or find possible answers in perplexing situations. (p. 136)

Second, the beliefs and perceptions of teachers about teaching and learning can prevent the teaching of thinking in classrooms. Hollingsworth (1989), in a longitudinal study of teacher preparation programs spanning the time period before, during, and after the fifth year, found that it is difficult for preservice teachers to change their beliefs about teaching. She found that those who came to a teacher education program with the notion that knowledge is

constructed by the learner through experience could modify their thinking and actions to the constructivist (Brooks & Brooks, 1993) ideas of the program more easily than those who came with the view of teaching as transmission of information.

Zohar (2004) also found that the ability to teach thinking comes up against beliefs about teaching. His research shows that middle school teachers with a teacher-directed transmission view of teaching that emphasizes convergent thinking found it difficult to use constructivist methods that encourage a wider range of student thinking. Those who understood teaching as linear and teacher-directed found it challenging to allow students to struggle in solving a problem or to carry on discussions that helped students come to their own conclusions.

Another misperception that prevents teachers from integrating thinking into their instruction is that higher order thinking is only for the highest achieving and advanced students. Included in higher order thinking are the self-regulatory skills of goal setting, decision making, planning, self-evaluation, time management, learning strategies, self-evaluation (Folsom, 2009a; Stang et al., 2009; Wehmeyer, Agran & Hughes, 2000; Zimmerman, 2002). All of these self-determination skills are important for students with disabilities to learn in order "to live a quality life and assume primary control and responsibility for myriad life activities" (Stang et al., p. 94). Nevertheless, while these skills are important for all students to learn, necessary for gifted students, and critical for those with learning disabilities, these self-regulatory skills are not widely taught in general education classrooms.

A third reason that teaching thinking is not widespread in classrooms is that the research on thinking, teaching thinking, and thinking styles is overwhelming. The researchers agree (Zhang, 2002). Many psychologists have analyzed and synthesized studies to provide clarity (Harpaz, 2007; Moseley et al., 2005; Rayner & Riding, 1997; Riding & Sadler-Smith, 1997; Underbakke et al., 1993; Zhang). Yet, as Kuhn and Dean (2004) point out, these studies are not organized and made available in a way that is accessible to teachers who have limited time to read and consider research.

There is fourth reason that teaching thinking in classrooms does not match the proliferation of research on the topic. Teachers have not been adequately prepared to teach and discuss thinking in their classrooms. Sarason (1982), was surprised by the missing discussion of thinking and learning in classrooms he visited. When he asked teachers to explain, they told him that nothing in their teacher preparation programs had prepared them to address thinking in their classrooms, and if they had learned, they would not have time in their

schedules to include discussions of thinking.

Fortunately, educational organizations make research on thinking available to teachers. Journals, whose primary audiences are teachers working in schools, have recently devoted full issues to the integration of thinking into classroom curriculum (*Social Studies*, 2008; *Education Leadership*, 2008). Yet, learning to integrate thinking into classroom curriculum requires deep changes in thinking about teaching and learning. It is difficult for teachers to alter their thinking and teaching methodologies while managing the exigencies of a classroom filled with thirty children. Time, in short supply for teachers, is an important factor in learning new teaching skills. In addition, the "period of cognitive dissonance while less effective practices are replaced with new practices or while new practices are integrated with old" (Folsom, 2009a, p. 69) is stressful while attending to daily teaching responsibilities.

TEACHER PREPARATION

Learning about the fundamentals of thinking and how to integrate the teaching of thinking into curriculum and instruction must be introduced effectively in teacher preparation programs. Teacher education programs commonly teach constructivist methods that open space for a wide range of thinking through inquiry, decision making, critical questioning, collaboration, and reflection (Brooks & Brooks, 1993). Yet, the higher order thinking that constructivist methods support is seldom made explicit in instruction or visible in the teaching of curriculum design (Folsom, 2009a; Goodlad, 1990) in ways that help teachers become conscious of these thinking processes. Underbakke et al. (1993) emphasize that if "teacher performance is the most powerful link to higher order thinking in students, teaching teachers to teach thinking must become one of the highest priorities of education" (p. 138). According to Kuhn and Dean (2004) understanding what these the higher order thinking skills are that students need to learn is one of the major "unresolved problems of education" (Bereiter, as cited in Kuhn & Dean, p. 269).

Adding to the challenge in teacher preparation, Ashton (1996) includes the social-emotional dimension with the cognitive. In her description of the "wide range of "knowledge and experiences not typically included in teacher preparation programs" (p. 22), she includes (a) interaction of social, emotional, and cognitive forces in learning; (b) new conceptions of teaching consistent with this complex view of students; (c) new conceptions of intelligence; and (d) new conceptions of motivation and assessment. Yet, few teacher education

programs are providing the knowledge and skills necessary for teachers to effectively teach these skills and dispositions within the curriculum of the classroom.

While there is much literature on thinking and the teaching of thinking in journals focusing on research, gifted education, and special education, there is comparatively little found in journals that focus on teacher education. Using the words thinking, thinking skills, teaching thinking, curriculum development and thinking, I performed a search through 21 journals from the last 20 years that included *Teacher Education* in the title. I found eight articles addressing the teaching of thinking distributed throughout five journals. While titles and words do not always reveal all that is written on a subject, it is an indication of the imbalance between the research on teaching thinking and the application in teacher education.

TIEL: MAKING COMPLEX PEDAGOGY ACCESSIBLE TO TEACHERS

While both psychologists and educators have realized the close relationship between the cognitive and psychosocial aspects if learning, (Fasko, 2001; Hayes, 1977; Zhang, 2002), there has been little help in bringing these concepts simultaneously into the teacher education process. Teaching for Intellectual and Emotional Learning (TIEL) provides a framework that clarifies the thinking and emotional components that form the infrastructure of 21st century learning and teaching. The TIEL Curriculum Design model makes these complex thinking and emotional processes accessible to teachers and to their students (Folsom, 2009a).

TIEL, an acronym for *Teaching for Intellectual and Emotional Learning*, is a synthesis of the thinking operations from Guilford's (1977) Structure of Intellect theory and Dewey's (1964) writings on qualities of character. While theories and frameworks of thinking and creativity (Bloom, 1956; Gardner, 1985; Moseley et al., 2005; Sternberg, 1984, 1985; Treffinger et al., 1983), and learning styles (Curry, 1983; Riding & Cheema, 1991; Sternberg, 1985; Torrance, 1963) contain components of Guilford's work, psychologists have pointed out the limitations of his model (Horn & Knapp, 1973; Sternberg & Grigorenko, 2001). One criticism that pertains especially to teachers is the complexity of Guilford's model limiting its use as a practical pedagogical framework. Yet, by deconstructing SI to its component parts, the elements that

underlie the intellectual processes of critical thinking, higher order thinking, and creativity become clearer.

Description of the TIEL Model

The TIEL model is represented by the TIEL Curriculum Design Wheel (see Figure 1), a graphic organizer that serves as a visual and semantic guide to the intellectual and social-emotional processes. The contents of the model are derived from the fields of psychology and educational philosophy. The model is depicted graphically by a color-coded wheel divided into ten segments that include five thinking operations from Guilford's (1977) Structure of Intellect Theory and five qualities of character described by Dewey (1964).

The thinking operations include cognition (research, discovery, gathering information), memory (recall, remembering, and connection-making), evaluation (critical thinking, assessment, and the self-management processes of decision making, planning, and self-evaluation), convergent production, (developing a product that involves logical thinking, one right answer), and divergent production, (developing a product that involves creativity, risk-taking, and imagination). The social-emotional characteristics or, as Dewey (1964) referred to them, "qualities of character" (p. 197) include appreciation, mastery, ethical reasoning, empathy, and reflection.

Components of the TIEL Model

While the underlying theories that form the TIEL model are not new, connecting the concepts provides a fresh perspective on teaching and learning. In the following section, I define each of the components of the TIEL model in more detail; explain the relationship between each intellectual component and the corresponding social-emotional component; and give examples of questions that can assist teachers in planning more complex learning activities for their students.

Cognition and Reflection

Cognition, defined by Guilford (1977) as "discovering, knowing, and understanding" (p. 48), helps teachers think in new ways about how they will plan for students to obtain information. Teacher candidates learn to see planning not simply as sequencing interesting activities, but as a means to help

students develop the intellectual skills of questioning, gathering information, observing, and researching that lead to knowing and understanding. Using the TIEL framework as a guideline for curriculum planning helps teachers ask themselves important questions as they plan.
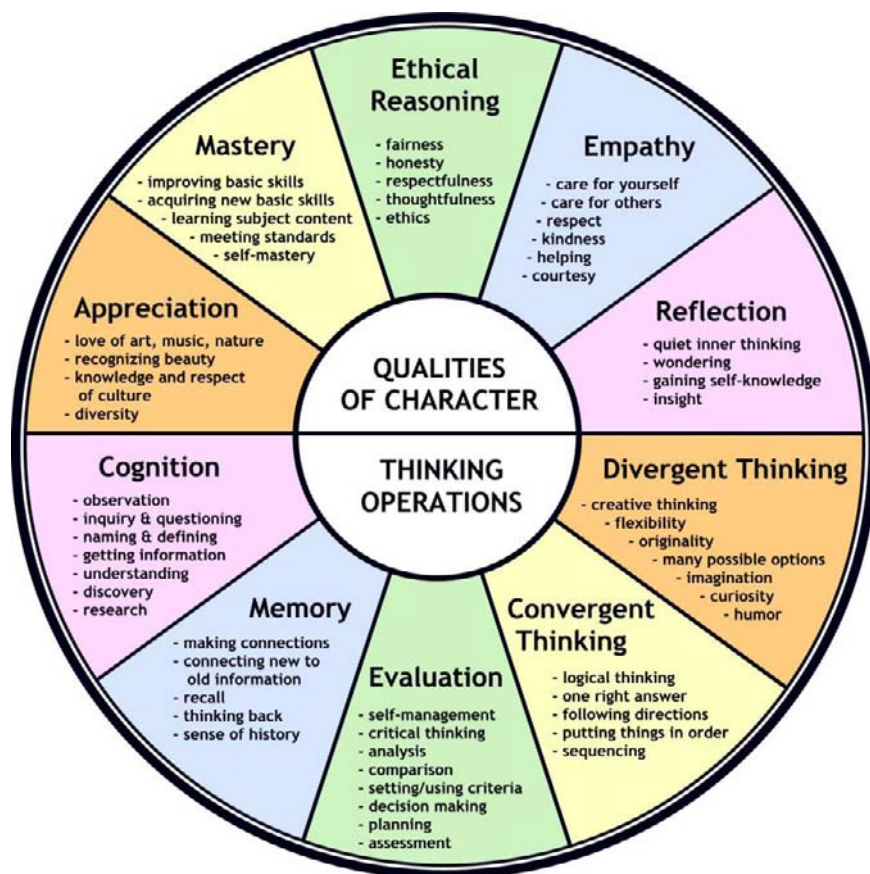
Figure 1. TIEL curriculum design model.

How will I plan for students to gather information in ways that will help them develop understanding? What questions will I ask that will help students develop a variety of thinking skills? What questions might students ask about this topic?

Dewey (1964) connected the intellectual skill of observation, important in acquiring information, to *reflection*. He stated that "there can not be observation in the best sense of the word without reflection, nor can reflection

fail to be an effective preparation for observation" (p. 196). The TIEL Curriculum Design Wheel visually reminds teachers to plan opportunities for their students to reflect on their learning. How can I plan for my students to reflect on the information and concepts they are learning? How can learning this content help students learn about themselves? How can I help students reflect on the intellectual and social-emotional processes of their learning?

Memory and Empathy

Memory is the glue that allows us to use our experiences to learn. Memory stores information, facilitates recall, and allows us to make connections between concepts and experiences (Guilford, 1977; Jensen, 1998; Sprenger, 1999; Sternberg, 1985; Wolfe, 2001). The TIEL framework helps teachers recognize that memory goes well beyond the recall of information and encourages a broader range of questions. How can this concept be connected to something that is familiar to the students? How can students develop their memory skills within this content area? How can I help students make connections between concepts and thinking processes across multiple subject areas?

While *memory* serves us academically, it also forms the well of *empathy* in each of us. Dewey (1964) states that the development of human sympathy, or *empathy* and caring, is an important "aim of education" (p. 197). Noddings (2003) states, "Sharing the suffering of others contributes to our own fulfillment as human beings" (p. 15). Yet, to feel compassion for another requires that "one must draw upon one's own capacity . . . one's own experience" (Jersild, 1955, p. 127). An awareness of *memory* as an important source of our feelings for others and for ourselves helps teachers consciously link the intellectual skills of memory to the emotional development of *empathy*. This awareness can help teachers understand more clearly how students bring experiences that profoundly influence their learning and behaviors in the classroom. Questions that help teachers reflect on the teaching of *empathy* include: How can students develop empathy during this study? What experiences have students had that will help them develop empathy for others and for themselves? How can I help the students care deeply about their work?

Evaluation and Ethical Reasoning

Evaluation and *ethical reasoning* are central in complex teaching and learning. The thinking skills included in *evaluation* include "comparing and judging" information (Guilford, 1977, p. 128) and "reaching decisions or

making judgments concerning criterion satisfaction" (Meeker, 1979, p. 17). The opportunity to choose motivates, opens opportunity for exploring options, and promotes self-directed learning. Marzano (1993), states that the processes of decision making, planning, and self-evaluation "render any activity more thoughtful and more effective" (p. 158) and are necessary for higher-order thinking to take place. When students learn how to analyze ideas, make decisions use criteria, formulate a plan to accomplish a goal, and evaluate their own work, teachers prepare them to "evaluate how they think and behave well beyond the classroom" (Bain, 2004, p. 94).

The TIEL model makes visible the self-management skills of decision making, planning, and self-evaluation that are often expected, but infrequently taught in any explicit way. Teachers can ask themselves questions that insure that these self-regulation skills are included in their curriculum. Where can students make decisions within this content study? How can I teach students to set criteria that will help them evaluate their work? What projects will provide an opportunity for teaching students how to plan?

Ethical reasoning, or "unswerving moral rectitude" (Dewey, 1964, p. 197), is evaluation anchored by qualities of character. Making ethical decisions requires the same evaluative skills of setting criteria, weighing options, planning or evaluating one's actions, yet combined with empathy and appreciation. The TIEL framework reminds teachers to dig deeply into content and ask the following questions: In the course of this study, where can children become aware of decisions based on honesty, respect, and fairness? How can I use group project work to help students develop capacity for ethical reasoning?

Convergent and Divergent Production

It is useful to discuss the thinking operations of *convergent* and *divergent production* together in order to clarify the importance of balancing these two kinds of thinking in the classroom. The corresponding qualities of character, mastery and appreciation will also be discussed together. Guilford (1977) states that *convergent production* is a kind of productive thinking that seeks for "one correct answer" as well as logical and deductive thinking. *Divergent production*, on the other hand, involves a broad production of information, resulting in "alternative ideas" (p. 92) and generating information with an "emphasis on variety and quality of output" (Meeker, 1979, p. 20). *Divergent production, "*no minor innovation" (Richards, 2001, p. 253) includes the kind of fluent and flexible thinking students need to succeed in today's complex society. Guilford, however, cautioned about considering convergent

production to be only about "problems that have a correct answer" as the "interplay between convergent and divergent processes" is necessary for creative thinking (Osburn & Mumford, 2006, p. 174).

Guilford need not have concerned himself that convergent thinking would be neglected. Linear sequential thinking that focuses on one right answer is the most prominent kind of thinking in the educational system (Berliner & Biddle, 1995; Fer, 2007; Gehrke, Knapp, & Sirotnik, 1992; Goodlad, 1984; Meeker, 1995; Resnick, 1987; Sarason, 1982; Zohar, 2004). Understanding the importance of helping students develop both convergent and divergent thinking skills encourages questions that help teachers plan learning activities that balance the two kinds of thinking. What facts are important for students to learn about this topic? Where can students best practice sequencing and organizational skills in this study? How can I plan for students to use their creativity within this content area? Where can I teach students how to use flexible thinking? How can I design assessment that includes both convergent and divergent learning?

Mastery and Appreciation

While *convergent* and *divergent thinking* are important intellectual skills, each corresponds to a social-emotional characteristic that is important for students to develop. Within the context of the TIEL model, there are two ways to consider *mastery*. First, teachers need to be conscious of helping students develop social-emotional self-mastery that includes *reflection*, *ethical reasoning*, *empathy*, and *appreciation* for others as well as for themselves. Second, teachers need to consider the relationship between mastering school skills and the development of social-emotional characteristics. Because assignments, assessments, and standardized testing require right answers, mastery is most often associated with convergent production in school. Students who experience repeated failure in mastering school skills develop a "lack of confidence in themselves as learners" (Weiner, 1999, p. 71). Similarly, students who are not challenged intellectually in school can also experience feelings of confusion, frustration, and defeat leading to a loss of confidence that can inhibit the development of social-emotional characteristics that students need to be successful learners (Rimm, 1986).

The following questions can help teachers make the qualities of character, *mastery* and *appreciation*, an integral part of their teaching. How can I help this student develop mastery in academic skills in order to help him gain self-confidence as a learner? How can I support students' development of personal mastery in the area of social-emotional qualities? How can this study help

students develop an appreciation for differences and diversity in themselves and others? How can art and music support the learning of content while helping students develop an appreciation for the arts?

DESIGNING LESSONS: INTEGRATING THINKING AND SOCIAL-EMOTIONAL LEARNING INTO DAILY CURRICULUM

In his 1950 American Psychological Association address, Guilford (1950), pointing out the lack of creativity in classrooms, asked, "Why is there so little apparent correlation between education and creative productiveness?" (p. 444). The TIEL model helps fill the gaps indicated in this question in three ways. The first is awareness. The TIEL model can help teacher candidates become conscious of thinking and social-emotional learning in themselves and others and to become aware of the relationship of thinking to curriculum and learning. The second is to help teachers and teacher candidates develop project-based curriculum that include teaching students the self-organization skills of decision making, planning, and self-evaluation (Folsom, 2005, 2006, 2009a). The third, included in this chapter, is using the TIEL model to integrate a wide range of opportunities for thinking and social-emotional learning into daily curriculum through lesson planning.

Using the TIEL model to design lesson plans helps teacher candidates experience creative productiveness as well as plan for their students to experience creative productiveness in their learning. Examples from a teacher candidate's lesson plan and her reflections on teaching will to explain the TIEL lesson plan format and how the components address the thinking processes and social-emotional learning described in the TIEL Curriculum Design model (see Figure 2). While the students in our teacher education program include inservice teachers as well as preservice teachers, the examples included here are from a preservice teacher. The term teacher candidate and teacher will be used interchangeably to distinguish those who are preparing to teach from the students in elementary classrooms.

The TIEL lesson plan format follows a workshop model structure that helps teachers plan for "hands-on, minds-on" learning experiences for students (Darling-Hammond, 1997). Using the workshop model, teachers give a short group lesson involving direct instruction and discussion followed by a longer work time for hands-on practice with concepts and skills taught in the "mini

lesson."

Curriculum Planning Using TIEL

Name:	Workshop Lesson Plan	Date:
Course, Assignment, & Topic:		Grade Level:

PREPLANNING
Core Curriculum: (Where does this unit fit in the core curriculum?)
Standard/s: (What standard/s is (are) the focus of this lesson?)

Unit Goal: (What is the goal for the unit of which this lesson is a part?)

Lesson Objective: (What will the students <u>DO</u> to <u>show understanding</u> of the <u>skills and concepts</u> taught in this lesson?)

Inquiry Aims: (Write a question about content on lines below for each kind of thinking and/or social emotional process)

Cognition/Reflection:

Memory/Empathy:

Evaluation/Ethical Reasoning:

Convergent Production/Mastery:

Divergent Production/Appreciation:

Differentiation: (What are the individual needs? How will you tailor the mini lesson and practice to individual needs?)

Materials Needed:

LESSON PROCEDURE or MINI LESSON (What can you show them? What questions can you ask to elicit thinking?):

Motivation/Connection: (How will you hook the students into this lesson and make connections to previous learning?)
Show:
Discussion Questions:

Lesson Presentation: (What will you show the students during the lesson? What questions will you ask?)
Show:
Discussion Questions:

PRACTICE (What will the students do to explore the concept or practice the skill stated in the objective? How will you set criteria for evaluation with the students?)

Guided Practice:
Independent/group work:
Share:
Metacognition: (What questions will you ask to find out if students are aware of the **thinking processes** they used? What questions will you ask to help students become aware of **social-emotional learning** that took place?)

ASSESSMENT (How will you know the students learned what you taught? What specifically will you look for that shows that students understand the **content & concepts** and the **thinking and social emotional processes** you are teaching?)

Assessment Product: (What did the students DO that helps you assess?):	Criteria for evaluation:

REFLECTION: (What is your evaluation of the lesson? What worked well? What needs to be re-taught?)

Figure 2. TIEL lesson plan format.

The lesson plan format is sequential with an emphasis on relationships among the components that include a unit goal, lesson objective, inquiry aims, lesson procedure, practice, and assessment. While candidates can start at any point in their planning, the sequential format helps them "learn to create

coherent, connected learning experiences" (Darling-Hammond & Bransford, 2005, p. 185).

The following lesson plan is part of a project-based unit on Ancient Egypt. A project-based unit includes lessons that teach the essential concepts and skills of the unit; a culminating project the stsudents will create to show understanding of the concepts and skills taught; and self-management lessons that teach students the decision making, planning, and self-evaluation skills they will use in creating their culminating projects.

Unit Goal

The unit goal places the lesson within the context of a project-based unit of study. The goal includes the topic and concepts to be learned in the unit, the culminating product that will act as an assessment showing student understanding of the content of the unit, and the self-regulation skills of decision making, planning, and self-evaluation that students will use in creating their culminating project.

Unit Goal: (What is the goal for the unit of which this lesson is a part?)

After lessons on Ancient Egypt based on the six social studies disciplines and the New York State Standards, students will show *understanding* and *appreciation* of the history, geography, politics, economics, and culture of Ancient Egypt by using the *self-management skills of decision making, planning,* and *self-evaluation* to create an artistic, informative, accurate brochure encouraging travel to Ancient Egypt.

Figure 3. Example of goal from a teacher candidate's lesson plan.

The unit goal includes five components. The first component, *context*, gives information about the learning activities of the unit. The second, *content*, explains the topics, concepts, and skills to be learned in the unit. *Process*, the third component, includes thinking and social-emotional processes from the TIEL Curriculum Design model that students will use and develop during the unit of study. The fourth component, *product*, states the culminating project of the unit that will be an assessment showing the students' understanding of the unit's content. The fifth component, *criteria for evaluation*, states the basic criteria for evaluating the final product. An analysis of the five components of the goal for the unit on Ancient Egypt are as follows:

Context: after lessons on Ancient Egypt based on the six social studies disciplines and the New York State Standards.

Content: history, geography, politics, economics, and culture of Ancient Egypt

Process: understanding, appreciation; self-management skills of decision making, planning, self-evaluation (using criteria); and creating

Product: the brochure, culminating project to be completed by the students to show understanding of the concepts and processes taught throughout the unit.

Criteria for evaluation: artistic, informative, accurate

The TIEL Curriculum Design model helps teachers become more explicit about the *process* component of the unit goal. The term *understanding,* included in the *cognition* section of the TIEL Wheel, is used in the goal to emphasize deep understanding over surface learning. A*ppreciation,* one of the qualities of character found in the TIEL model, is included in the goal to convey the importance of developing *appreciation* for what the students are studying. The term *self-evaluation skills* from the *evaluation* section of the TIEL Wheel focuses attention on self-determination or self-management skills that are often neglected (Rogers, 2002; Stang et al., 2009; Wehmeyer et al., 2000; Zimmerman, 2002). Including the skills of decision making, planning, and self-evaluation in the goal helps teachers recognize the connections between activities that foster higher order thinking and what those thinking skills are. *Criteria for evaluation* are included in the goal to clarify what is expected of the students and to provide them with the standards they need to monitor their own work (see Figure 3).

Lesson Objective

The lesson objective, written in a style similar to the goal (Handelsman et al., 2007), pertains to one particular lesson within the unit. The objective asks teachers to state what students will do to show understanding of the skills and concepts to be learned in the lesson. In this introductory lesson that involves creating a timeline for a study of Ancient Egypt, the objective includes understanding the concept of chronological order within a time period, the process of creating a timeline, and the criteria for evaluating the completed timeline. The lesson includes the important interplay between the *convergent* processes required to place B.C.E. dates in chronological order and the *divergent* processes involved in creating an information card for the group

timeline that will become part of the larger class timeline. Including the criteria for evaluation in the objective helps novice lesson designers become aware that the self-regulation skills of planning and self-assessment, included in the TIEL component of *evaluation,* are an essential part of the lesson (see Figure 4). In addition, there is a positive relationship between planning and creativity as shown by Osburn and Mumford (2006) in their research on training interventions.

Lesson Objective: (What will the students <u>**DO**</u> to <u>**show understanding**</u> of the <u>**skills and concepts**</u> taught in this lesson?)

After analyzing pictures of objects from Ancient Egypt, students will show understanding of chronological order of events within Egypt's major historic time periods by creating an individual timeline card that includes an important event within a time period, an image, three facts, shows originality, and is placed correctly on the classroom timeline.
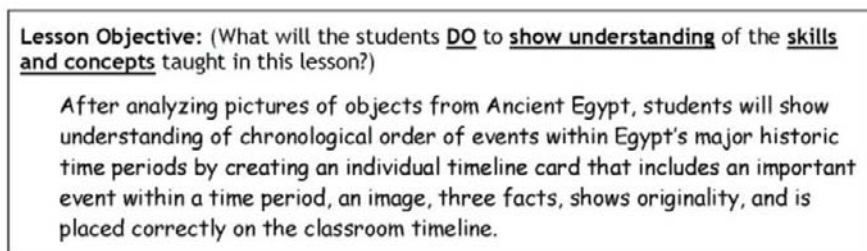
Figure 4. Example of lesson objective from a teacher candidate's lesson plan.

The lesson objective, like the unit goal, includes five components. The *context* provides information about the learning activities in the lesson. Second, *content* states the topic, facts, skills, and concepts that the students are to understand and apply. Third, *process*, includes the thinking and social-emotional processes that students will use and develop within the lesson. The fourth element is the assessment *product*, stating what the students will do or create that will show their understanding of the content. Fifth, *criteria for evaluation*, states criteria for evaluating the assessment product of the lesson. The following is an analysis of the components of the objective for the timeline lesson.

Context: after analyzing pictures of objects from Ancient Egypt
Content: chronological order of events within Egypt's major historic time periods
Process: understanding, creating, meets criteria
Product (assessment): individual timeline card
Criteria for evaluation: an important event within a time period, an image, three facts, shows originality, placed correctly on the classroom timeline

Differentiation

One of the greatest challenges in designing lessons is addressing learning differences of the students in the classroom. Including differentiation in the lesson plan helps teacher candidates think about the students in the class who struggle with learning or physical disabilities, those who are gifted learners, and in some cases, those who have a combination of learning challenges. The candidate planning this lesson considers how she will group students as well as the teaching strategies of inquiry, modeling, and setting clarifying criteria. All are examples of effective teaching methods that are effective with all students (Jordan, Schwartz & McGhie-Richmond, 2009). Materials are included in this section because modifications in materials and resources are often needed to address specific learning needs of the students. For example, materials that students read to gain information about the content can be adjusted for different reading levels (see Figure 5).

Differentiation: (What are the individual needs? How will you tailor the mini lesson and practice to individual needs?)

To differentiate instruction, I will group students accordingly based on their strengths and weaknesses and partner students that can benefit from one another to create the time period hanger. I will use certain teaching strategies such as inquiry based learning and cooperative learning. Also, during the mini lesson I will be sure to model and provide clear expectations of what I want.

Materials Needed:

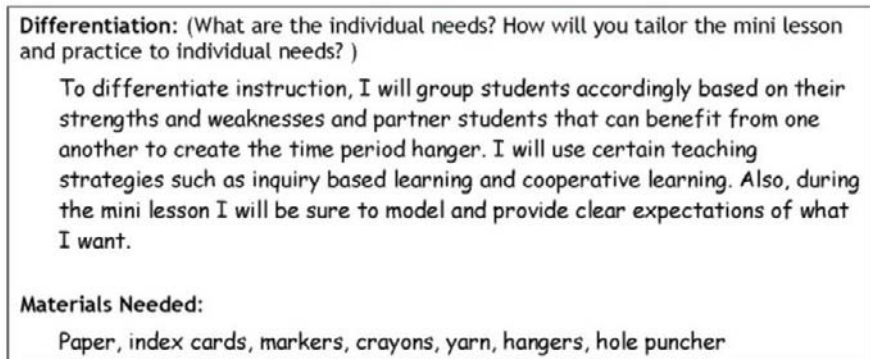Paper, index cards, markers, crayons, yarn, hangers, hole puncher

Figure 5. Example of differentiation from a teacher candidate's lesson plan.

Inquiry Aims

This section provides a place for teachers to visually consider all aspects of the TIEL components as they develop questions. The sections for the inquiry aims are highlighted in the colors of the TIEL Wheel to help candidates make sure their questions represent a balance of thinking and social-emotional opportunities. In her review of research on the impact of thinking skills on teachers, Baumfield (2006) found that when teachers

planned with thinking skills in mind, they asked more open-ended questions, dialogue in the classroom changed, and the teachers thought more carefully about the questions they asked. The purpose of inquiry aims is reflected in a quote by a teacher participating in Zohar's (1999) research on metacognition, "Now I am thinking that before each lesson I must think 'What is my purpose?' in each question I intend to ask" (p. 425).

Inquiry aims are conceptual, open-ended questions that represent the wide range of thinking and social-emotional processes found in the TIEL model. The inquiry aims scaffold the lesson as they become the initiating questions in the discussions throughout the lesson plan. This will be further discussed in the section on lesson procedure. In the timeline lesson, the *cognition* question (pink) focuses the students attention by asking them what they observe when the teacher shows them the pictures of Egyptian artifacts. The memory question (blue) helps the teacher determine what students already know about the topic and the connections they can make to this prior knowledge. Most teachers are familiar with this process from the K-W-L (Know-Want to Know-Learn) chart (Ogle, 1986).

The *evaluation* question (green) sets the stage for establishing criteria for evaluating the product created during the independent or group work. Candidates are encouraged to include two *evaluation* questions in the inquiry aims. One focuses on the content and asks students to analyze information, compare and contrast, or critically evaluate an idea or action using evidence to support their position; the other evaluation question addresses the processes of self-regulation such as setting criteria, setting a goal, or planning their work. This lesson includes two inquiry aims in the evaluation section: What evidence gives you some information about the time period of each object? What are the criteria for evaluating the individual timeline? In this lesson, the teacher candidate has asked both a *convergent* question that addresses the concept of chronology and a *mastery* question that focuses on the skills being developed during the lesson. The teacher draws the last inquiry aim from the qualities of character portion of the TIEL Wheel as she inquires into the students' *appreciation* for the country and time period they are studying (see Figure 6).

Lesson Procedure

It is in the lesson procedure, containing the motivation and the lesson presentation, that the concepts of the lesson are developed through show/discuss sequences. *Show* refers to the information and how that

information is presented to the students.

Inquiry Aims: (Write a question about content on lines below for each kind of thinking and/or social emotional process)
Cognition/Reflection: What do you observe when I show the time capsule with objects from ancient Egypt?
Memory/Empathy: What connections can you make to what you already know about ancient Egypt?
Evaluation/Ethical Reasoning: What evidence gives you some information about the time period of each object? What are the criteria for evaluating the individual timeline?
Convergent Production/Mastery: Where does each group timeline fit into the ancient Egypt time period on the classroom timeline? What skills did you learn?
Divergent Production/Appreciation: How does the timeline help us to appreciate what is special about ancient Egypt?

Figure 6. Example of inquiry aims from a teacher candidate's lesson plan.

For example, in the *motivation/connection* section, the teacher plays Egyptian music to focus the students and initiate the lesson. *Discussion questions* are the questions that the teacher plans to ask to guide the exploration of the content. The inquiry aims are used in the procedure. For example, in the motivation after the teacher candidate plays Egyptian music, she asks a *cognition* question: What do you hear? She follows that question with a *memory* question that focuses on connections: Can you make any connections to any other types of music that you have heard?

The inquiry aims are used as primary questions to initiate the discussion and scaffold the lesson. In the lesson presentation, the teacher shows the pictures of objects to the students and asks similar *cognition* and *memory* questions: What do you see? What connections can you make to what you already know about Ancient Egypt? These primary questions are followed by secondary questions that follow up the initial observations and connections and probe for more detailed information. What are the objects? How do you know what they are? What specifically tells you? What do the objects represent? Why do you think they represent that? What questions do you have about the objects shown in the pictures? After exploring the content, the teacher asks the first *evaluation* inquiry aim that calls for critical thinking about the content: What evidence gives you some information about the time period of each object? (see Figure 7) This question leads into the independent

and group work in the practice section.

LESSON PROCEDURE (How will you help students understand the concept? What will you show the students? What questions will you ask?):

Motivation/Connection: (How will you hook the students into this lesson and make connections to previous learning?)

Show: As students enter the classroom, Egyptian Music will be playing, for example the song, "Aatbak Ala Eih" by Mohamed Mohie. This is a very upbeat song where a lot of percussion instruments are used. In addition, the Egyptian National Anthem will be played.

Discussion Questions: What do you hear in the two pieces? Can you make any connections to any other types of music that they have heard? Where do you think this music is from? How do you feel when you hear it?

Lesson Procedure: (What will you show the students during the lesson? What questions will you ask?)

Show: I will show the students a time capsule (a metal tin filled with pictures of objects) that was "found" thousands of years ago in Ancient Egypt. We will explore the pictures of the objects together.

Discussion Questions: What do you see? What connections can you make to what you already know about Ancient Egypt? As we look at the objects in the time capsule, we will discuss and explore certain questions such as: What are the objects? How do you know what they are? What specifically tells you? What do the objects represent? Why do you think they represent that? What questions do you have about the objects shown in the pictures? What evidence might give you some information about the time period of each object? How can you find out about the time periods of ancient Egypt?

(Students will use their texts to find out which object is derived from a certain time period in Ancient Egypt and the names of the time periods: Predynastic, Old Kingdom, Middle Kingdom, New Kingdom and Greco Roman.)

Figure 7. Example of lesson procedure from a teacher candidate's lesson plan.

The show/discuss sequences serve two important functions in the lesson plan. First, they help the teacher think purposefully about the questions that will be asked during the lesson. Second, the "show" is a reminder to accommodate for the various learning styles in the classroom by presenting information in a variety of ways—visually, auditorily, holistically, and sequentially (Riding & Sadler-Smith, 1997)—before asking questions. The show/discuss sequences help teachers consider what method of providing

information will best help students think deeply as they explore and answer questions.

Practice

The practice section of the lesson plan provides a time for the students to apply the concepts and skills taught in the lesson and for the teacher to informally assess and clarify student understanding of the concepts of the lesson. This section of the lesson plan includes guided practice, independent or group work, a time for students to share their work and what they learned, and metacognition to discuss the thinking processes that students used during the lesson and their independent or group work.

Guided Practice

During the guided practice, the teacher *models* the work the students will do during independent or group work time. The teacher gives the students the opportunity to *observe* (cognition) a sample of the work that they will do and *sets criteria* (evaluation) to make sure that expectations are clear. The teacher shows an example of the timeline cards that will be assembled onto a group timeline using a clothes hangar. After asking the students what they notice about the timeline cards, the teacher and the students develop the criteria for evaluation together. Criteria for the timeline cards include an important event in their assigned time period, an image, at least three significant facts, easy to read, shows originality, and all cards in group are organized in chronological order. The clear criteria help the students take responsibility for monitoring their own work. During the guided practice the teacher groups and regroups students as needed and clarifies any management instructions. In this lesson, the teacher candidate created five groups based on her plans for differentiation (see Figure 8).

Independent/group Work

During the work time the students use the computers, textbooks, and other books provided to find key objects and events that occurred during their assigned time period. In this lesson, the students worked in groups each completing a timeline card to be used in assembling a group time line of their time period. While students are working the teacher can observe how the students are researchng the information, how they are following the criteria set as a class, who needs help selecting information, who needs re-teaching, and

who needs to go more in depth in searching for information.

PRACTICE (What will the students do to explore the concept or practice the skill stated in the objective? How will you set criteria for evaluation with the students?)

Guided Practice:

I will show the students the classroom timeline on the wall that is made out of paper. The only information that will be on the timeline are dates (for example, 7000 B.C. - 395 A.D.).

What do you think we need to do with the timeline?

Modeling

The students are in groups of 5-6 students. I will model an example of the individual timeline cards and show how, using clothes hangers, each group will make a group timeline using all the cards in their group that represent one time period.

Setting Criteria

What do you notice about the cards? From their responses we will set the criteria so that the expectations are clear: Important event in their assigned time period, image, at least 3 significant pieces of information about the event, dates, organized in chronological order, easy to read, original touches.

Independent/group work:

Each group will be assigned a time period. They will use the computer, textbooks, and other books provided to find key objects and events that occurred during their assigned time period. For example, during the Predynastic period, the first pyramid was built, hieroglyphic writing was developed and north and south Egypt were united.

The students will write each important event on a large index card (there should be one completed post cards for each person in the group) and draw an object from that time period, and write at least three significant pieces of information about the event or object representing the event. Using a hole punch and string each group will organize their individual cards into chronological order on a clothes hangar, representing one time period.

Share:

The students will share their findings about the time periods as they place the hangers representing the time periods will be placed on the classroom timeline in chronological order.

Figure 8. Example of guided practice, work, and sharing from a teacher candidate's lesson plan.

Share

The sharing time offers the students time not only to share their work and

what they have learned, but to hear what each of the other groups have learned. In this lesson, the students can look at the individual timelines and determine if each group placed their cards in chronological order.

Metacognition

Burke, Williams, and Skinner (2007) state that "more emphasis in classrooms needs to be placed on encouraging learners to think about their thinking with the aim of improving their metacognitive abilities" (p. 10). The TIEL lesson plan includes space for students to reflect on their learning and the thinking processes and social-emotional processes developed during the lesson. Teacher candidates are asked to think about questions they can ask to help students become aware of the *thinking and social-emotional processes* they used during the lesson.

Metacognition is a challenging concept for beginning teachers who have rarely thought about their own thinking. Including metacognition in the lesson plan provides an additional reminder of the importance of the intellectual and emotional development that can take place during a lesson. These are the first metacognition questions planned by this teacher candidate. (see Figure 9)

While some of these questions direct students to think more about the content of the lesson than think about their thinking, other questions are more metacognitive. The question, "What else can I do to learn about Ancient Egypt?" helps students think about learning and how they can learn on their own. The question from the inquiry aims, "How does the timeline help us to appreciate what is special about ancient Egypt?" addresses the social-emotional characteristic of appreciation found in the TIEL Wheel. At the same time, the teacher is modeling for students that learning and knowledge is something to be valued. These questions show that this candidate is thinking about the purpose of the questions she asks, an important step in her own metacognition.

Here are examples of other questions that help students think about their thinking:

> **Evaluation**: How did you make decisions about the events to include on your timeline? How did you use the criteria that we set together as a class?
> **Ethical Reasoning**: Did you have in any problems in your group? How did you solve the problem? Did everyone feel that was a fair solution? What helped your group work together smoothly?
> **Mastery**: What skills do you feel you improved today?

Reflection: What do you now wonder about Egypt?

Metacognition: (What questions will you ask to find out if students are aware of the **thinking processes** they used? What questions will you ask to help students become aware of **social-emotional learning** that took place?)

> Comprehension: What are some key facts and objects that define Ancient Egypt?
>
> Connection: How is Ancient Egypt similar or different that what you already know about other ancient countries?
>
> Strategy: What else can I do to learn about Ancient Egypt?
>
> Reflection: What did you learn about Ancient Egypt? What were causes and effects from one time period to the next?
>
> Appreciation: How does the timeline help us to appreciate what is special about ancient Egypt?

Figure 9. Example of metacognition from a teacher candidate's lesson plan.

Assessment

The assessment section states what the students will do to show understanding of the concepts and skills that were taught in the lesson. At the assessment, the lesson comes full circle. The assessment must match the objective; the objective must match the assessment. The components in between provide the scaffolding from the beginning to the end and each needs to align to the next. In the TIEL lesson plan, the assessment section is structured in two parts: the assessment product and the criteria for evaluation. The assessment product is what the students do or create to show understanding of the concepts of the lesson; in this lesson creating the individual timeline cards, the group timelines, and placing them on the classroom timeline. The criteria for evaluation state the standards that provide evidence that understanding has been achieved. The candidate organized the evaluation criteria into three different levels. The first level lists the criteria set with the students during the practice that indicate optimum understanding. The second and third sets of criteria that indicate lesser degrees of understanding (see Figure 10).

ASSESSMENT (How will you know the students learned what you taught? What specifically will you look for that shows that students understand the **content &** **concepts** and the **thinking and social emotional processes** you are teaching?)

Assessment Product: (What did the students DO that helps you assess?):	Criteria for Evaluation:
I will assess the students based on the time period hangers that they created. I will analyze the information that they students provided on the index cards and see where they placed the hangers on the classroom time line.	Students were highly engaged in the class discussion; they created a comprehensive visual presentation which included: - an important event in time period - an image - at least 3 important facts - dates - easy to read - originality - placed in chronological order Students participated in class discussions, created a somewhat compressive presentation, including some facts and was in some chronological order. Students participated minimally in class discussions, created simplistic presentations with few or no facts and was not in chronological order.

Figure 10. Example of assessment from a teacher candidate's lesson plan.

Reflection

Since "the process of understanding and improving one's own teaching must start from reflection on one's own experience" (Zeichner & Liston, 1996, p. 6), the TIEL lesson plan format includes a place for reflection. The test of a plan is in its implementation. After teaching her lesson to a group of six students, the reflection reveals what this candidate discovered about planning.

First, she discovered that she needed to reconsider the criteria for the timeline cards to better fit the time constraints.

Overall, the lesson went well. It was a lot of information and a lot for the students to accomplish, so perhaps I would spread this lesson out over two periods. Also, maybe I would just have the students draw one object and one key fact to represent the time period, because it was too time consuming for the students to research and choose three facts.

Second, she discovered how to get the student's attention and involve them in the lesson from the very beginning.

For the Ancient Egyptian Timeline lesson, I was playing music as the students were seated. They appeared to be very intrigued by what they were hearing. I noticed that a few of the students would turn to each other and ask, "What kind of music is this?" and "I wonder where this music is from?" As I let the music play for a few minutes, I immediately noticed that I had sparked their attention. After informing the students that the music was from Egypt, they were very shocked, but looked curious to learn what was next.

Third, this candidate discovered that she and the students enjoyed themselves and she began thinking how this might work in a real classroom.

Although I thought this was a great and fun lesson, it took a very long time for the students to complete, and there were only six students! I think it would have worked better in a full classroom because there would be various groups and each group could work on a time period. The students did seem to have a lot of fun and they said that they enjoyed the lesson.

In this lesson, the teacher candidate and her students seemed to experience a glimpse of the elusive "creative productivity" that concerned Guilford. While research is just beginning on how using the TIEL model contributes to teaching curriculum design that explicitly integrates thinking and emotional learning, the experience of this teacher candidate indicates that it can be a powerful planning tool. First, in her initial experience in teaching a lesson, her planning appears to have contributed to the positive experience. Second, her creative planning, using music for example, contributed to her students' attention, engagement, and curiosity during the lesson. Third, her planning involved depth and complexity in consciously addressing a wide range of thinking processes not common among many experienced teachers, much less for those who are beginning to teach. Yet, this lesson plan is not unusual among the pre-service teachers using the TIEL model to plan.

CONCLUSION

Let's start at the very beginning
A very good place to start
When you read you begin with ABC
When you sing you begin with do re mi.
(The Sound of Music)

As I teach those who are preparing to become teachers, I think of Maria's song about fundamentals from *The Sound of Music*. There is so much for teachers to know as they begin this daunting profession. Yet, as Hayes (1977) suggests, we should not be preparing teachers for "what is", but for "what ought to be" (p. 234). The field of psychology has provided theories, frameworks, and constructs over several decades that can help teachers create the kinds of classrooms mentioned in the introduction to this chapter. The problem has been in making this surfeit of riches available in usable form for those who are preparing to become teachers and those who teach them. Taking Maria's suggestion, going back to the very beginning, to the fundamentals established by Guilford and Dewey, seems a very good place to start. These basic principles can help teachers and teacher educators identify and integrate into curriculum the thinking and emotional processes that can move us from "what is" to what "ought to be" in 21st century education.

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Chapter 2

A RATIONAL EXPECTATIONS ANALYSIS OF DECISION-MAKING

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ABSTRACT

I argue that policy-makers rather than using a single decision-making modle employ, depending on the situation, flexible decision strategies. The flexibility of Rational Expectations allows for the modeling of 'forward thinking', informed actors, and gives them the ability (and potential) to act strategically by modifying their policy according to the changes in the issue at hand. Incrementalism, synopsis and punctuated equilibrium can be modelled using rational expectations and policy-makers can employ them according to their needs and preferences.

1. THE PROCESS OF DECISION

Three models of decision making (synopsis, incrementalism, and punctuated equilibrium) have been at the heart of decision-making analysis for

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the past half century. They all have, to some extent, downplayed issue framing and the analysis of the psychological side of decision making. On the part of actors, the choice of a model is connected to cognitive framing as decision making is about more than just problem solving. In understanding decisions the psychology and the orientation of the actors are crucial. If policy-makers use more than one model to reach decisions, does that undermine the validity of the models themselves? Should actor be consistent in the use of a single model of decision? I argue that this is not the case. It is also about specific paths to achieving a solution, it is about forecasting and it is about resources mobilization. Forecasting is handled well by Rational Expectation models, which can also help select an approach that will maximize resource mobilization. Because the nature of an issue varies according to our perception of it (i.e., it can be a small problem to some actors, a critical issue to others or no issue at all to a third group), and because the demands derived from forecasting, resource mobilization and problem solving are complex and diverse for most issues it makes sense to employ a flexible decision strategy that is based on the cognitive framing of these specific issues.

Decision-making explores how actors deal with the environment surrounding them by consciously taking steps to either modify or leave it untouched. If their choices carry enough authority to affect others, we are, broadly speaking, looking at policy. Many variables have been invoked to unlock patterns of decision including social, institutional, cultural, cognitive, historical, ideological, economic, and psychological ones. Various models emerged during the 1950s and 1960s: Arrow (1951), Downs (1957), Lindblom (1959, 1968, 1979), Dror (1964) and Etzioni (1967) tackled the dynamics of decisions. With incrementalism and synopsis being the most successful. However, the two models ultimately became bogged down in a sterile face off. Synoptic models generally proved too demanding in their preliminary requirements and few actual examples of synopsis could be uncovered. For incrementalism, the demise of the pluralist paradigm and the emergence of an economic approach across the social sciences certainly played a part. If we can easily explain behaviours using economic rationality, why bother with analyses of decision-making? Is it not simpler to gather information about policy outcomes, without delving in how they came about? The incapacity of decision-making to generate a widely applicable paradigm while satisfactorily addressing strategic planning and resource constraints also sapped the field. The inability to resist the lure of "general" applications was also problematic. For example, incrementalism has been used in areas from budgeting (Booth 1988; Bramley 1985) to organization theory (Baker 1998), to foreign policy

(Schraeder and Borstelman 1994) and lost analytical capacity as scholars stretched its meaning, reach, and content. In turn, the confusion arising about its meaning led to a mistaken assessment of the nature of the two models and to the unsatisfactory description of what they set out to explain (Smith and May 1980). An additional source of this confrontation was the relative lack of attention for the cognitive phase of decision-making. This situation was only partially remedied by the development of punctuated equilibrium theory, which while providing a way to overcome the sterile confrontation of the previous debate was still facing three problems. First, it has proved complicated to generate a commonly agreed upon definition of policy change, so that the operationalization of the dependent variable in policy dynamics research is often a problematic one. Second, it is not necessarily true that a punctuated equilibrium model would be the sole possible causal model (Howlett and Cashore 2009). Third, and of particular interest to us, there is little in this model that refers back to cognitive background of decisions.

In this sense, I argue that the selection of a model depends on the combination of the ideological position of the policy makers, their perception of the output of a certain program, the amount of available resources they are ready to commit, or that they need to muster. I believe that this results in the use of a flexible strategy in the selection of a decision making model.

When deciding, individuals are not unencumbered, unfettered, or unrestrained. They are enmeshed in institutions that define the roles through which they recognize and assign obligations to themselves and others, and must deal with resource and capacity constraints. Furthermore, decisions are undertaken on the basis of cycles of perception and decision in which values, goals and the institutional paradigms within which the actors operate all influence their choices (Connolly and Wagner 1988). Four factors frame decision. Actors should be assumed to be "thickly" rational (they have goals, which they know how to reach, and both ends and means are rational to them) and are bound by socio-cognitive constraints, which are crucial to the phase that precedes the actual decision and where perception and assessment are deployed. Resources should be considered scarce and, while decision-makers can order their priorities, a well-defined, stable ordering is likely only for a limited number of issues. In these conditions, flexible decision strategies that are closely linked to both the political and material conditions that exist at the time of the decision can be described well by rational expectation models. In practice, decision-makers are unlikely to be wedded to a single strategy of decision. Various explanations have been proposed for this flexibility. Braybrooke and Lindblom (1963) argued that the actors' understanding of the

problem, and the degree of policy change they proposed were crucial. Hayes (1992) postulated that the amount of resources committed to the process and the perception of the acceptability of the policy outcomes, could help us understand both policy analysis and policy change. Others argued that issue framing is paramount because it shapes our understanding of the situation and of the problem at hand. Therefore, it is likely to affect both the perception of the outcomes and the epistemic means to be used (Kahneman and Tversky 1984; Tversky and Kahneman 1981). In the next section I sketch the incremental, synoptic and punctuated equilibrium models and argue in section three that some of cognitive aspects of decision making can more profitably be examined through the lens of rational expectations. This is not intended as an exhaustive literature review, but rather as a reminder of some select trends in the field and will therefore have a somewhat historical flavour. I then provide a case study of Canadian unemployment protection programs as a preliminary approach to the application of this analysis, and offer some conclusions in the final section.

2. THE MODELS OF DECISION

2.1. Incrementalism

Before delving in more detail in the history of incrementalism, we should note that this model also became a household notion in at least two other fields apart from decision-making: budgeting and management. Budgetary incrementalism looks at the process of integrating incremental steps into the difficult and contentious process of allocating financial resources (Schick 1983; Wildawsky 1964; 1988). It is based on the premise that "this year's budget is based on last year's budget, with special attention given to a narrow range of increases or decreases" (Davis, Dempster and Wildavsky 1966: 529). Falling in the field of management literature (Camillus 1982), is Quinn's (1980) logical incrementalism. According to this model, there is a continuous process of integration between the formulation of a strategy and its implementation, and crises can be used as stepping stones for change. By using a decentralized model of decision-making and by allowing for a broad framing of the strategy itself, logical incrementalism allows for a high degree of flexibility in implementation. This process, in Quinn's opinion is not 'muddling' but rather a logical strategy under complex conditions. While these

two fields are interesting in their own right, here I shall focus on decision-making.

From a cognitive point of view, incrementalism favours an interpretation of decision processes leaning towards incomplete knowledge and limited capacities, coupled with possibly shifting preferences. It also fits situations where large constraints are placed on the actors' degree of choice. In a society practicing slavery the issue from the point of view of the slaves is both grave and ideally requiring a quick, non-incremental move towards abolitionism. It is also likely a choice that is reasonably free of issue of limited knowledge. However, there generally are strong limitations imposed on the choices slaves can make. In this case, an incremental framework may be the most suited to the situation. Therefore, incrementalism is premised on actors facing both organizational and cognitive limitations and dealing with an uncertain and complex world (Knott, Miller, and Verkuilen 2003), about which they disagree. A way to get past these roadblocks is to try to simplify (rather than overcome) them. Incrementalism evolved over a long period of time. While Lindblom introduced it in 1953 (Dahl and Lindblom 1953:82-83), a complete outline would only appear in "Still Muddling, Not yet Through" (Lindblom 1979) where he distinguished three processes. *Simple incremental analysis* only deals with policies incrementally distant from the status quo. In *disjointed incrementalism* Lindblom bundled the methods he had previously generally called Incrementalism and that are noted above. Finally, *strategic analysis* includes the strategically defined pathways to simplifying complex problems.[1]

Incrementalism focuses on minimizing the impact of the inevitable mistakes of policy-makers, and recognizes that not all possible solutions are considered. Among the tools used to do so are a variety of shortcuts that include the use of rules of thumb, reliance on market forces, focusing on a few, select, policy options and limiting the range of decision to the immediate future (Lindblom 1959, 1968, 1979). The concept was progressively refined, reaching its final synthesis in Neoincrementalism where it is defined as a series of processes aiding decision-making by limiting analysis to familiar policies and to a subset of possible consequences, employing a trial-and-error approach, and tending towards problem remediation rather than positive goals. Furthermore, it is noted that incremental analysis has a tendency to both

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[1] There was debate about how effective "muddling through" actually was; partially this depended on the vagueness of the process and on the complexity of actually measuring it. Bendor (1995) proposed a formal model solving this issue. For an interesting modeling the effects of complexity and limited information on the decision maker, see Knott, Miller, and Verkuilen (2003).

conflate policy goals, values and empirical problems (rather than creating an ordinal sequence for them), and towards fragmenting analysis along the partisan spectrum, assigning to each actor a step in the problem (Weiss and Woodhouse 1992:256).

Criticism of incrementalism falls within five major categories (Redner 1993). First, it is contended that it lacks goal-orientation. However, this weak critique can be dispelled by even a brief review of the literature (Lindblom and Woodhouse 1993). A more serious charge is that it is inherently conservative, couching a pro-elite bias in its structure. It is true that incremental tools could be used to maintain the status quo. However, this does not seem attributable to incrementalism per se, but rather to the distribution of power in the system where decisions are made. Two critiques focus on the practical applicability of the model. The first is that it only fits stable, non-crisis situations. However, it is unclear why other approaches would have more success in this situation considering that crisis decision-making is unstable by definition. Second, incrementalism is said to be vulnerable to threshold effects. In this case, small marginal changes, which theoretically are easily reversible, cannot be if a threshold is crossed. Once again, this is a problem extending to all decision-making models, and not typical of incrementalism. Finally, it is charged that the meaning of incrementalism is confused. This is a concrete issue dependent on the fact that Lindblom was rather late in clearly outlining the meaning of the term, and on the latitude other authors granted themselves in applying it. Neoincrementalism successfully tackled this critique by distilling an acceptable definition, focusing the topic, and noting that incrementalism has three distinct meanings as an analytical tool, a disjointed incremental strategy, and a small-step approach (Weiss and Woodhouse 1992; Lindblom and Woodhouse 1993; Hayes 1992; 2001).

2.2. Synopsis

In the case of synopsis, cognitive frameworks tend to be much more goal-oriented rather than leaning towards a process orientation as with incrementalism. Therefore, they may be better suited where degrees of choice are not very limited or for situations where goal orientation is critical to, for example, resource mobilization. Advocates of synopsis define themselves as

"rational" (Arrow 1951; Downs 1957).[2] The synoptic approach assumes that decision-makers will be able to solve a problem through optimization. Ideally, when confronted with an issue, actors will identify all goals and values to an end, ordering them according to their preferences; they will exhaustively analyze all means and all possible consequences of every single decision. Finally, they will choose the option that maximizes the desired outcomes. This procedure will optimize policy outcomes because perfect information and rationality assure the best possible grounds for decision.

While some models incorporate both self-interest and expected utility maximization, which are tenets of rational behaviour, these are not synonyms for synopsis. The Rational Choice model, for example, does not necessarily involve a synoptic analysis: maximization of goals does not automatically mean optimization, and self-interest does not automatically lead to an exhaustive analysis of all the various options available to decision-makers. Synopsis satisfies the Western/Aristotelian requirements of rationality and efficiency; however, it suffers from relatively weak applicability. Even those who were looking for rational behaviour (Banfield 1973[1959]; Meyerson and Banefield 1955), were unlikely to believe in perfect rationality as a working principle in the day-to-day dealings of organizations, preferring to use it as a tool to give consistency to general policies and as a useful metaphor. Synoptic models fall short when trying to explain how people truly act, mainly because of the massive *a priori* burden that perfect information and economic rationality impose. Imagining individuals as self-interested utility-maximizers antecedent to and independent of groups, capable of assessing their values with sharpness and precision, fully informed, and completely rational, may help building a model of optimal decisions. It is harder to demonstrate that people are actually such. In this sense, synoptic models are already more in line with cognitive frameworks, rather than being descriptive analyses of how people actually go about making decisions.

2.3. Punctuated Equilibrium

Punctuated equilibrium is very much a step forward in the analysis of the process of decision. By the 1980s, the opposition between incremental and

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[2] There is little consensus on what constitutes rationality and on the degree to which it shifts from a certain period of time, or society, to another and so on. I shall not address this problem, focusing instead on the mechanics of synoptic decision-making.

synoptic models was increasingly looking sterile and a new and more sophisticated approach seemed necessary (Smith and May 1980) The most successful result came from the efforts of Baumgartner and Jones on budgeting, who empirically proved that dramatic change was routinely found throughout periods of incremental policy making so to speak punctuating them (Baumgartner and Jones 1993). While this analysis did not immediately extend to general policy making (Mortensen 2005; John 2003), it gave an important contribution to the field setting four critical points in policy analysis. These points are the expectation that policy analysis should be developed historically (Sabatier 1993), the agreement on the importance of political institutions (and of their policy subsystems) in reproducing policy (Howlett and Ramesh 2003), the link between change in the institutional setting and the occurrence of "paradigmatic" change (Deeg 2001), and finally the agreement on the external source of many paradigmatic changes that shake up existing, beliefs and practices, affecting extant actors and institutions (Thelen 2004). In such a milieu it became necessary to distinguish between the means and ends of policymaking and between abstract and concrete decisions if we wanted to correctly map policy and decision processes (Hall 1993). Hall (1993) argued for three orders of change. To *first order* change belonged the recalibrations of policy instruments, that fall within the scope of existing institutional and instrument boundaries. "*Second order*" changes affect dominant types of policy instruments utilized within existing policy regimes. Finally, "*third order*" changes represent shifts in abstract policy design. According to Hall first- and second-order changes tend to be incremental and to emerge as a result of activities endogenous to a policy subsystem. Instead, third-order changes are 'paradigmatic' being triggered, in the main by exogenous events. Punctuated equilibrium has become the new orthodoxy in policy making analysis and presents substantial advantages over both incrementalism and synopsis, and going beyond the sterile opposition between the two models.

In terms of the psychological structures that are involved in the processes of decision, it is interesting to note that while punctuated equilibrium does explain much of policy making without conflating the synoptic and incremental model it still leaves us wondering about whether or not the actors must necessarily change when paradigmatic shifts occur (which they may, but not necessarily do), or if the same actors must somehow adopt a frame of decision that they do not subscribe to. If the actors believe in synopsis why would they use incremental models? It is possible to look at the flexibility of the actors in terms of their capacity to analyze decisions through the lens of rational expectations. While punctuated equilibrium models go beyond the

rather counterproductive opposition between incrementalism and synopsis to develop a better policy-making model, there should be more attention paid to the framing phase of the decision process. I argue that, while a punctuated equilibrium approach may offer a better description of the process, it still leaves open the question of how to model the flexible framing that is often undertaken by decision makers and that appears to allow them to choose, according to the issue at hand, any of the models discussed up to now. I propose that in the framing of an issue and therefore at a time when decisions are made as to the best way in which to solve them and on how to mobilize the resources needed, actors employ a Rational Expectations-like model.

3. RATIONAL EXPECTATIONS: AN ALTERNATIVE FOCUS

I argue that, in selecting a model of decisions, actors follow a version of Muth's Theorem (Muth 1961). Here, I wish to use the model as a metaphor for a type of psychological orientation and not as a forecasting tool. In short, I argue that it allows policy-makers to look at issues and frames of action in terms of a flexible strategy. The theorem postulates that the expected and actual values of the variables we forecast tend to have a common mean value, therefore that they have the same probability distribution. This is its mathematical formulation:

$$_{t-1}X^e_t = E\left(X_t \,/\, I_{t-1}\right) + w \qquad\qquad (1)$$

The formula states that the subjective expected value of variable X at time t, calculated by persons forming their expectations at time t-1 [$_{t-1}X^e_t$] will be conditional on the expected value of X_t (variable X at time t) given the set of total information available at time t-1 [I_{t-1}] plus w which is a white noise error term.[3] This model incorporates uncertainty: not always will the rational

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[3] This means that the conditional expectations of the forecast error is zero, that is $E\left(w_t \,/\, I_{t-1}\right) = 0$ and that enjoys the *error orthogonality property*: it is serially uncorrelated with the information available to agents, given a one-period forecast horizon. Information gathered during period **t** will not be useful at period **t+1**. This is probably not true for political decision, because people form their expectations by relying on past behavior. Also, setting the expected forecast error at zero is an assumption that might not hold in policy studies. Regarding the introduction of a white noise error, there are issues in the social sciences regarding its use. For example, it is very complicated to separate white noise from the effects of the dynamics of the social systems' variables. However, this is once again about describing a frame of mind and not about providing absolutely correct modeling.

expectation of a variable be the expected mean value of the variable based on all available information. Despite its mathematical formulation the model is quite intuitive. When confronted with a decision, individuals will gather all *available* information (that is, rational agents will collect and use information to the point where the expected marginal cost of doing so and its expected marginal benefit are equal). They will then evaluate this information in connection with their goals and be aware that there will be some possibility of making an error. [4]

Advocates of incremental analysis tell us that decision-makers will be limited in their capacities: they will focus on I_{t-1} by limiting the amount and the kind of information to be gathered and will also accept w as an inevitable companion. This allows them to go forward with the process of decision but leaves a few uncertainties about the ultimate value of $_{t-1}X^e{}_t$. Synoptic actors, to reduce the complexity of the process, will assume the information they gather to be perfect and complete (the forecast error for I_{t-1} expected value would be so small to be negligible) and assume w to be tending towards zero itself. Notwithstanding the difficulty of actually getting perfect and complete information, it is problematic to set w at an expected value close to zero. Furthermore, synopsis sets the expected marginal benefit of further gathering information at an artificially high level to justify complete information and discards the possibility that systematic errors might be present in the expectations themselves. The strong assumptions made by synoptic models allow a much clearer picture of the value of $_{t-1}X^e{}_t$, but at the price of reducing the overall explicative value, just like the assumption of analysis limited to known paths reduces the value of the incremental one.

We face some long-standing questions: do policy-makers have one fixed model of decision they always use? Do they decide which model to apply according to some constraint or opportunity? Above I suggested that policy-makers use flexible decision-making strategies. The models shown above are different ways of addressing the process. Choosing one strategy over another is not solely reliant on the level of satisfaction with the outputs of a certain

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[4] As far as the rationality of the process is concerned, Benjamin Friedman's (1979:25-26) comment is still most pertinent:

> Much of the confusion surrounding the meaning of "rational" expectations is due to a failure to distinguish between (a) the general assumption that economic agents use efficiently whatever information is available and (b) a specific assumption identifying the available set of information. ... The specific information availability assumption … is that … people not only observe or know in advance the values of certain economic variables but also draw, on the basis of those known values, inferences which are identical to the inferences of the process actually generating the outcomes in question.

program or on the need to gain support. It also depends on the actors' cultural and ideological background, on the cognitive elements that help frame the issue, on the resource commitment actors are prepared to make, and on whether the policy is amenable to piecemeal implementation or not. For example, rational models stress clear decision-making paths, describe results as certain (as opposed to open-ended incremental procedures), and therefore may make resource mobilization and consensus building simpler. On the other hand, programs that only require fine tuning, or those for which there is not sufficient support for a broad restructuring, may be approached incrementally, by recognizing calculation and resource limits, and without "rock[ing] the boat, … stir[ring] up the great antagonisms and paralyzing schisms as do proposals for more drastic change" (Lindblom 1979:520).

Arguably, the immediate aims of most policy-makers will be the well-being of their constituency and their own re-election. If we start from the reasonable assumption that policy-makers are both value- and goal-oriented, rather than process-bound, it makes sense to argue that they use decision models as aids to policy-making, imperfect models of reality they can employ flexibly. A synoptic interpretation would yield the following reading:

$_{t-1}X^e_t =$	$E\,(X_t$	$/\,I_{t-1})$	$+\,w$
High capacity to determine its exact value	Pragmatic	Perfect or close to perfect information	Tends to zero

In an incremental setting instead, different weight and importance will be assigned to the variables within the formula.

$_{t-1}X^e_t =$	$E\,(X_t$	$/\,I_{t-1})$	$+\,w$
Limited capacity to determine its exact value	Ideological bias	Limited knowledge	Large and Complex

Both variants are valuable and can be adapted to the needs of policy-makers who are rarely engaged in value-free action. They can incorporate cognitive elements and be used for a dynamic analysis of decision-making while maintaining the unity of decision patterns. The rational expectations reading proposed here has the potential to go beyond this and to offer a frame to analyze the psychology of decision employed by policy makers, especially in the context of generating consensus or in aggregating resources.

Naturally, this does not exhaust the process of decision-making. Rather, it is a proposal aimed at the process of cognitive framing that all decision processes undergo. I would like to suggest that cognitive framing of the type shown here functions at two levels. First and more obvious, it is a reflection of the priorities and preferences of the decision-makers. The second facet of this process is directed to the public or to those who must approve of the decision in question. It is likely to be much easier to obtain resources and approval for upcoming policies if we present a clear roadmap for the solution of a problem that if we promise a muddle-through approach. if politics is, at least in part, theatre, the public seems more likely to respond better to a well laid-out plot that to improvisation.

4. THE CANADIAN UNEMPLOYMENT/EMPLOYMENT INSURANCE PROGRAM

Assessing the nature of decisions is always difficult, but if there is any value to the argument I propose, we should be able to find some evidence of the following processes. First, given enough resource availability, a change in policy orientation should generate a shift in policy strategy in programs indicated as unsatisfactory. The nature and depth of the shift would depend, among other things, on the amount of resources dedicated to it and on public support for the change. Also, it may be interesting to see if the administration of a program is held by a politically controlled unit or by a relatively independent one. I venture that synoptic approaches should fit better with independent agencies than with political control. Central bank policy is a good example. Third, if patterns of decision appear to be targeted at building consensus to stage successive policy change (i.e., if a government targets incrementally a policy that it has indicated as highly undesirable before using synopsis) we may also interpret this as an indication that decision-making models are used instrumentally as flexible aids to policy-making. Finally, we should expect large changes to be framed in synoptic notions if I am correct in assuming that the latter help justify the change in policy and the mobilization of resources.

In Canada, the Unemployment Insurance (UI) program has a long history starting in 1940, with the Unemployment Act. However, here I focus on the period beginning in the 1970s, when a newly structured system was implemented. Rooted in the paper *Unemployment Insurance in the 1970s*

(Government of Canada 1970), the Unemployment Insurance Act of 1971 sought to provide support to workers during a temporary interruption of earnings. The approach was Fordist in its universal coverage, but also emphasized returning the unemployed to the labour force as quickly as possible; program management and the supervision of its implementation was largely left to the Unemployment Insurance Commission (UIC).

Of particular importance within this program were the provisions for women, including maternity leave, which were achieved through the pressure of women's groups as second wave feminism challenged a strong gender bias within Canadian politics (Finkel 2006; Porter 2003).

Employers and employees paid (at different rates) into the program, which calculated contributions and benefits as a percentage of insurable earnings.[5] The ceiling for the latter, as well as the premium rates, was to be reviewed each year to keep pace with economic fluctuations such as increases in average income and raising cost of living. This very early stage of the program was marked by both economic and ideological shifts. From a practical point of view, the economic contraction of the early 1970s changed the material parameters of program affordability and resulted in the hyper attention dedicated to perceived abuse. In the mid-1970s, the introduction of an actuarial approach in the UI discourse buttressed emerging notions of fiscal prudence and helped shape the future debate on the issue.

While trade unions and the left supported Unemployment Insurance, and tended to dismiss talk of abuse and 'bad risk' as part of a neoliberal strategy to weaken the program, they were unable to make broad inroads in the public opinion. By the mid 1970s, economic and political conditions had changed. Monetarism began to challenge Keynesian policy, unemployment became both long-term and structural, and an increased misuse of the program all resulted in a growing financial commitment that the federal government had not planned and that it became less and less willing to pay for.

However, Ottawa was not prepared to renounce its goal of universal coverage of the labour force just yet. An incremental increase in both premium rates and the minimum insurable earnings reduced the growing financial burden; still, costs went up. A 1974 public opinion survey showed that Canadians agreed that UI fulfilled a basic social need, even if over one third of

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[5] Basically, the amount paid was expressed in terms of the insurable earnings ceiling and a rate per hundred dollars. The contribution in dollars could be expressed as:

$$(\text{insurable earnings}/100)* \text{ premium rate}$$

Rates for employers have been higher that of employees since the 1971 Act. Previously they had been the same.

respondents also believed that tougher rules were needed to eliminate abuse. The following year, partially in response to this poll, the federal government implemented various changes that were expected to have decremental effects on the program. This was done mainly by limiting coverage and by introducing tougher qualification rules. At this point, an "actuarial philosophy" began to surface (Pal 1988a). The feeling that requirements were too loose brought about the notion of actuarial soundness, a very convenient tool for manpower officials who wished to reform the program in the face of austerity. By championing cuts to UI, they could use the savings they generated for job creation purposes. At the same time, the Unemployment Insurance Commission's scope was reshaped. It now was entitled to operate on negative labour market policies. Positive policy was made outside of the Commission, which itself stated that it would prefer a program with less welfare aspects (Government of Canada 1974). By 1976, government priorities for UI had shifted to finance restraint, which is not surprising considering that benefits payments had reached $3.3B. This was considered unacceptable. Incremental legislative and regulatory changes were implemented to better balance the program. However, this strategy did not satisfactorily solve the situation. Major changes were needed.

As Leslie Pal (1988b:115) noted, the government felt that "UI benefits were being received by people with only marginal attachment to the labour force and that those benefits were all too generous." The federal government now wanted to better control the program. To do so it would have to deal with the Unemployment Insurance Commission. At the beginning of the 1970s, the UIC was able to work with a considerable degree of detachment from political pressure. The federal government perceived this independence as dangerous when the program began to require substantial contributions. Opposition existed against these changes and Bill C-27 finally passed in the House of Commons on August 5, 1977, but only under closure. It favoured job sharing and work creation over monetary transfers in the form of UI benefits. [6] It also reshaped the bureaucratic structure of the program by creating the new Department of Manpower and Immigration.

The UIC was renamed Canada Employment and Immigration Commission. It had long been evident that the Department and the Commission had to work together to optimize the program. The final amalgamation brought about a structure where the Deputy and Associate

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[6] Both labour (Morris *et al.* 1977) and business organizations were opposed to UI changes. The former because of the cuts, the latter because they did not go far enough.

Deputy Ministers of the Department were also Chairman and Vice-Chairman of the Commission itself, virtually putting the control of the Commission in the hands of the Department, and reducing the possibility of conflict in the area. This very important reform ended a period during which the Commission had kept the Unemployment Insurance program, more or less, away from political pressure. Both the federal government and the public continued to perceive UI as too weak on job creation and not setting strict enough entrance requirements. These were raised in 1978 and further changes in that direction were suggested in the early 1980s, but the 1980-1983 economic recession prevented their implementation. Philosophically, the modern UI program, born and "firmly embedded in an organization largely focused on labour market development … by 1981 had been absorbed into an employment perspective" (Pal, 1988b:134).[7] By adjusting incrementally both the levels of premiums (the tax imposed on employers and employees) and the level of maximum insurable earnings (the taxable base) the federal government was able to reduce the percentage of money it contributed to the program.[8] These increasingly restrictive policy changes came at a time of economic downturn and protests were voiced throughout Canada, but especially in the Atlantic Provinces and in Quebec, where unemployment had soared. While these protests were generally relatively weakly organized, they tended to be stronger and more unifying where unemployment was a bigger issue. By the end of the decade, the group Action-Chômage in Quebec was trying to create a network of workers and actively counselling unemployed people who could not collect UI.

In May 1980, a survey found that most Canadians approved of the program and only 26% of those interviewed were concerned about it. However, public opinion in general seemed to support a tightening of program requirements. More radical changes, which reflected the emerging neoliberal

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[7] However, there were counterpoints to this neoliberal approach. In the 1980s, the Supreme Court of Canada rendered two important decisions noting how the social goal of the UI program to pay benefits to the jobless should be interpreted liberally (*Abrahams v. Canada (A.G.)*, [1983] 1 S.C.R. 2.) especially because of the mode of financing that saw shared contributions based on an insurance model (*Hills v. A.G. Canada*, [1988] 1 S.C.R. 513). Ultimately, though, the program succumbed to a neoliberal perspective.

[8] This is a very important trend. Although it encompasses some non-incremental steps (namely the decisions of the early 1990s) it has a incremental pattern leading to a progressive build up that strongly modifies the program. Notice that there we have two, different, levels. On the one hand, there is the 'philosophy' of the program, on the other there is its implementation. Broad changes at the former level generally trigger similar changes at the latter one but this is not always true. If a government can operate over the long-term, it might prefer incremental implementation.

political agenda, took place after the Liberals lost power in the 1980s. The new Progressive Conservative government could not immediately make large structural changes to the UI program because its top priority was the dismantling of the National Energy Program, but it implemented many incremental decisions aimed at fine-tuning and monitoring its development. In 1982, as unemployment rose to about 13% nationally, labour organizations began lobbying heavily to strengthen (or at least maintain) UI. They would ultimately be unsuccessful. The decisions of the mid-1980s were taken in an effort to fit the program within neoliberal parameters. Developed in a period favourable to inclusive welfare programs and social solidarity, UI was now being modified to respond to changing ideological and material conditions and came under greater scrutiny. We should note that three separate ideological realities existed. The governing party was fully committed to a neoliberal shift as was at least a majority of the business community; in opposition to this solution stood many salaried workers, trade unions and advocacy groups. An intermediate position was occupied by a large cross-section of Canadians, who were in favour of an unemployment insurance program, but believed that it should be more strictly regulated. Protection for the unemployed, though, remained a broadly supported policy. In 1984, when the Conservatives attempted to further tighten the requirements of the UI program they faced significant opposition. The reaction in Quebec was particularly negative. A broad-based coalition of all provincial trade unions, seniors, women groups, and welfare advocates coalesced in Solidarité Populaire Québec.

In 1985, the federal government introduced the Canadian Job Strategy. Minister Flora McDonald (Government of Canada, 1985:1) announced that it was to be a "complete redesign of the government's labour market programmes and a fundamental change in the way we develop and invest in our most important resource - the people of Canada." Training and job creation became a top priority and were designed to favour the business sector. While codified in 1985, the guidelines of the Canadian Job Strategy were already surfacing in previous years, and allowed the federal government to reduce expenses and legitimize the new neoliberal approach (McBride 1992:149-154).

Always in 1985, Prime Minister Brian Mulroney created the Forget Commission to evaluate the program. Unable to find a common ground between its labour and neoliberal souls, the Commission put forward a minority and a majority report. Some of the majority report's proposals would have radically restructured the program and had a synoptic flavour. While these were considered far too strong and little actual change was implemented,

the Commission had the effect of structuring a specific vision of the UI program in a direction favourable to the neoliberal agenda. The majority report argued that the system had to drop most of its regional features and that it should become financially self-sufficient (Campeau 2005:103). Aided by a now favourable economic cycle, the Federal government managed to continue incrementally substituting Keynesian principles with neoliberal ones and shifting the financial burden towards the private sphere and away from the public one. Many of the changes in the plan's philosophy were tied to a broader shift in the political discourse from the social state to neoliberalism (Campeau 2005:xi). Yet, there was not the degree of support needed for major revisions.

In the 1970s and early 1980s, the wide inclusiveness of Unemployment Insurance, combined with a tough job market, created a bulk of frequent users who relied on the easily accessible money the program provided. Year after year, a well identifiable part of the labour force worked for the minimum number of weeks needed to be eligible and then collected benefits. In the mean time, they were slowly but consistently sliding out, or at the margin, of the labour market (Corak 1994; Green and Riddell 1992). The new program targeted job-creation, to recover at least part of this workforce by providing them with new, marketable skills.[9]

By the end of the 1980s, much of the gains embedded in the 1971 Bill had evaporated. For women, while access to the labour market had become easier, equality had not been achieved. Furthermore, the shift towards neoliberalism meant a financial and ideological withdrawal from notions of equalization and solidarity. It also meant the progressive dismantling of the ability of social and advocacy groups to have their voice heard by government (McBride 1992; 2005). This can be exemplified by the elimination of the Canadian Advisory Council on the Status of Women (CACSW) in 1995 (Porter 2003) and by progressively diminishing returns provided by lobbying and action in the area of unemployment. The situation was mirrored in the failure of labour to hold on to any important element of the original UI program.

UI was slowly eroded and major changes were carefully staged. Implementing a decremental approach when public opinion still supported the program, and backing it with ideological legitimization provided solid ground

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[9] Some of the problems the program faced depended on the nature of the job market and from a poor choice of control variables. Issues like the cross-sectorial redistribution of money from firms with stable employment to those with unstable employment (Kerr 1994) or the change in the behaviour of some of the unemployed, who began using the program as a second salary, were unintended consequences.

from which to launch nonincremental changes when favourable ideological pressure was strong and the economic situation was good. The steps taken with the 1990 and 1996 legislation cannot, by any means, be considered incremental. Since then, no substantial change has occurred in the policy even as premiums began to decline and so-called break-even rates were progressively implemented.[10] In 1990, policy-makers did not face a very organized or strong resistance, neither from the bureaucracy, which was virtually under control, nor from labour groups, while business groups were very vocal in their demands for substantial change. On 18 November 1990, a new regime became effective for the Unemployment Insurance program. It prescribed that by the end of 1992 the federal government would have terminated its already progressively diminishing contributions to the UI funds. It redirected part of that same contribution towards reskilling and related activities. In addition, the number of weeks needed to qualify for benefits was increased and the maximum number of collectable weeks of benefits linked to the regional unemployment rate was reduced. A reduction of the benefits themselves was decided along with an increase in the disqualification period for those who left a job without just cause.

The Liberal Party returned to power in the 1990s, but very little changed in the direction of the policy. The Hon. Lloyd Axworthy, in the 1994 paper *Proposed Changes To The Unemployment Insurance Program* (Government of Canada 1994), clearly stated that previous adaptations had been only the initial phase of a broader and more radical reform of the whole social security system. The paper *The Need For Change* (Government Of Canada 1995) argued that UI had been created under very different job market prospects. Employers had to be discouraged from planning their hiring practices around unemployment benefits and workers from using them as a second source of income. Escalating costs, neoliberalism, and the end of Fordism, had radically changed the policy field. In an attempt to correct what were now perceived as program's distortions, The Employment Insurance Act (1996) introduced important changes.

The new program, renamed Employment Insurance, under which the Commission was renamed Canadian Employment Insurance Commission (CEIC), focused squarely on reinserting Canadians in the workforce. Its guidelines were productivity, efficiency, and more attention to the needs and requirements of business. The new government also simplified the program's

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[10] How effective these rates are remains open to question. As of 2004, the EI account surplus exceeded $46 billion and the program had not had a cumulative deficit since 1995 when it posted a $666 million surplus (Government of Canada 2004).

structure: five results-oriented employment benefits replaced 39 centrally-controlled programs. As of July 4th 1996, the program's benefits schedule was amended to improve the link between length of work and duration of benefits.

Other changes touched the nature of eligibility, which was now calculated on the basis of the total amount of worked hours. The qualifying period was fixed in 52 weeks and remained tied to the regional unemployment rate, eligibility requirements were raised to a minimum of 700 working hours per year. This was a steep increase over the previous model based on worked weeks, during which a person would have to work a minimum of 15 hours per week. The harshest requirement, 910 hours, was set for a re-entrant or a new-entrant. This had a deeply negative effect upon part-time workers (many of them women), who were included in the job market but often in marginal ways and were still expected to deal with a classical division of gender roles (Porter 2003) and for whom retraining did little (Griffin-Cohen 2004).[11] Some protests were voiced, but they had little real effects. Between 1990 and 1996, a reduction of the benefits for frequent claimants was also implemented in an attempt to force Canadians to ask for benefits only if they were in real need. The most interesting and revealing part of the EI guidelines was the one concerning the commitment that benefits recipients and those involved with other measures specified in the program had to show. This involved achieving the goals of the assistance, taking primary responsibility for identifying their employment needs, locating services necessary to allow them to meet those needs and, if appropriate, sharing the costs of the assistance.[12] The following years are an example of broadly incremental decisions, and of fine-tuning of a workfare program. Bill C-2 in 2001 continued the process of reduction of the EI program even as it implemented some small extension of coverage. It also allowed Ottawa to use the large surplus in the EI account against the federal debt (Campeau 2005:182). However, in 2002, there was a change in the way in which premiums were set. The Governor in Council was given the direct duty to set the EI employee premium. The new goal was to focus the premium setting process on expert, independent advice and to achieve a break-even rate.

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[11] While the Canadian welfare state never showed gender equality of the type found in Scandinavia, the changes that were introduced as a reflection of neoliberal policies have a strong retrenchment flavour in terms of gender issues. This topic is not explored here because of space limitations, however an excellent treatment can be found in Anne Porter's *Gendered States* (2003).

[12] Consider the progressive drift that occurred at the Provincial level with income support program of which the Gosselin case was a concrete example [*Gosselin v. Quebec (Attorney General)*, [2002] 4 S.C.R. 429]. The changes to the UI/EI program are just one facet of the strategy to change the model of income security in Canada (Battle 2001).

The Budget Implementation Act of 2005 enshrined the latter principle into law by giving CEIC the responsibility to set EI premiums every year and independently. However, considering the strong workfare flavour of the program, the commitment to break-even rates, and the fact that the maximum limit to yearly changes in the premium is 0.15%, it is questionable that the CEIC decision could stray very far from the current policy path.

5. CONCLUSIONS

While it is perhaps impossible to reach a definite conclusion, some interesting points emerge from an analysis of the Canadian employment benefits program. First, changes in the political outlook (especially the onset of neoliberalism) deeply affected the overall direction of the policy process, creating consensus at the metalevel on the goals of the policy (Jones, True, and Baumgartner 1997). Second, the history of the Commission seems to indicate that elected politicians wanted to increase their ability to directly control the program when it did not perform as they wished. The shift that in 1977 brought the Commission under the control of the ministry effectively achieved this result. Even the increased latitude granted to the CEIC cannot match the initial freedom of the UIC. This choice was certainly aimed at 'rationalizing' the program, but also at ensuring that the federal government would be able to control the direction of the policy process (and the program's mushrooming costs). Whether this meant a move away from synopsis is difficult to say; however, increased political control is likely to lead to increased responsiveness to political pressure rather than rational optimization.

A synoptic framework is often used when calls for broad changes are made as with the 1985 Canadian Job Strategy. In a variety of occasions, the program exhibits a tendency to rely on patterns of incremental decisions aimed at setting the stage for more radical policy-change.[13] This is not exceptional because legitimation is an important part of policy-making, but it does suggest that policy strategy, in the eyes of policy-makers, affects the public's perceptions. Taken together, these factors suggest that policy-makers may understand decision-making models instrumentally and may apply them

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[13] In this sense, the mixed-scanning strategy while depicting the alternation of incremental and major decisions missed part of the point: incremental decisions are not used solely to fine-tune a major decision that preceded them, but may also come before a synoptic change to build support for the latter and weaken an existing program.

flexibly according to both framing constraints and a pragmatic outlook that is value- and goal-oriented, rather than being defined by the process of decision.

It also seems, but more research would be needed to reach a more definite answer, that an incremental process may be used when a program enjoys popular support in order to erode its tenets. On the other hand, major non-incremental changes appear to have been staged, in the case of UI/EI, when policy-makers faced little opposition on the topic as one would expect. If this pattern was to hold in more cases, it would indicate that a flexible strategy of decision may be very attractive for policy-makers, allowing them to optimize their policy approach to the current level of public support while not relinquishing all together its general direction by alternating small decremental steps and larger non-incremental ones.

The process of change and conflict that imbued unemployment policy in Canada for the past four decades has been complex and multi-layered. It involved labour organizations, women groups, bureaucratic units and, of course, individual Canadians in a shift from Canadian-style Keynesianism to Neoliberalism. Each actor reacted differently to the policy changes that marked the issue, but a few general comments can be put forward. All groups experienced a reduction in their power and ability to influence policy-making as neoliberal politicians solidified their grip on fiscal policy, ideological priorities, and as the neoliberal small state introduced an arms-length approach to social and political demands from advocacy groups (McBride 1992). While opposition was at times spotty, during the 1970s and early 1980s it was also relatively effective. This effectiveness drops quite remarkably starting in the mid-1980s with the consolidation of the workfare models and the refocusing of employment policies from full employment to monetarism and the acceptance of a non-accelerating inflation rate of unemployment of about 8% in Canada. Since the 1990s, opposition to this retrenchment became less and less efficacious and common.

There is no doubt that the framing of policy decisions is a very important part of understanding the policies themselves. It is also clear that even from a cursory review of governmental activities that policy-makers deal with both synoptic and incremental models. This, I argue, can be explained by understanding this behaviour as being based on a flexible framing strategy. This framing tool helps decision-makers to simply the realm of choice and can also be used to make resources accretion and mobilization easier, as well as being an important tool for legitimizing choice. Assessing the nature of decisions is always difficult, but if there is any value to the argument I propose, we should be able to find some evidence of the following processes.

First, given enough resource availability, a change in policy orientation should generate a shift in policy strategy in programs indicated as unsatisfactory. The nature and depth of the shift would depend, among other things, on the amount of resources dedicated to it and on public support for the change. It would also matter if new resources needed to be mustered for the policy. Also, it may be interesting to see if the administration of a program is held by a politically controlled unit or by a relatively independent one. I venture that synoptic approaches should fit better with independent agencies than with political control. Central bank policy is a good example. Third, if patterns of decision appear to be targeted at building consensus to stage successive policy change (i.e., if a government targets incrementally a policy that it has indicated as highly undesirable before using synopsis) we may also interpret this as an indication that decision-making models are used instrumentally as flexible aids to policy-making. Finally, we should expect large changes to be framed in synoptic notions if I am correct in assuming that the latter help justify the change in policy and the mobilization of resources.

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Chapter 3

STRUCTURING THOUGHT: AN EXAMINATION OF FOUR METHODS

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ABSTRACT

A fundamental thinking skill is the ability to see the structure of thought. Awareness of the structure of thought begins with an intuitive description of the elements and relations that constitute a decision-making process and a description of the relationship between the structure and function of thought. Regardless of how one judges the quality of everyday decisions in light of the goals being pursued, it is useful, as a first step, to construct a structural map of everyday decision-making processes. This allows for objective analysis of everyday decisions and it enhances structural awareness in those who map the thinking process and in those who read the maps. The same applies to scientific thinking. Scientists advocate a particular position in the academic field and explicit mapping of their arguments enhances structural awareness, critical comparison and evaluation, and communication in the field. Overall, the mapping of decision making is a worthwhile goal, a skill that is becoming increasingly prominent and even necessary as part of expert decision making in many fields of applied science. This chapter presents a case for

the cultivation of graphicacy skills in this context. We describe four thought mapping techniques that offer considerable power and potential to elucidate and enhance thinking and decision making abilities. We suggest that technological advances may allow us to merge various different though mapping techniques and further enhance an interdependent set of graphicacy skills that may help to support decision making and adaptive action in context.

INTRODUCTION

In an ideal world, and with the right kind of education, we may well progress from lower-order, irrational thinking to higher-order, rational thinking (K. W. Fischer & Bidell, 2006; Piaget, 1955), but this does not prevent us from reasoning to different conclusions, different theoretical orientations, different worldviews, and different decisions for action (Coan, 1968; Koltko-Rivera, 2004; Warfield, 1995). Even if one assumes that irrational thinking and rational thinking can be distinguished by reference to a quality judgment, the structure of thought itself, in everyday usage, when mapped – a combination of reactive, quick, heuristic, holistic (system 1) thinking, and reflective, analytical, deliberative, procedural (system 2) thinking – looks much more fluid and subjective than the advocate of objectivity and restrictive rationality daily dreams about (P. Facione & N. Facione, 2007). Ultimately, the flow of thought in human systems is very dynamic and variable, and the only way to truly understand the shape of human thought is to observe the thought and map the shape observed.

Thus, when it comes to understanding human thought we should begin our analysis of the phenomena as we would any other phenomena – we should begin with wholehearted objectivity, and simply describe what we see. We may wish to use our science of human thinking to enhance our ability to make *good* decisions and act in a *reasonable* way. Nevertheless, prior to evaluating what is *good* and *reasonable* in the field of thought and action, the thinker does well to see clearly – perceive without pre-judgment – the phenomena under investigation. To this end, in this paper, we will briefly describe four thought mapping techniques, each of which highlights different aspects of individual and group cognition and each of which can be usefully applied in a variety of contexts.

We begin with a description of argument mapping and focus specifically on mapping arguments using Rationale™, a software package developed by

Tim van Gelder and colleagues. We draw attention to research findings which suggest that training in argument mapping enhances critical thinking skills in students (van Gelder, Bissett, & Cumming, 2004), and we suggest ways in which this line of research can be developed. Next, we describe the method of Argument and Heuristic Analysis (P. Facione & N. Facione, 2007) and examine the value of mapping not only the arguments people use but also the heuristics (or cognitive shortcuts) they use. People have limited time and energy and the mental shortcuts they use to save time and energy have a significant effect on the quality of their decision making (Gilovich, Griffin, & Kahneman, 2002). In our view, the move from argument mapping to argument and heuristic analysis involves a natural progression: new avenues of basic and applied research are opened up by virtue of the move. Next, we consider the Lectical™ Assessment method of analyzing the structure and complexity level of arguments and we draw attention in particular to the challenge and potential value of carrying out a structural analysis of argument complexity. Finally, we point to the challenge of collaborative cognition and, in particular, the challenge of constructing a structural map of the collective thinking process that guides collective action. We describe Interactive Management, a systems science thought mapping method that allows a group of people to work together to think about and solve complex problems (Warfield, 1974, 2006; Warfield & Cárdenas, 1994). Notably, all four methods involve the use of visual representations that elucidate the structure of thinking and decision making activity. Thus, before describing these four techniques it will be useful to provide some historical and contextual background on the rationale for using systems of visual representation (or graphacy skills) to enhance awareness of the structure of thought.

A BRIEF HISTORY OF GRAPHICACY

Perhaps the most famous pedagogical interaction in history takes place in Plato's *Meno*. Socrates, concerned about the nature of learning and knowledge, questions a young slave boy about the most basic principles of geometry. The exchange hinges upon Socrates literally drawing a set of figures in the dirt at their feet. He *displays* the concepts they are considering. The slave boy is rendered knowledgeable as he explicates the ideas implicit in the Socratic graphic-designs. So begins a long and important relationship between philosophical inquiry and graphicacy—the use and understanding of figures,

graphs, concept-maps, and other representational devices. The strong claim endorsed in this paper is that this is a non-trivial relationship. Forms of graphical representation facilitate unique and important insights, which can be had no other way. Philosophers, among others, need these representational devices. And while many have deployed them, some have openly confessed dependence.

Take for example, Petrus Ramus, the influential 16th Century philosopher, pedagogue, and logician whose work shaped the teaching of logic for over one hundred years. As Walter J. Ong (1958) has shown, Ramus's work and influence was directly related to the development of the printing industry and his insights about the visual presentation of materials on the printed page. Ramus explicitly addressed the importance of the spatial arrangement of tables and text, seeing it as an integral part of the logical and pedagogical economy of his work. That is, he saw the arrangement of signs on the page as more than a matter of taste, and began the modern printing practice of combining tables, figures, and text. This attention to the non-arbitrary logic of graphical representations resulted in that his influence was not only on what people thought, but on how people displayed their thinking (Ong, 1958).

A less obscure example is John Venn, the inventor of the Venn Diagram, whose concerns for graphical representations of logical relations have had a wide-ranging impact to this day. He understood his diagrams as more than a mere heuristic (Venn, 1881). On his view, the search for new representational devices is part and parcel of the search for new ideas. Along these same lines, Charles S. Pierce, inspired by Venn, developed alternative modes for representing logical relations, a system that looked more like concept-mapping than propositional calculus. Peirce's existential graphs, unlike Venn's diagrams, were built as a comprehensive system of logical expression (Peirce, 1933; Shin, 2002). Peirce, like Venn and Ramus, reflected explicitly on the benefits of some graphical systems over others and on the non-trivial relation between graphicacy and philosophical inquiry, claiming that we need to build representational devices—moving beyond linear text—in order to prove some of the most important ideas in philosophy and logic.

More recently, John Warfield (2002, 2003; 2006; discussed further below) and Robert Brandom has echoed these sentiments about the primacy and importance of graphicacy in philosophy and science (Brandom, 2008). Brandom invented a concept mapping system to represent the innovative mode of formal pragmatic analysis he endorses, claiming that the logical insights it yields cannot be seen another way. Warfield claims, with explicit reference to Peirce, that some forms of communication and inquiry are *dependent* upon a

mixture of figures and text, which disclose complex logical relations while also having clear information processing advantages. Importantly, Warfield draws upon psychological research to show the importance of new forms of graphicacy in handling the increasingly complex task demands of post-modern decision-making contexts.

This brings us to the thrust of this paper. We believe that the guiding insight of the linage traced above is an important one. New forms of graphicacy make possible new forms of philosophy, inquiry, and decision making ability. We think new methods have emerged over the past decade that will make it possible to advance knowledge through the explicit and problem-focused deployment of concept-dissecting, decision-process explicating, graphically robust representational devices. And we think that these new graphical systems do more than serve as heuristics. If they are built and used correctly they can make things explicit that would otherwise remain implicit. Yes, they can relieve working-memory load and help organize conceptual spaces for collective consideration, but, so the strong claim goes, they can also expose structural properties of decision-making processes or domains of knowledge to which we would otherwise be blind. They are part of thinking, not merely an aid to it. Thus, part of the exposition that follows is a call to reconsider what thinking is, and a call to expand common-sense notions that it only goes on between our ears.

ARGUMENT MAPPING WITH RATIONALE™

The method of argument mapping is grounded in the assumption that, when deciding what to believe or what to do, we generate a series of reasons and objections that either support or refute a specific belief or a specific course of action. We then weigh up each of our reasons and objections, and we arrive at an overall evaluation, ultimately, a decision. Argument mapping itself does not call for any decision to be made, and mapping our arguments using argument mapping software does not necessarily make it very *easy* for us to decide what to believe or what to do. Nevertheless, argument mapping does help us to structure our arguments and thus begin to analyze and evaluate our arguments.

Consider trying to decide whether or not you should buy a dog. You like dogs, but you do not want to make a decision too quickly. You want to think

about it for while. You want to think carefully about your decision. Three important questions for you to consider in this context are:

1. What kinds of things might you think about to persuade yourself that buying a dog is a good idea?
2. What kinds of things might you think about to dissuade yourself: buying a dog is not a good idea right now?
3. How will you arrive at a final decision in this context?

In answer to questions 1 and 2, you might generate the following thoughts: "I should buy a dog, *because* I've always had dogs and I love them; *because* dogs are peoples' best friend; and *because* I can go out walking every evening, keep fit and meet other people with dogs. *But* walking my dog every evening will mean I cannot pursue my new hobby (sailing); I'll also feel guilty if I'm forced to leave my dog alone in the house all day; and a new dog would be expensive and I'm really short of money right now". In this example, we have three reasons and three objections, all of which, presumably, impinge upon the decision-making process. In answer to question 3 above, we can assume that a rational person will arrive at their final decision by weighing reasons (*Because dogs are peoples' best friend, etc.*) against objections (*But a new dog would be expensive and I'm really short of money right now, etc.*). The rational person may also be compelled to delve deeper to discover a solid foundation for any given argument. For example, what is the basis for our belief that dogs are peoples' best friend? Figure 1 illustrates one way in which we might support this belief.

As we continue to go deeper, seeking to build an increasingly solid foundation for our beliefs, the argument map we build in Rationale™ will adopt a pyramid-like structure, with more and more layers of reasons, objections and rebuttals expanding at the base of our central claim. For example, if we were to fully support the belief that *Dogs aid people's mental wellbeing* (one of the reasons provided for why we believe *Dogs are peoples' best friend*), we would need to argue the case beneath and point to the research studies that confirm this belief.

More generally, at the basis of every argument are propositions that draw upon different sources of knowledge, be they conclusions drawn from experimental or quasi-experimental research, survey research, case studies, authority/expert opinion, anecdotes, common sense, personal experience, etc. Rationale™ is designed such that different argument types can be labeled

using discrete icons. This helps the analyst to assess, at a glance, the overall quality and quantity of evidence presented.

Rationale™ is well suited to mapping arguments presented in dialogue or prose format. Arguments can be *translated* from text to map[1] and the logical strength, soundness, relevance, and non-circularity of arguments can be evaluated. Working with arguments maps is potentially beneficial. For example, research suggests that students who study argument maps remember more of the core arguments than do students who study homologue texts (Dwyer, Hogan, & Stewart, 2009). Furthermore, research conducted by Tim van Gelder and colleagues reports that semester-long training in argument mapping (i.e., building argument maps and evaluating argument maps) produced significant gains in critical thinking skills as measured by the California Critical Thinking Test (van Gelder et al., 2004). However, this study did not include a control group. Randomized controlled trials are needed to better examine argument mapping as a critical thinking training intervention. Part of the design of these studies might be to focus on the process of skill development, for example, by tracking the ability of students to develop increasingly coherent and integrative text-to-map argument translations and evaluate weaknesses, strengths and routes to enhancement of argument structures. A related objective might be to evaluate the relationship between this developing skill and a students' ability to engage with increasingly complex arguments in the context of dialogue and collaborative cognition. Also needed are studies that compare the merits of argument mapping training with those of other more traditional methods of enhancing structural awareness, for example, via training in the technique of hierarchical summarization, a text-based argument structuring technique.

ARGUMENT AND HEURISTIC ANALYSIS

As noted earlier, the structure of thought, when mapped, is much more fluid, reactive, intuitive, and holistic than advocates of objectivity and restrictive rationality may hope for, and the method of argument mapping

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[1] In fact, for the purpose of education in the technique, once students become familiar with the principles of argument mapping using Rationale, these text-to-map translation exercises are an excellent way to reinforce the ability to *extract the structure* of an argument from a text (e.g., an interview transcript, a journal article, a book chapter, etc.). This is the first step prior to fuller analysis and evaluation of the overall argument structure.

needs to be supplemented with a method that helps us to analyze both the arguments *and* the heuristics that people are using when they are trying to decide what to do. *Heuristics* are cognitive shortcuts that speed the decision making process. However, heuristics also delimit the application of more thoroughgoing reasoning. Facione and Facione (2007) highlight 14 distinct heuristics (see Table 1), often used in parallel, which can influence decision making in a variety of different ways, depending on the situation. Facione and Facione (2007) show how to use interview techniques to gather data about real human decision making episodes. They describe a method of data mapping and data analysis that enables an empirical analysis of human decision making.

Two important features of thought mapping using the method of Argument and Heuristic Analysis are: first, the sequence of thoughts as they unfold over time in the interview is maintained in the map (i.e., a numbering system is used); second, different types of thoughts – ideas, reasons, or claims; implicit (non-verbal) ideas; heuristics; watershed ideas, counterarguments, abandoned argument strands, and decisions – are represented on the map using different graphics.

Table 1. Heuristic Maneuvers and their Reasoning Disadvantages

Name	Cognitive Maneuver	Disadvantage/Risk
Satisficing and temporizing	Given an option that is good enough, decide in favor of that option	Good enough may not be best
Affect	Take an initial stance in support of or in opposition to a given choice consistent with one's initial affective response to that choice	Feelings may mislead
Simulation	Estimate the likelihood of a given outcome based on one's ease in imagining that outcome	Over-estimation of one's chance of success or likelihood of failure
Availability	Base the estimate of the likelihood of a future event on the vividness or ease of recalling a similar past event	Mistaken estimations of the chances of events turning out in the future as they are remembered to have turned out in the past

Representa-tiveness - Analogical	Infer that because this is like that in some way or other, it is like that in relevant ways	The analogy may not hold
Representa-tiveness – Associational	Connect ideas on the basis of word association and the memories, meanings, or impressions they might trigger	Jumping from one idea to the next absent of any genuine logical connection and drawing inaccurate inferences from the combined thought process
Generalizing from One to All	From a single salient instance draw a generalization about an entire group	The one may not be representative of the many
"Us vs. Them" Dynamic	Reduce problems to a simple choice between two opposing forces	Conflict which excludes reasonable compromise
"Master – Slave" Power differential	Accept without question a problem as presented by or a solution as proposed by a superior authority	Working on the wrong problems, applying a mistaken solution
Anchoring with Adjustment	Having made an evaluation, adjust as little as needed in light of new evidence	Failure to reconsider thoroughly
(Illusion of) Control	Estimate the level of control you have over the actual outcome of events upon the amount of desire or energy you put into trying to shape those events	Over-estimation of one's power to control events or under-estimation of one's actual responsibility for what happened
Elimination by Aspect	Eliminate an option or group of options from consideration upon the discovery of an undesirable feature	Failure to give full holistic consideration to viable options
Risk and Loss Aversion	Avoid the foreseeable risk of sustaining a loss by not changing the status quo	Paralysis of decision making stuck in the deteriorating status quo
Zero-out Tendency	Simplify decision contexts by treating remote possibilities as if they are not even possibilities	Failure to appreciate the possibilities that events could actually turn out differently than expected
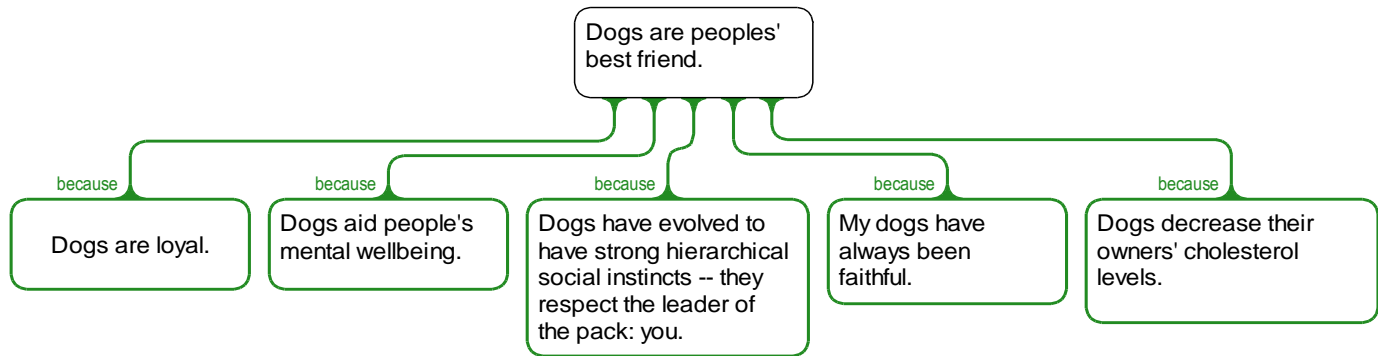
Figure 1. A simple two-level argument map (built using Rationale™) illustrating a set of reasons we might generate in support of our belief that 'a dog is a person's best friend'.
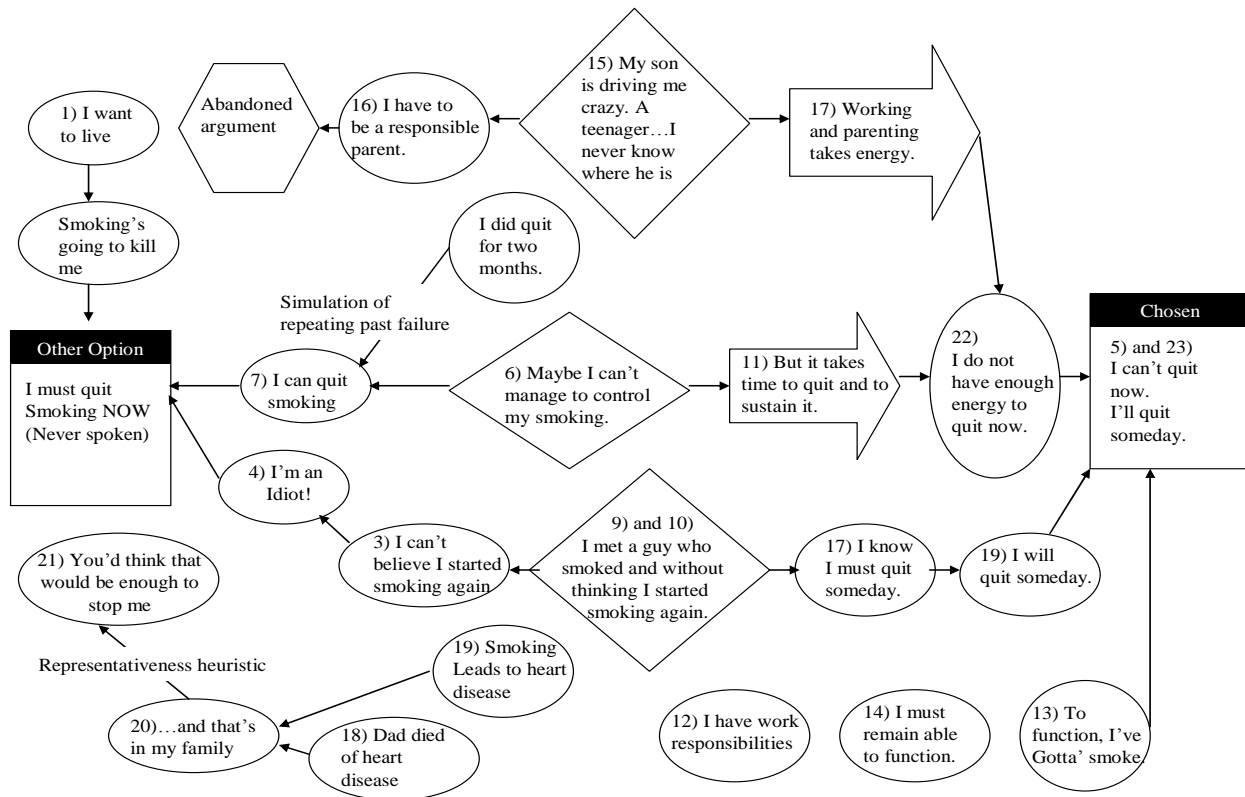
Figure 2. The decision not to quit smoking. Adapted with permission from Facione and Facione (2007, Figure 23, p. 160.).
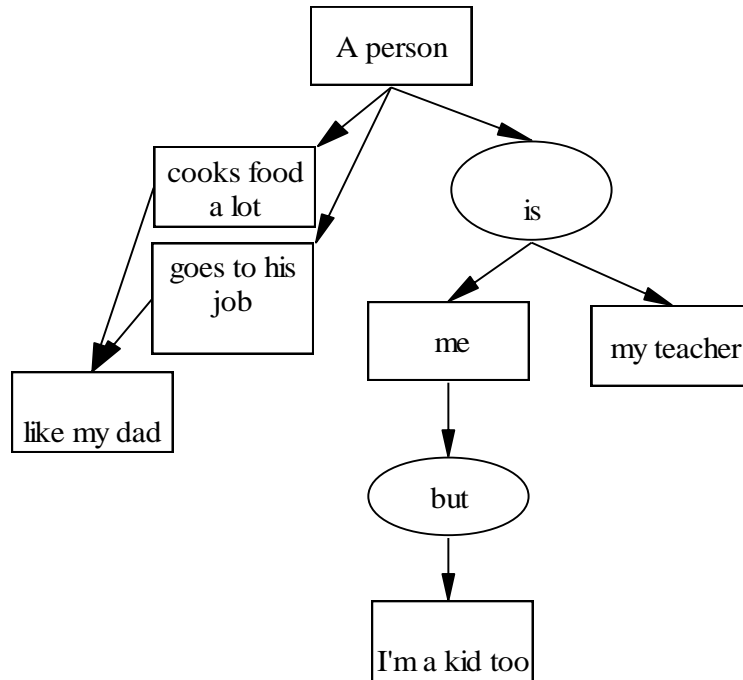
Figure 3. Concept map displaying the structure of representational mappings level performance.
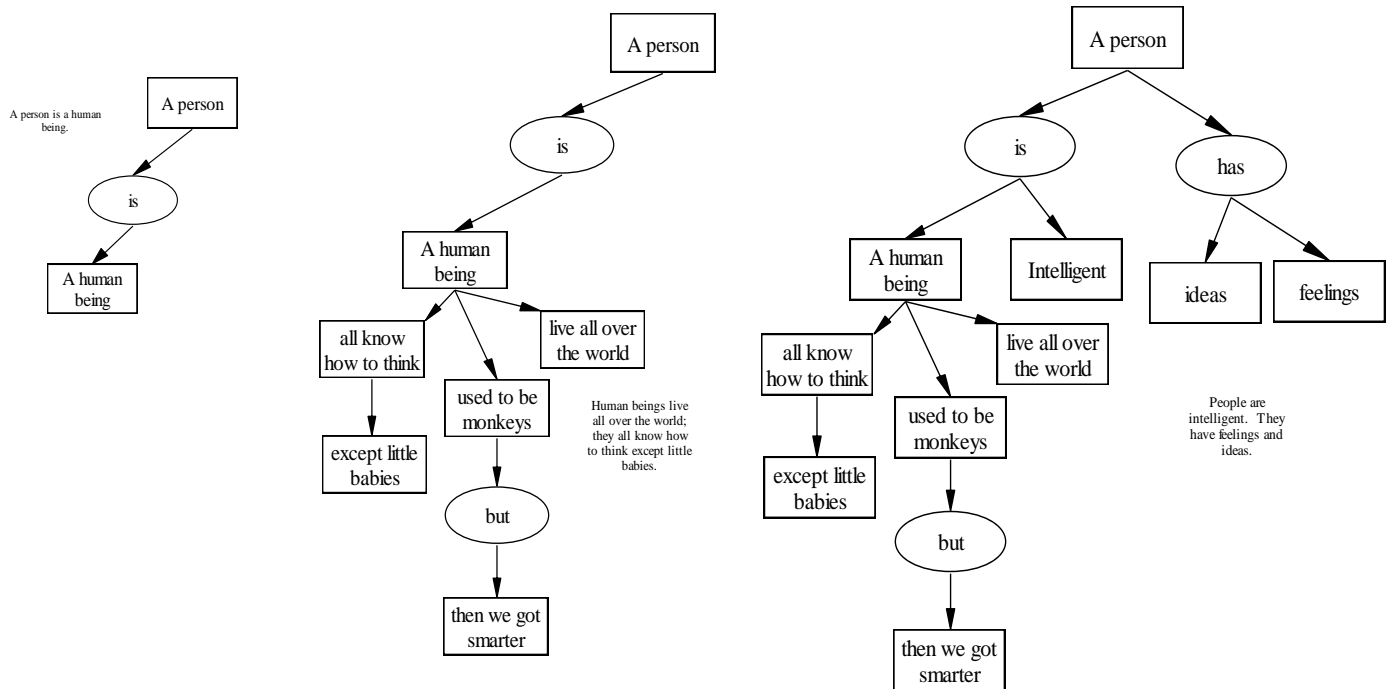
Figure 4. A set of concepts mappings displaying the structure of a single abstractions level performance.

Consider figure 2. It displays the complete decision map of a woman who ultimately decides not to quit smoking. The map of her interview transcript highlights two options: *I must quit smoking now* (an option that is never spoken in the interview), and *I can't quit smoking now. I'll quit someday* (the end-of-interview decision). There are three watershed ideas [numbered 6, 9, and 15, respectively] – ideas that really shape the direction of ideas and arguments that follow. One of these watershed ideas (15 - *My son is driving me crazy. A teenager…I never know where he is*) pulls the thinker in the direction of an abandoned argument [16 - *I have to be a responsible parent…*(and 'quit smoking')], but it also pulls the thinker in the direction of the selected decision: 17 - *Working and parenting takes energy*, and 22 - *I do not have enough energy to quit now*, therefore, 5 & 23 - *I can't quit now. I'll quit someday*. During the early part of the interview, the woman gravitates toward the conclusion that she must quit smoking now, but as the interview progresses her defenses mount and she argues that she cannot quit smoking now. She uses a representativeness heuristics to draw out the relationship between the death of her father from heart disease and the probability that she might suffer a similar fate, if she does not stop smoking. However, she decides that she needs to smoke to function well and this along with her belief that she does not have sufficient energy to give up right now is the argument that shapes her final decision.

Noreen and Peter Facione have recently used their method of argument and heuristic analysis to examine the quality of decision-making in health care settings (N. Facione & P. Facione, 2007). By comparing arguments and heuristics used by a group of 15 women delaying diagnosis of breast cancer symptoms with a group of 13 women who quickly sought a diagnosis, Facione and Facione reported that diagnosis-seekers offered more arguments for diagnosis-seeking than for diagnosis-delay. Those who delayed diagnosis offered fewer arguments for diagnosis-seeking and many more for diagnosis-delay. Delayers also abandoned sound and usually compelling arguments to seek diagnosis, relying instead on false information and poorly reasoned arguments. By reference to the full set of arguments and heuristics used by women to delay diagnosis, Facione and Facione recommended that interventions aimed at decreasing patient delay need to challenge mistaken beliefs of control over possibly advancing cancer, and the tendency to abandon sound arguments for seeking prompt diagnosis. A good intervention would also need to challenge the tendency to satisfice when scheduling diagnostic visits, simulate a benign diagnosis rather than the prevention of late-staged cancer, and prioritize fear control over protection of life. Overall, a close

evaluation of the structure of thinking in this context revealed a problematic pattern that can be structurally unpacked and used as the basis for counter-pattern restructuring in an intervention designed to challenge and ultimately change the thought patterns that shape poor decision-making. Whether or not these interventions are successful remains to be seen – much depends on how easy it is to alter particular patterns of thinking.

DYNAMIC DIFFERENCES IN THOUGHT COMPLEXITY AS MAPPED USING LECTICAL ASSESSMENT

An examination of the thinking process in action reveals significant variation both within and across individuals, including variation in the level of organization and complexity of argument structures (T. Dawson, 2004; T. L. Dawson, 2002; K. W. Fischer & Bidell, 2006). The Lectcial Assessment system (or LAS) is the outcome of decades of research in cognitive developmental psychology. It is a form of structural analysis that can be used to measure the complexity of arguments, concepts, and performances, allowing them to be placed at different developmental levels, or different level of complexity. Dawson, the creator of the LAS, has built a rigorous method for insuring the psychometric validly and reliability of the LAS (for more info go to: www.lectia.info). The system is build around the basic construct of *hierarchical complexity*. The construct of hierarchical complexity can be understood most easily through an acquaintance with the conceptual tools used to identify it.

The ability to 'look through' the content of reasoning is necessary in order to fully grasp what it means to identify the level of complexity manifest in an argument or text. Consider, for example, the meaning of one word, *person*, as described across the different levels of hierarchical complexity identified by the LAS (see Table 2). In attempting to describe what a person is, people can draw upon a huge variety of concrete and abstract concepts that are more or less integrated in their overall presentation at different levels of hierarchical complexity. When examining the different ways people use the concept *person*, the LAS method of analysis focuses less on content and more on the hierarchical complexity, or the underlying structure of the concept being used. Examining differences in complexity through concept mapping will serve to demonstrate the process of 'looking through' the content and enacting the perspectives that reveal the deeper structure of complexity behind arguments.

To simplify this examination, we employ an idealized example, illustrated with a series of concept maps.

Table 2. An idealized example of the concept person as it changes across the complexity orders

Complexity order	A Person is…	Abstraction	Structure
Single represent-tations	My mom?	1st order represent-tation	
Representational mappings	A person cooks food a lot, and goes to his job. Like my Dad. My teacher is a person, and I am a person, but I'm a kid too.	2nd order represen-tation	Mapping: Person is a mapping of several 1st order representations.
Represen-tational systems	I'm a person you are a person. A person does things. Like talk to friends and eat to stay alive so they can have fun.	3rd order represen-tation	System: Person is a system of 2nd order representations with two variables on the input.
Single abstract-tions	A person is a human being. Human beings live all over the world; they all know how to think except little babies. I heard humans used to be monkeys but then we got smarter. People are intelligent. They have feelings and ideas.	1st order abstraction	Definitional: Person is defined as a 1st order abstraction, which is a conceptual integration of representational systems.
Abstract mappings	A person uses reason; they are animals, but they are different from animals because they think about things better. A person has responsibilities, in life. You know, a person *is* somebody, with a personality of his own. It's hard to get to know somebody because the real person is on the inside. A person has a soul.	2nd order abstraction	Mapping: Person is a mapping of several 1st order abstractions.
Abstract systems	A person is like a whole world in themselves. So, you have to respect the unique	3rd order abstraction	System: Person is a system of 2nd order abstractions. Here

	emotional temperaments, life circumstances and perspectives of everyone. And you can't separate one of those aspects from the others because they all interact with each other. That's why people are so complex. That's why we need to be conscious of individuality.		several variables which are at least 2nd order abstractions are coordinated on the input.
Single principle	The concept of *person*, as I define it, can be used to coordinate what often seems like a rift between an individual's unique system of meaning and a society's complex web of structures and institutions. The concept of 'person' is a way of thinking about the mutual-dependence between these two systems. It is in the 'person' that the citizen, (as defined by a system of rights, liberties, social roles etc.) and the individual, (as defined by system of unique choices, motivations and meanings), meet and embody their interdependence. You can not really have one system with out the other. Only in the social space provided to the citizen can an individual flourish, understand him or herself, and develop. And yet, only with the unique development of motivations and meanings can individuals fulfill their roles as citizens. So I understand 'persons' in this way, as they embody the fragile interdependence of the mind and society.	1st order principles	Definitional: Person is defined as a 1st order principle, which is a conceptual integration of two abstract systems.

The development levels displayed in Table 2 have been researched for decades by a group pf Neo-Piagetians, including Fischer, Case, and Commons (Case, 1992; Commons, Trudeau, Stein, Richards, & Krause, 1998; K. Fischer, 1980). One way to think about the LAS is that it operationalizes the broad structural descriptions of these levels. The representational levels begin with the onset of language, serving to organize action schemes and facilitate concrete forms of communication and thought. Over time representational concepts come to be complexly interrelated, moving through linear mappings toward multivariate systems. Eventually, abstract concepts emerge from representational systems, serving to chunk whole systems of concrete concepts in terms of overarching qualities and ideas and facilitating such higher-level skills as long-term planning and counterfactual reflective hypothesis formation. Abstract concepts are first combined into linear mappings that become increasingly complex, eventually forming multivariate systems of abstract concepts, which in turn give way to principles. Principles are dialectically rich and informationally dense constructs that subsume whole systems of abstract concepts. These are built to serve broad functions in discourse and behavior regulation, and are rare in populations lacking forms of rigorous higher education (Dawson-Tunik, 2004)

Table 2 displays the development of the conceptual element *person* across the seven levels identified by the LAS. The column with the heading "A person is…" is composed of text samples that display reasoning about the concept of *person*. These text samples are not taken from actual interviews. They have been created to explain the LAS and do not represent a hypothesis about the way the concept *person* actually develops.

The process of constructing a concept map from a sample of text is similar to enacting the analytical perspectives necessary to score using the LAS. Here, we employ concept maps of the examples in Table 2 to assist us in making clear the construct of hierarchical complexity.

To begin, it is necessary to select a protocol from Table 2. The sample of text from the representational mappings complexity order reads:

> A person cooks food a lot, and goes to his job. Like my Dad. My teacher is a person, and I am a person, but I'm a kid too.

First it is necessary to understand the meaning of what is being said. After the initial meaning has been grasped, isolating the conceptual elements of the protocol is the first step in the process of concept mapping it. The conceptual elements in the protocol are displayed on the left in figure 3 below. These

conceptual elements are the main ideas used to construct the meaning of the protocol. The right side of figure 3 shows the organization of these conceptual elements. In the ovals are words that connect two or more conceptual elements.

This process of concept mapping visually represents the meaning of the protocol, displaying the organization of conceptual elements. The process of concept mapping involves picking out the conceptual elements of a protocol and grasping the manner in which they are organized. These two analytical skills are the prerequisites to 'looking through' a protocol to the order of hierarchical complexity that is its underlying structure. This protocol has been placed at the level of representational mappings because—as the concept map makes clear—concrete representational concepts are coordinated in a linear fashion.

A second example will help to clarify the process further. The sample of text from the single abstractions complexity order reads:

> A person is a human being. Human beings live all over the world; they all know how to think, except little babies. I heard humans used to be monkeys but then we got smarter. People are intelligent. They have feelings and ideas.

The conceptual elements are displayed on the left in figure 4 below, their organization is shown on the right.

As reasoning becomes increasingly complex it becomes apparent that there is more than one way to display the meaning of a protocol in a concept map. However, a step by step look at how the conceptual elements are fitted into the map will show that the map is not arbitrary and the level of complexity is clearly revealed in the concept map. Specifically, by examining the concepts used to describe a person in this protocol and the way they are organized in the flow or argument, it is clear that this protocol is organized at a higher level of complexity than the previous one. Note that while many of the concepts are concrete there are many more of them and they are coordinated in a complex manner. Moreover, certain concepts (e.g., human being) are building towards abstraction, subsuming a variety of concrete ideas (e.g., live all over the world, know how to think, etc.).

Isolating how each group of conceptual elements is added to the map demonstrates just how the concept maps dissect the meaning of a protocol and reconstruct it in a more formal way. The concept maps make clear how the meaning of a conceptual element is constructed through a process that

integrates the differentiated conceptual elements beneath it. For example, as explained above, the conceptual element *human being* as it is used in this example can only be understood as a summary or integration of the conceptual elements beneath it in the map. Displaying the structure of the concepts ultimately allows us to gauge the relative abstraction and complexity of the overall performance—thus measuring the hierarchal complexity of the arguments.

In the examples above the meaning of 'person' at different levels of hierarchical complexity is revealed by the concept mapping process, which as a result exposes, through a kind of reconstruction, the integration accomplished by this meaning. The LAS identifies a sequence of conceptual structures with increasingly integrative capacities. These structures appear in all arguments, and are an important factor that should bear on their analysis. For example, if the concept of 'person' figures prominently in an argument under analysis—e.g. debates about abortion—the level at which people understand and use this concept is critical. Arguments may be ostensibly about the same thing, while the reality is that those engaged in debate are operating at different levels. This is more than a concern about setting terms. Arguments coming from different level have different structures, and thus different logical properties. Strategies for mediating cross level argumentation are only just beginning to be devised (Rosenberg, 2002; Wilber, 1999). By developing efficient strategies for identifying individual differences in complexity level and the influence of these individual differences on the construction of *relational argument structures* that emerge when a group of individuals debate and collaborate, it may be possible to reduce unnecessary conflict within groups and move toward greater coherence and ultimately greater collaborative problem-solving power and potential (Bohm, 1994; Bohm & Nichol, 1996).

GROUP DECISION MAKING USING INTERACTIVE MANAGEMENT

The three thought mapping strategies described above work on the assumption that decision making is an individual pursuit. However, many everyday decisions are collaborative affairs. In fact, the resolution of complex social problems generally requires some kind of *collaborative constructivism*,

that is, a certain amount of rational coherence at the level of the group that facilitates the decision making of the group.

Legend for Figures 1-3:
-- The arrow should be interpreted as: "Significantly Supports"

-- The letter-number combination after each statement indicates the category in which the item was grouped (see results section) plus a numerical label for the item.

To help build a country where everybody's needs are everybody's concern (E-22)

• To empower Cypriots to envision a Cyprus where people live in peace and to believe that this is possible now (D-34)
• To learn to accept differences in culture and start thinking of them as positive, interesting, and enriching factors (E-47)

• To develop public confidence in the peace building process (A-42)
• To provide opportunities for expression and analysis of new ideas (F-63)

To eliminate the fear of losing our "Greekness" when involved in peace building (G-41)

To work toward the establishment of integrated schools (J-69)

To promote confidence in our Cypriot state and in ourselves as citizens of Cyprus (G-49)

To build a solid understanding in both communities of the need to work together for the mutual satisfaction of interests (D-12)

To motivate and organize women to participate in shaping a peaceful political future for Cyprus (C-51)

To enhance breaking with or transcending the past as a way of opening up the future (D-50)

To promote democratic and humanistic values, particularly in the younger generation (E-8)

To modify image of peace building projected by mass media (A-53)

To stress the relatedness of peace building with the Christian religion (A-68)

• To begin to develop non-adversarial attitudes (E-2)
• To develop a peace culture in Cyprus (E-59)

• To involve people from all possible tracks in the peace building effort (C-36)
• To provide opportunities for interaction between the two communities (I-6)

To promote both communities working together on common projects (I-9)

• To establish an effective peace-building movement with a clear vision and a more effective practice (B-14)
• To build intercommunal institutions and centers (I-3)
• To build bridges of mutual empowerment and understanding with Track I level (C-39)
• To build new and strong bridges of communication with Turkish Cypriot peace building groups (C-20)

To develop a creative and generative approach in facing the Cyprus problem (F-48)

To begin to take significant steps toward demilitarization (K-38)

Vision Statement for Greek Cypriots

Figure 5. Vision Statement for Greek Cypriots designed using Interactive Management (IM).

To try and create a proper climate where Turkish Cypriots will ask for Greek Cypriots whatever they want for themselves and where G/Cs will refuse anything for T/Cs that they don't want for themselves (D-83)

• To promote free access to both sides (E-43)
• To eliminate the "enemy image" (K-27)

To encourage T/Cs abroad to come back (G-19)

• To strengthen the peace movements on the citizen level (B-21)
• To be prepared to make sacrifices for a viable and long lasting peace (D-42)
• To ensure effective implementations of Confidence Butilding Measuress (K-63)

To eliminate the danger of military confrontation (E-50)

To eliminate demographic changes concerning T/C community (G-12)

• To promote the idea of demilitarization of Cyprus (K-26)
• To transform hatred into friendship (D-5)

To restructure the paralyzed economic and social system of our community (K-89)

• To start stimulating the Cypriot identity (G-35)
• To minimize the negative effects of national identities and stimulate a polyethnic inclusive federal identity (G-41)
• To eliminate the possibility of one side dominating the other (G-22)

To promote economic relations between the two communities (K-8)

To promote bi-communal activities such as commercial, health, educational and sportive (I-25)

• To support becoming a member of the E.U. (K-17)
• To promote cultural and social relations between the two communities (C-13)
• To encourage people to respect and accept each other's identity (G-94)

To secure concrete and tangible results of peace building efforts (9)

• To create a mutually acceptable peaceful resolution in Cyprus (K-3)
• To transform the status quo into a bi-communal and bi-zonal federal state (K-18)
• To eliminate the economic differences between the two communities of Cyprus (G-7)
• To provide opportunity for the trainers of conflict resolution to put their learnings into practice (B-36)
• To stimulate the idea of cooperation rather than confrontation (F-38)

• To form a common vision for both communities (H-75)
• To enable T/Cs and G/Cs to have a determining voice in designing their island's future (G-4)
• To advocate realization of Confidence Building Measures (K-58)
• To help secure the equal political status of both communities (G-37)

• To encourage people to accept and respect each communities' basic needs (E-96)
• To make sure that stupidity does not rule over wisdom (D-14)

Vision Statement for Turkish Cypriots

Figure 6. Vision Statement for Turkish Cypriots designed using IM.

Interactive Management (IM) is a process of collaborative decision making developed by John Warfield. IM recognizes that multiple viewpoints on social and technical issues are needed to resolve complex problems. Social psychologists have long recognized that group decision-making efforts are often hampered by poor use of logic and the dominance of heuristics that reinforce the solutions of a charismatic leader or those group members who possess power and influence. Under conditions where there is the added pressure of time constraint and high stress, there develops a belief that no solution other than the solution provided can be found. Under such circumstances, people will very often simply give up thinking and thus contribute nothing to the process of decision making (Janis, 1982; Warfield, 1995).

IM is a thought mapping technique that enhances group problem solving. There are a series of steps in the process. First, a group of between 12 and 20 people – key stakeholders with an interest in resolving a problematic situation – come together in a situation room[1] and are asked to generate a set of 'raw' ideas (commonly 100 – 300) about what might potentially have a bearing on the problem they all agree exists. Further discussion clarifies the sub-set of ideas that bear upon the most critical problem issues. Next, using IM software (cf. Warfield, 2007 for more information), each of the critical issues are compared systematically in pairs and the same question is asked of each in turn: "Does this issue have a significant impact on that?" Unless there is majority consensus that one issue impacts upon another, the relation does not appear in the final analysis. After all the critical issues have been compared in this way, a problem structure (or problematique) showing how the issues are interrelated can be viewed and printed for discussion.

The group reviews the model and, after a further period of discussion and, if necessary, a further period of modeling, the problematique becomes the launch pad for planning solutions to problems within the problem field. The logical structure of problems is visible in the problematique and when generating solutions, action plans are aimed at resolving problems in a logical and orderly manner, from the ground up. The impact of these actions is then modeled for the group. When the group is happy that they have modeled both the problem field and the best possible set of solutions, the IM session closes and each member leaves with a detailed action plan, a specific set of goals to

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[1] A room with computers, IM facilitators, IM voting and mapping software, and large wall space that allows relations between problems in the problem set to be mapped.

work on, and the roadmap and logic describing how all the various plans and goals of each member will work together to resolve the original problem.

IM has many useful applications. For example, it has been used to good effect in Cyprus to help resolve conflict driven by ethnic divide (Broome, 2004). In this case, a group of Turkish Cypriots and Greek Cypriots have worked both in isolation (Figures 5 and 6) and together (Figure 7) to map the structure of their vision for peace for the future. Prompted by the question, 'What are desired goals for our peacebuilding efforts during the next decade?' Greek Cypriots proposed 72 goals, and Turkish Cypriots proposed 101 goals. Through a facilitated process of categorization, these goals were organized under the following themes: (A) Image of Peacebuilding; (B) Strengthening the Peacebuilding Movement, (C) Bridge Building, (D) Peace Mentality, (E) Peace Culture, (F) Problem-Solving Approaches, (G) Identity Issues, (H) Bicommunal Understanding, (I) Bicommunal Communication and Exchange, (J) Youth and Education, (K) Political and Economic Issues. Each community then voted to identify from their full list of goals a subset they considered most important. Using this subset, the group then used IM software to build a graphical portrayal (or problematique) of individual goals and their perceived interrelationships. This problematique was used as the basis for discussion to shed further light on the structure of their vision for peace. Each group then compared and contrasted their vision with the vision of the opposing group (Figures 3 and 4) before coming together as one group to generate one agreed vision. They began by identifying the shared goals from each community's vision, and they generated additional goals they wanted to include in the collective vision. Although there was heated debate over the wording of some statements, the two groups eventually agreed a common vision (see Figure 7).

Each of the problematiques presented below is read by starting at the bottom and following the lines of influences upward. Goals at the base of the structure are primary in the causal network. Goals at the top of the structure are long-term or outcome goals that require the support and fulfillment of goals that lie beneath. The goals in the middle of the structure are conduits through which the support passes from the base to the long-term goals. Following the completion of the collective vision statement, or problematique, the group designed a collaborative action agenda for implementing the goals in the structure. They generated a set of 245 options, from which they selected a total of 15 projects to implement during the following year. Most of the activities were eventually realized in some form and work is still ongoing in Cyprus as the two groups continue to design pragmatic solutions that help to maintain the peace.

• To help build a country where everybody's needs are everybody's concern (E-1)

• To try and create a proper climate where Turkish Cypriots will ask for Greek Cypriots whatever they want for themselves and where G/Cs will refuse anything for T/Cs that they don't want for themselves (D-10)

• To promote the idea that the security problem of both communities could be lessened by demilitarization (K-26)

• To come up with a solution that will satisfy the security needs of both communities (K-41)

• To minimize the effects of outside powers (K-29)

To promote in both communities a better understanding of basic needs, fears, and aspirations of each community concerning the property issue (H-17)

• To empower Cypriots to envision a Cyprus where people live in peace and to believe that this is possible now (D-2)

• To learn to accept differences in culture and start thinking of them as positive, interesting, and enriching factors (E-3)

• To work for an independent bicommunal bizonal federally united Cyprus with full respect to human needs and rights and develop the appropriate public mentality to support it (K-43)

• To make known and acknowledge the basic needs, fears and aspirations of each community to the other community (H-21)

• To eliminate the "enemy image" (E-11)

• To stimulate the idea of freedom of movement throughout the island (K-19)

• To encourage youths of both communities to get to know each other (I-36)

• To accept and respect each others' identity as T/Cs and G/Cs and see this as a richness rather than an obstacle to peace building (G-32)

To minimize the effects of national chauvinism and promote the idea of a poly-ethnic inclusive federal society (G-14)

• To develop public confidence in the peace building process (A-4)

• To strengthen the peace movements on the citizen level (B-12)

• To promote the idea in G/C community that the existence problem of T/C community is vital for the whole of Cyprus (H-18)

• To help the two communities create a common vision (H-27)

To try and find ways to bridge the economic differences between the two communities (K-37)

• To build a climate in which the ethnic identities of the two communities are not threatened (G-6)

• To support in both communities the idea of joining the European Union (K-28)

• To provide opportunities for interaction between the two communities (I-8)

• To build inter-communal institutions and centers (I-9)

• To promote bi-communal commercial, health, educational and sports activities (I-15)

• To establish an effective bi-communal peace movement (B-30)

• To promote cultural and social relations between the two communities (C-16)

• To promote both communities working together on common projects (I-7)

To build bridges of mutual empowerment & understanding with Track I people (C-42)

Collective Vision Statement for Peace Building Efforts in Cyprus

Figure 7. Collective Vision Statement for Peace Building Efforts in Cyprus.

The core principles and methodology of IM can be applied to the resolution of any problematic situation. However, this tool has not been widely applied to solving problems in the mainstream science of psychology and education. For example, one of us has made the call for the application of IM to foster the integration of facts and perspectives – including positive and negative worldviews – that shape the science of human flourishing (Hogan, 2008). However, IM has never been applied in this way.

One problem with IM is that it is a time consuming process. For complex problems, it can take anything up to 6 days to develop a problematique and a correlated action plan. Furthermore, in order to bring about a solution to the problem, the group of people involved need to work on the action plan. In this sense, people have to make an ongoing commitment of time. However, the advantage of the method is that there is power in numbers – each group member contributes some small portion of action to the overall solution – and with a logical roadmap that describes the consequence of their collective action in the problem field, those involved can be reasonably confident that their actions will be effective.

Cultural evolution has been described as a process whereby the ideas, values, beliefs and behaviors of individuals and groups that foster the highest levels of adaptive success are generally imitated by others and thus become increasingly prominent in the culture – that is, until replaced by other ideas, values, beliefs and behaviors that offer even greater success. If, as we believe, group problem-solving strategies such as IM generate effective solutions to problems by capitalizing on our ability to use formal logic in the context of complexity, then it makes sense that mainstream application of IM to significant social and technological problems will become increasingly prominent. However, biological and cultural evolution have also canalized our investment in heuristics that help us to solve adaptive problems very quickly and with minimal cognitive effort (Barkow, Cosmides, & Tooby, 1992). The argument from evolutionary psychology is that many of our core problem-solving routines are evolved adaptations, that is, modular behavioral routines that are activated by specific contexts that are somehow similar to contexts that critically impinged upon on our survival and evolution success in the past. However, cultural evolution has radically altered the nature of many of the problems we now work to resolve. The development of high levels of insight into the structure of our individual and collaborative cognition is not an evolved adaptation that has emerged during the process of our evolution to date. New cultural tools and resources are needed to support our work when solving some of the big economic, social, and environmental problems we

now face. We advocate greater cultural investment in the development of the skills and tools of graphicacy. We close this chapter with a brief note on the possibility of integrating various thought mapping technologies into one functional educational tool that includes various 'modules' and interdependent skill enhancement structures that will enhance the power and potential of individual and collaborative cognition and action.

INTEGRATIVE EDUCATIONAL TOOLS

In a fascinating book that describes and evaluates *Thinking Frameworks* for teaching and learning, Moseley and colleagues (2005) describe and evaluate a total of 41 individual thinking frameworks. The frameworks are largely theoretical descriptions of core thinking skills that are relevant for problem-solving and decision-making activities – recognizing and recalling, comprehending, working with patterns and rules, concept formation, organizing ideas, reasoning, monitoring, evaluating, inferring, creative reconfiguring, and so on. Pointing to different thinking skills is interesting, but one problem with the majority of thinking frameworks that dominate perspectives in the field of learning and teaching is that formist and mechanistic worldviews undergird their design (Pepper, 1942) and there is a noticeable absence of an organismic and contextualist focus on the *integrated process of thinking and action in context*.

Specifically, in the formist and mechanistic worldview the tendency is to either (a) simply point to discrete forms (or parts) of thinking that are important aspects of our overall thinking skill, or (b) attempt to overlay this emphasis on the parts with a hypothetical cognitive machinery that describes the functional relations between the parts of thinking that have been classified as important aspects of our overall thinking skill. What emerges is a fascinating neglect of organismic and contextualist worldviews that focus attention on the integrated process of thinking and action in context. One negative consequence of this is poor linkage between the theoretical models proposed and educational applications that might serve to foster thinking skills. Also, by pulling attention away from a focus on activity in context, many thinking frameworks simply reinforce an *abstract view of thinking* over the reality of thinking and action in context. It is only by understanding the reality of thinking and action in context and the environmental contingencies that influence the process of thinking and action in context that we can begin

to design ways to enhance a persons' awareness of this process and their individual and collaborative ability to successfully pursue a range of valued goals.

We have argued above that cultivating and using graphicacy skills may serve the joint goals of both developing better understanding of the structure of thought and enhancing both individual and collaborative goal pursuit in context. We would now like to suggest that educational researchers focus more attention on developing integrated educational *tools* (rather than integrated *thinking frameworks*) that help us to elucidate and enhance thinking and decision-making processes in context.

Two of the thought mapping techniques we considered above – Argument Mapping and Interactive Management – already have associated with them very usable software systems that allow one to (a) map argument structures and (b) design problematiques that structure complex problem spaces. Both software systems are pragmatic systems, in the sense that both are designed to facilitate working toward a select goal (e.g., working to establish the foundation of a belief using argument mapping, or working to establish an optimal collaborate path to resolution of a fundamental problem using Interactive Management). We believe that the current design of argument mapping software could be reconfigured to allow for analysis of the development of argument structures, and the impact of heuristics in both directing and restructuring argument structures at different levels of hierarchical order and complexity during the process of development. (By development here we refer largely to micro-development, that is, development over the course of hours, days, weeks, and perhaps months.)

In other words, we believe it should be possible to design educational software that provides students (guided by experts and working in a collaborative context) with a tool that facilitates their developing understanding of the thought structures that shape decision making and action in context. With the core skill of graphicacy being central to this new educational tool, we believe that students will slowly develop the ability to *see* the structure of thought in action (i.e., in their own action and in the action of others), and in a collaborative working context they will begin to see how collaborative, relational thought structures impinge upon decision making and action in context (e.g., in the context of collaborative exercises where they are collectively working to establish the basis for a certain belief or working to solve a particular problem that requires collaborative action planning).

Using an educational software tool that facilitates greater awareness of how collaborative, relational thought structures impinge upon decision making

and action in context, and with IM software capabilities built into the same educational tool, it will be possible for groups of students to move from individual and collaborative analysis of thought structures to increasingly coherent design activity, that is, in the design of problematiques that help them to characterize problem structures at a higher level of complexity. Finally, in the gradual move from undergraduate to post-graduate training in thinking, decision-making, and problem solving – using a core module that runs from first year to final year and from undergraduate to postgraduate training at increasingly higher orders of software complexity – the focus of college life could begin to move away from discipline-focused to problem-focused training and employment opportunities. Specifically, the focus would be on catalyzing the developing skill of students for the resolution of key problems that involve multiple actors for successful resolutions (e.g., the design of social systems that focus on resolving problems of isolation and depression; the design of solutions to complex engineering problems that a group of postgraduate engineering students might work on under the supervision of a larger professional outfit; and so on). Successful human adaptation hinges upon the ability of human being to catalyze their biological and cultural resources to facilitate problem solving in context. While biological evolution may have run its course in terms of further enhancement of human potential, economic, social, and environmental problems that impinge upon individuals and groups continue to mount, and the only way we can successful resolve these bigger problems is by investing more intelligent effort in the redesign of the tools of culture that help us all to develop our skills and capacities. Integrated software systems that catalyze the power and potential of graphicacy use in educational contexts offers one path to greater skill.

CONCLUSION

Few of us deny that our thinking is limited. We have a limited working memory capacity; our rationality is 'bounded' by sentiments and heuristics that shape our best decision-making efforts. At the same time, we can map the structure of our thoughts and learn from the maps constructed. We can use argument mapping software to lay out in plain view the structure of our arguments for analysis. We can use argument and heuristic analysis to map our decision making as it unfolds in real time and consider more deeply the role of heuristics in shaping the outcome of our thinking. We can characterize the

level of order and complexity in our thinking using Lectical Assessments. We can work as part of a group and use Interactive Management to map the structural relationships between problems in a problem field and we can use the logic of this structure as the basis for action planning. In other words, notwithstanding our limitations, we can use what mental capacity we have to greater effect and facilitate better thinking, better decision-making, and better action. As the science of thought mapping develops, the applications will continue to grow, and it is our prediction that thought mapping will eventually become the foundation stone for rational, sustainable cultural evolution.

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Chapter 4

OBSTACLES: THEIR IMPACT ON THINKING AND BEYOND THINKING

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ABSTRACT

People encounter myriads of obstacles throughout their lives. Those can be big or small, such as a fallen tree blocking the road to work or life circumstances that make it hard for an adolescent to obtain a university degree. What are the effects of such obstacles? Could it be that obstacles have an impact beyond the very task or goal people with which they interfere? The present chapter reviews major findings regarding the affective, motivational, and especially cognitive consequences of insurmountable obstacles on the one hand and potentially surmountable obstacles on the other hand. It also introduces new findings that show how obstacles influence the more basic ways in which people perceive and conceptually process information from their environment. Finally, it highlights possible directions for future research and discusses the role of people's cognitive responses for dealing with life's obstacles.

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INTRODUCTION

Obstacles are part of life: An avalanche might have blocked the road to one's holiday destination, a colleague's background chatter might interfere with one's ability to concentrate on writing a review, a newborn child might hinder parents in maintaining their active social life, or an advanced age might stand in the way of switching to a more attractive job. Sometimes, obstacles might appear insurmountable, yet, at other times, they can or even have to be overcome. Despite their omnipresence, and despite their potential for influencing people's goal pursuits, relatively little is still known about the processes involved in dealing with obstacles and in particular with those that can potentially be overcome. The aim of this chapter is to propose an organizational framework for studying different types of obstacles and their effects, on the basis of which major findings regarding the affective, motivational, and especially cognitive consequences of potentially surmountable and insurmountable obstacles will be reviewed. Within this framework, possible directions for future research will be identified. Moreover, new findings on the impact of obstacles for basic cognition will be introduced and their potential role for dealing with life's obstacles will be discussed.

CONCEPTUALIZING OBSTACLES AND THEIR EFFECTS

As defined by the dictionary, an obstacle is "something that stands in the way or that obstructs progress (*lit.* and *fig.*); a hindrance, impediment, or obstruction." (Oxford English Dictionary, 2009). Thus, obstacles can be conceptualized as *interfering forces* (Higgins, 2006) that obstruct the standard course of action and have to be removed or otherwise dealt with if one wishes to reach a desired end-state. Accordingly, obstacles can take diverse shapes (e.g., physical, social, mental), they can appear in a variety of settings (e.g., organizational, private, clinical), and their potential impact can range from merely signaling that an adjustment in one's thinking or action is needed, to decelerating progress until a way to conquer them is found, or bringing progress to a complete halt if they cannot be overcome.

Rather than assuming that all obstacles should have the same effects, we propose to distinguish between *insurmountable obstacles*, which (are perceived to) block progress and/or task accomplishment completely, and potentially *surmountable obstacles*, which (are perceived to) interfere with a goal or task without completely blocking progress or accomplishment. This distinction is important, because depending on whether an obstacle is (perceived as) insurmountable or not, different trajectories are likely to ensue. More specifically, when an obstacle cannot be overcome, people need to accept and cope with the fact that they are unable to accomplish the original goal or task and gradually disengage from it while re-engaging in another pursuit (see Wrosch, Scheier, Carver, & Schulz, 2003; Wrosch, Scheier, Miller, Schulz, & Carver, 2003). By contrast, when an obstacle can potentially be overcome, people can decide whether to stay engaged and try to overcome the obstacle or disengage because they might have other attractive goals in mind that they could turn to without having to deal with the obstacle.

Much classic research on obstacle-related concepts can be conceptualized as falling under the rubric of insurmountable obstacles. For instance, participants in studies on goal-blockage or frustration were oftentimes prevented from finishing tasks or reaching assigned goals by having to work on unsolvable puzzles (Geen, 1968; Geen & Berkowitz, 1967; Strube, Turner, Cerro, Stevens, & Hinchey, 1984) or by confederates disturbing them repeatedly in order to ask questions (Burnstein & Worchel, 1962; Geen, 1968). Likewise, participants in classic studies on interruption (e.g., Atkinson 1953; Weiner, Johnson, & Mehrabian, 1968; Zeigarnik, 1927) were typically not permitted to move any closer towards their goals or complete assigned activities within the scope of the experimental session. Although in such situations (e.g., not attaining a high score in an experimental task due to constant interruption) people might still re-construe the entire situation (e.g., a psychology experiment) in terms of a higher order goal (e.g., collecting study credit to obtain a degree) and thereby make the obstacle appear surmountable, the obstacle would still remain insurmountable with respect to the specific goal or task at hand.

Other work has focused on potentially surmountable obstacles and related concepts. This work includes studies on parents interfering with their children's romantic relationships (Driscoll, Davis, & Lipetz, 1972), background noise interfering with cognitive tasks (e.g., Banbury, Macken, Tremblay, Jones, 2001; Higgins, Marguc, & Scholer, 2009; Jones, Miles, & Page, 1990; LeCompte, 1994; Marguc, Förster, & van Kleef, 2009; Martin, Wogalter, & Forlano, 1988), or physical obstacles blocking the most direct

path to a goal (Marguc, Förster, & van Kleef, 2009). In these studies, the obstacle can usually be dealt with in relation to the goal or task it interferes with. That is, parents may not be able to prevent their children from dating their loved one, an interfering background noise may not stop people from solving a cognitive task altogether, and, unless a physical obstacle blocks the only available path to a goal, people can still reach their destination by taking a detour. Accordingly, people do not need to re-construe the entire situation in terms of a higher order goal to make the obstacle appear surmountable, because the original goal can, at least potentially, still be attained.

Sometimes, the (in)surmountability of an obstacle can be determined on the basis of objective criteria. For example, the sudden death of one's spouse will irreversibly block the goal of spending the rest of one's life with that person, whereas a lasting handicap or illness does not a priori make it impossible to realize that goal. Oftentimes, however, the surmountability of an obstacle is in the eye of the beholder. One may subjectively think that one cannot stand the noise in the department and may at the same time think that talking to the dean about it would not have an effect. In contrast, one may think that a decent strategy or a good plan will be efficient. Such different construals of surmountability may have different effects for further behavior. For instance, imagine a person who considers an advanced age to be a surmountable obstacle to finding a more attractive job. That person might deal with the obstacle by stressing unique qualities throughout the application that can only be gained through maturity and experience. By contrast, a person who considers an advanced age to be an insurmountable obstacle might end up not even sending out applications and become increasingly frustrated with the current situation, unless an adequate substitute is available (e.g., devoting more time to a hobby).

Whether an obstacle is (perceived as) surmountable or insurmountable may not only influence the actual trajectory of an activity or goal pursuit, but also the emotional, motivational, and cognitive processes that accompany these trajectories. Accordingly, as an organizing framework for this chapter, we would like to introduce a 2 x 3 typology of obstacles and their effects based on the distinction between insurmountable and potentially surmountable obstacles on the one hand, and their affective, motivational, and cognitive consequences on the other hand. Within this framework, we will first briefly review some of the major findings concerning the affective and motivational consequences of insurmountable and potentially surmountable obstacles, as affective and motivational states can influence people's thinking (e.g., Cacioppo, Berntson, & Crites, 1996; Easterbrook, 1959; Förster & Higgins,

2005; Gable & Harmon Jones, 2008; Gasper, 2004; Gasper & Clore, 2002; Isen & Daubman, 1984) and might thus be relevant for the impact of obstacles on cognition. Thereafter, we will turn to the cognitive effects of obstacles, which will be the main focus for the remainder of this chapter. Again, we will consider effects of insurmountable and potentially surmountable obstacles in turn, whereby we will introduce new findings on how obstacles affect basic cognition, and discuss their likely implications for unrelated tasks and dealing with life's obstacles. Throughout this review, we will identify open questions and propose directions for future research that may help to draw a more complete picture of human responses to obstacles.

OBSTACLES, EFFECT, AND MOTIVATION

Research on the affective consequences of obstacles has mainly investigated insurmountable obstacles. Perhaps not surprisingly, this research has found a number of adverse effects. For example, goal-blockage and frustration have been associated with increased negative arousal (e.g., Berkowitz, 1989; Lewis & Ramsay, 2005), aggressive tendencies (e.g., Berkowitz, 1989; Dollard, Doob, Miller, Mowrer, & Sears, 1939), or even depression in cases where the goal that is blocked is highly important to an individual (see Klinger, 1975). Would surmountable obstacles have the same effects? Or are negative affective reactions less likely to the extent that an obstacle seems possible to overcome? To the best of our knowledge, while such assumptions are implied in some models on motivation and coping (e.g., Bandura, 1998; Folkman, 1984; Lazarus & Folkman, 1984) those questions have not been directly addressed in experiments.

With regard to motivational consequences, both insurmountable and surmountable obstacles were considered. At first sight, this research seems to suggest that obstacles in general are likely to enhance the subjective value and motivation to reach a desired end-state. To illustrate, pleasant activities (e.g., watching an entertaining movie) have been shown to become even more attractive when they are interrupted and cannot be resumed (Mischel & Masters, 1966). An early study by Driscoll, Davis, and Lipetz (1972) further revealed that feelings of romantic love among couples become even stronger when parents disagree or interfere with the relationship. More recently, research exploring the effects of aversive task circumstances on value found that hearing an interfering background noise (e.g., words) as opposed to a non-

interfering nuisance (e.g., dentist drills) while trying to solve enough anagrams to win an attractive prize increases the subjective value of that prize (Higgins et al., 2009; see also Scholer & Higgins, 2009). Such results can, for example, be explained within the frameworks of reactance theory (Brehm, 1966; Brehm & Brehm, 1981) and the more recent regulatory engagement theory (Higgins, 2006), which suggests that trying to oppose or overcome the impact of an interfering stimulus increases engagement in an activity and thereby creates value, whereas coping with a nuisance decreases engagement in the activity and thereby reduces value.

Surely, it would be maladaptive if obstacles would always increase motivation, and research suggests that there are indeed situations in which they do not. For example, research by Oettingen and colleagues (e.g., Oettingen, 2000; Oettingen, Hönig, & Gollwitzer, 2000; Oettingen, Pak, & Schnetter, 2001; for a review, see Oettingen & Stephens, 2009) suggests that when people mentally elaborate on negative aspects of present reality and positive aspects of a desired future in a way that highlights how aspects of the present *stand in the way* of the desired future, they either strengthen or reduce their commitment in line with relevant expectancies. To illustrate, participants are either asked to elaborate only the positive aspects of having attained a desired future (e.g., the happy ending of an interpersonal problem), to elaborate only on the negative aspects of present reality hindering them in attaining that future (e.g., being too shy, having too much work), or to first elaborate on the positive aspects of the desired future followed by the negative aspects of present reality standing in the way of that future. Only in the latter condition, which involves mentally contrasting the present situation with the desired future such that both are made accessible and their relation is highlighted, commitment increases if expectancies are high and decreases if expectancies are low. These studies show that beyond value of certain goals or tasks, the way in which people think about obstacles and goals might reduce or enhance motivation. When obstacles and goals are contrasted with one another (i.e., both are made accessible and their relation is highlighted), people take success/failure considerations into account. Thus, it seems important that people neither ignore an obstacle nor focus on it so much that they loose sight of their goal, but rather consider both obstacle and goal in relation, in order to disengage or increase efforts in ways that are appropriate to the circumstances.

Although a comprehensive review of the affective and motivational consequences of obstacles goes beyond the scope of this chapter, based on the above findings one may conclude that insurmountable obstacles are likely to engender   negative   emotional   experiences,   whereas   the   emotional

consequences of potentially surmountable obstacles remain unclear. Moreover, both insurmountable and potentially surmountable obstacles can enhance the attractiveness and value of a desired end-state, even though explicitly thinking about how negative aspects of the present stand in the way of a desired future was shown to increase commitment only when expectancies are high, that is, when obstacles are perceived as surmountable. Important questions remain, such as whether a linear relationship exists between the extent to which an obstacle is perceived as possible to overcome and the intensity of negative affective experiences. Moreover, it is not entirely clear how the affective and motivational consequences of obstacles are related to one another. For example, is there a threshold at which obstacles become so adverse that they decrease rather than increase value and motivation? More importantly for the present chapter, it is not clear what the cognitive consequences of obstacles are. These will be addressed in the following.

OBSTACLES AND COGNITION: A THEORETICAL PERSPECTIVE

How do obstacles affect cognition? In a recent article, we addressed this question and proposed a model based on Lewin's field theory (1935), construal level theory (Liberman & Trope, 1998; for reviews, see Liberman & Trope, 2008; Liberman, Trope, & Stephan, 2007; Trope & Liberman, 2003), as well as on novelty categorization theory (Förster, Marguc & Gillebaart, 2010).

From a Lewinian (1935) perspective, obstacles or "barriers" constitute "detour problems" (p. 82) that require people to take an indirect route to reach a goal or obtain a desired object. Thus, if people face an obstacle that cannot simply be eliminated or ignored they can choose to either "leave the field" and disengage from the task or goal or remain "in the field" and try to overcome the obstacle. In case they remain engaged, people may find a solution by restructuring the field and perceiving the total situation such that "the path to the goal becomes a unitary whole" (p. 83). Furthermore, people should find it easier to adopt such an encompassing, Gestalt-like perspective to the extent that they have encountered and gained experience with obstacles in the past as well as to the extent that they can psychologically distance themselves from the situation at hand, and detach from the positive valence that pulls them towards the desired end-state. As a result, whenever people are facing an

obstacle and are interested in staying engaged, they might adopt a more global, integrative perspective that might further help them restructure elements of the situation and integrate the obstacle into goal pursuit.

While Lewin's (1935) approach is rather theoretical, the idea that mentally distancing oneself from the situation at hand may lead to a more global, integrative way of processing information is in line with a recent body of research by Liberman and colleagues (for a review, see Liberman & Trope, 2008). This research suggests that construing events as distal rather than close to "me, here, now" is associated with a more global, integrative processing style that involves a *perceptual* focus on the overall structure rather than the details of objects and, on a more *conceptual* level, grants access to representations with lower a priori accessibility, leading to the construction of broader mental categories. For instance, in a recent series of studies (Liberman & Förster, 2009a) participants were asked to imagine temporally, spatially, or socially distal events prior to completing unrelated measures of global versus local perception. In one study, participants first imagined that they were sitting 5 cm, 5 m, or 10 m away and then completed Navon's letters task (1977), a task that involves responding to visual targets that either appear at the global (i.e., overall shape) or the local (i.e., constituent elements) level of stimuli (see Figure 1). Results from this study showed that as participants imagined themselves sitting farther away (i.e., 10 m, 5 m, or 5 cm), their perceptual scope became wider. In another study, temporal rather than spatial distance was manipulated by asking participants to write about their life in a year from now (distant future), tomorrow (near future), or not asking them to write about anything (control). Results revealed that when participants were thinking about their life in a year from now, their perceptual scope was broader than when they were thinking about their life tomorrow, or were not thinking about anything in particular. In a study assessing conceptual rather than perceptual scope (Liberman, Sagristano, & Trope, 2002), participants imagined future activities (e.g., a yard sale) to take place either in the distant or the near future. Subsequently, the former participants classified objects (e.g., cutlery, skis, infant clothes) related to those activities into fewer (i.e., broader) categories than the latter.
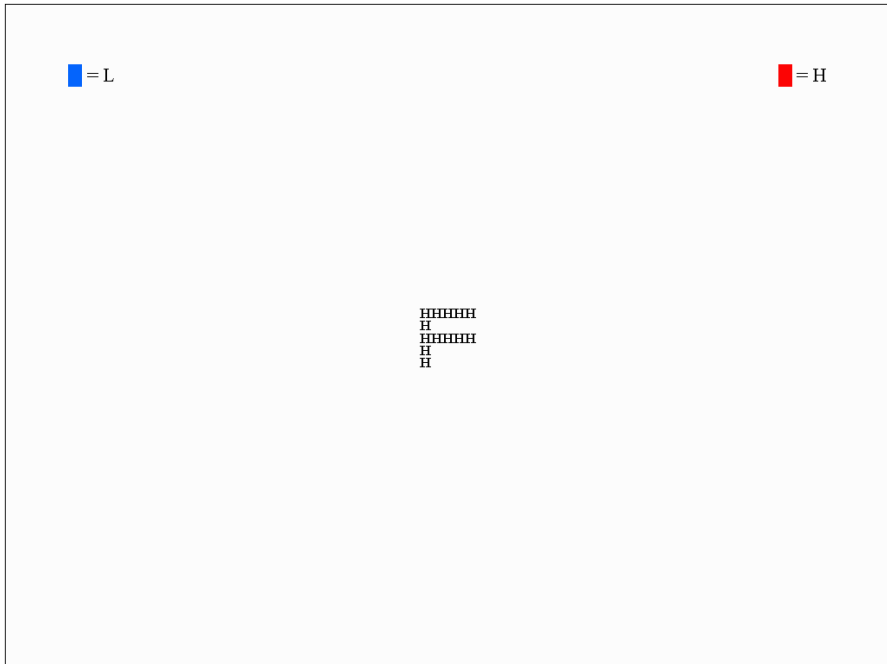
Figure 1. Sample stimulus picture from Navon's (1977) letters task.

Attesting to a close relation between psychological distance and global processing, recent studies revealed that psychological distance versus proximity not only influences global versus local processing, but also vice versa. In these studies, participants who were asked to attend to global rather than to local features of visual stimuli in one task subsequently estimated future events to occur later in time, places to be further away from their current location, other people to be less close to themselves, and events to be less likely to happen to themselves (Liberman & Förster, 2009b).

Finally, perceptual and conceptual scope themselves are closely related. For example, in a study by Friedman, Fishbach, Förster, and Werth (2003), participants were asked to focus either on an entire state or a single city depicted on a map to induce global versus local perception, respectively. Afterwards, in a seemingly unrelated task, participants primed with global perception generated more unusual category exemplars than those who were primed with local perception, reflecting a broader conceptual scope among the former compared to the latter.

Taken together, findings from this research suggest that whenever people mentally distance themselves from direct experience, both their perceptual and their conceptual scope will increase. Applying this logic to obstacles and taking into account that switching to global processing should be more relevant when people want to stay engaged and deal with an obstacle, but not when they would rather disengage and turn to another activity (see also Lewin, 1935), one might predict that whenever an obstacle hinders people in accomplishing a task they would like to finish, they will adopt a more global, Gestalt-like way of processing information. Notably, while people stay in the field, they may at the same time "step back" to see the big picture, or to perceive both, goal and obstacle at the same time.

Research on negative moods and processing styles may qualify our proposal, as it was shown that negative moods and even subtle cues of avoidance or signals of lacking security can trigger local rather than global processing (for a review, see Friedman & Förster; 2008). Because obstacles interfere with smooth goal attainment, they might naturally be experienced as aversive, thus one may wonder whether they can actually trigger global processing. Such questioning may be warranted, however, recent research (Förster, 2009; Förster, Liberman & Shapira, 2009) suggests that unknown events (which obstacles can sometimes be) activate a global processing style although they can be perceived as slightly aversive (see Zajonc, 1968). To explain such results, novelty categorization theory was introduced (Förster et al., 2010; Förster, 2009; Förster et al., 2009), suggesting that only when novelty is experienced as strongly threatening, it leads to local processing. Because people need to understand novel events, however, whenever a novel event is only slightly aversive or positive, they will routinely activate a global processing style that generally helps to integrate new information into existing knowledge structures. One may conclude that because global processing can help to integrate information and enhance understanding, it should also be useful when people encounter obstacles.

Notably, because global versus local processing styles are free of content, they can transfer from the task in which they were elicited to completely unrelated situations or tasks (Schooler, 2002; Schooler, Fiore, & Brandimonte, 1997; see also Förster, Liberman & Friedman, 2007). This was the case in many of the studies investigating the associations between global processing and psychological distance, and might also be the case for obstacles. Thus, if people broaden their perspective and open up their mind upon encountering an obstacle the cognitive consequences of obstacles might reach beyond the context in which the obstacle appeared and influence performance on

completely unrelated tasks. Surprisinlgy, this idea has not been investigated until recently.

COGNITIVE CONSEQUENCES OF OBSTACLES: EMPIRICAL FINDINGS

Content-Related and Context-Related Effects

In the past, researchers investigating the cognitive effects of obstacles primarily focused on questions pertaining to what people think about upon encountering an obstacle (i.e., content-related effects) and how obstacles influence performance on the tasks with which they interfere (i.e., context-related effects). For instance, studies on the classic Zeigarnik effect demonstrated that interrupted activities are both recalled better (Zeigarnik, 1927, for a review, see Butterfield, 1964) and are cognitively more accessible than completed ones (Marsh, Hicks, & Bink, 1998). Some researchers also suggest that frustration or blockage of important personal goals will instigate rumination, which can be seen as an attempt to finding alternative means and only ceases when people have managed to reach their goal after all or come to terms with not attaining it (e.g., Martin & Tesser, 1989; 1996). Note that these findings are both bound to the specific contents of a goal or task *and* refer to objectively insurmountable obstacles. However, the view that rumination might reflect attempts at finding alternate means points toward the possibility that individuals might subjectively still have considered all these obstacles as potentially surmountable. Future research might therefore examine whether explicitly breaking the "illusion of surmountability" would make people think less about blocked goals or tasks (see Epstude & Roese, 2008).

Going beyond content-related effects, other research has examined the impact of background noise on cognitive performance (e.g., Jones et al., 1990; LeCompte, 1994; Martin et al., 1988; for a review, see Banbury et al., 2001). In this type of research, participants typically work on a short-term memory task that requires them to recall a sequence of visually presented verbal stimuli. During this task, a background noise (e.g., narrative speech, isolated sounds) is played that they are asked to ignore. In a nutshell, results from these studies suggest that any kind of background noise is likely to impair performance on cognitive tasks that involve serial or free recall to the extent that the noise is variable and changing rather than monotonous. Accordingly,

the impact of background noise on short-term memory can be regarded as independent of content. However, when the focal task relies on the processing of meaning (e.g., reading comprehension, proofreading), meaning in the sound also influences performance on the focal task (Jones et al., 1990). Notably, interfering noise per se does not constitute an insurmountable obstacle, as it does not block progress on a task completely. However, it could become insurmountable if a performance threshold is specified that cannot be attained. Accordingly, when the variable in question is performance on the task with which the obstacle interferes, the only difference one would expect to occur between surmountable and insurmountable obstacles would be a difference in performance.

Although the latter type of research does not ask what people think about when they encounter an obstacle, it is still bound to the specific context in which the obstacle appears. Thereby, it leaves open the question of whether obstacles might have an impact in completely unrelated contexts or tasks. To fill this void, a recent series of studies by Marguc, Förster, and van Kleef (2009) addressed the question of how obstacles influence the more general ways in which people perceive and process information from their environment (see Lewin, 1935). Specifically, focusing on potentially surmountable obstacles, these studies investigated if and when obstacles lead people to *perceptually* and *conceptually* process information in a more global, encompassing manner as opposed to a more local, detailed manner, such that they attend more to the overall Gestalt of objects rather than their details and make use of broad rather than narrow mental categories, respectively. Because processing styles are free of content and were shown to carry over from the context in which they were elicited to completely unrelated situations or tasks (Schooler, 2002; Schooler et al., 1997; see also Förster et al., 2007), investigating the influence of obstacles on global versus local processing styles allows for testing cognitive effects that are unrelated to the specific contents of a goal or task and reach beyond the very context in which the obstacle originally appeared.

Content-Independent and Context-Independent Effects

In some of their studies, Marguc and colleagues (Marguc et al., 2009) aimed to simulate an obstacle that people commonly encounter in their working environment. Thus, in one study, participants first worked on a series of anagrams in the presence or the absence of an interfering background noise

(i.e., words) and then completed an ostensibly unrelated task (see Navon, 1977) measuring the extent to which individuals perceive the "forest" rather than the "trees" or vice versa. In this task, a series of stimuli was presented (see Figure 1), each of which consisted of a single large letter (e.g., an *H* or *L*) that was composed of numerous small letters (e.g., *F* or *T*). Participants had to indicate as quickly as possible, by pressing one of two designated keys, whether each stimulus contained a letter *L* or a letter *H*. Global targets were those where a large *L* or *H* was made up of small *F*s or *T*s, whereas local targets where those where a large *F* or *T* was made up of small *L*s or *H*s. Overall faster responses to global targets reflect a relatively more global perceptual scope (i.e., focus on the "forest"), whereas faster responses to local targets reflect a relatively more local perceptual scope (i.e., focus on the "trees"). Results of this study revealed that participants who had encountered an obstacle in the first task responded faster to global than to local targets than participants who had not encountered an obstacle. In a conceptual replication chronic volatility (Kuhl, 1994) was added as a variable reflecting whether people chronically "stay in the field" or tend to "leave the field". Using a measure of global versus local perception that involves geometrical figures (Gasper & Clore, 2002) rather than letters perceptual scope increased, as predicted, primarily among participants who generally become engaged in activities very easily and like to finish what they are doing (low volatility; Kuhl, 1994), but not among participants who quickly disengage and switch to alternative activities prematurely (high volatility).

Similar results were found with regard to *conceptual* scope, that is, whether people process information in a more abstract, integrative manner rather than a concrete, analytic manner. In two studies, high versus low volatility was either measured as a chronic trait (Marguc et al., 2009; Study 5) or manipulated experimentally (Study 6). Afterwards, participants navigated a maze on the computer in which an obstacle either did or did not suddenly appear and block the most direct path to the goal (Figure 2). In an ostensibly unrelated variant of Mednick's (1962) Remote Associates Task (i.e., a task that involves searching for similarities and integrating seemingly unrelated concepts), when trait or state volatility was low, participants performed better if they had navigated the maze with compared to without an obstacle, whereas when trait or state volatility was high, performance remained stable, suggesting that being motivated to remain engaged in an activity is important for obstacles to elicit global processing.
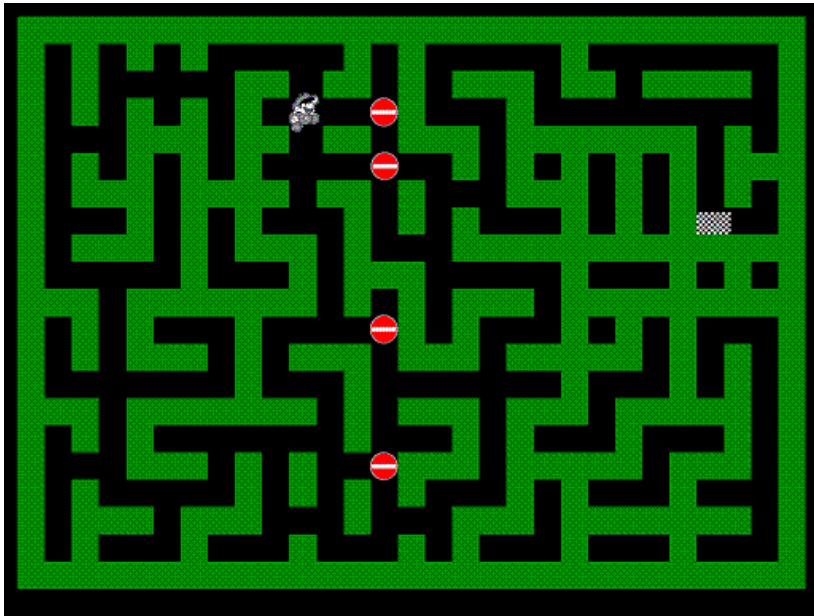
Figure 2. Obstacle manipulation used by Marguc, Förster, and van Kleef (2009). In the obstacle condition, an obstacle appears while navigating the maze. In the control condition, participants navigate the maze without an obstacle.

These findings are compatible with Lewin's (1935) perspective on obstacles, which, on the one hand, presupposes that people are likely to have gathered ample experience throughout their lives in dealing with obstacles and might thereby instantly respond to obstacles by broadening their perspective and, on the other hand, takes into account the importance of being willing to stay engaged and deal with the obstacle. The findings also go beyond Lewin's (1935) view in that an obstacle encountered in one task was shown to trigger a more global, Gestalt-like processing style that transfers onto tasks that are both independent of content and unrelated to the task in which the obstacle originally appeared.

Notably, the effects on perceptual and conceptual scope were all independent of mood, perceived task difficulty, and motivation, which may be due to the fact that these studies examined rather pure forms of obstacles that were close to the basic definition of interfering forces. Undoubtedly, obstacles that are subjectively insurmountable, very difficult to overcome, or otherwise threatening or aversive, might elicit avoidance motivation or negative mood and thereby lead to local processing (e.g., Friedman & Förster, 2005; Förster,

Friedman, Özelsel, & Denzler, 2006; Förster & Higgins, 2005; Gasper, 2004; Gasper & Clore, 2002). Research on the aforementioned novelty categorization theory shows that this is the case for novelty. Whereas (slightly aversive) novel events enhanced global processing, strongly aversive novelty triggered aversive arousal, leading to local processing (Förster et al., 2009). Moreover, when the directional pull of the desired end-state is very intense, such as when an important personal goal is at stake, people might be less able to mentally step back or distance themselves from the situation at hand (see Lewin, 1935; Liberman & Förster, 2008) and thus be less likely to switch to a more integrative, Gestalt-like way of processing information.

Although research on the basic cognitive effects of obstacles is still in its beginnings, the results that have emerged so far suggest that at least mild forms of obstacles can prompt people to adopt a more global, encompassing processing style that facilitates seeing the "big picture" and allows them to integrate seemingly unconnected pieces of information in tasks that are independent of content and unrelated to the task in which the obstacle originally appeared. This effect was mainly found when people were chronically, or through priming, inclined to become very engaged and follow through with what they do, but not if they were inclined to disengage and switch to alternative activities prematurely. Thus, being motivated to stay on track and deal with an obstacle plays an important role for how obstacles affect cognition. What do these findings mean?

Implications for Unrelated Tasks

Because global processing is associated with a diverse set of outcome variables, including assimilation rather than contrast in social judgments (Förster, Liberman & Kuschel; 2008), a search for similarities rather than dissimilarities (Förster, 2009), higher acceptance of unconventional art (Schimmel & Förster, 2008), improved creative thinking (Friedman, et al., 2003), and better face recognition (Macrae & Lewis, 2002), it might be that when obstacles elicit global processing (see Marguc et al., 2009) these variables would be affected as well. If this were the case, obstacles could increase the likelihood that a person will include John Cage's piece 4′33″ (a piece where no tone is played for four minutes and thirty-three seconds) into the category of music or recognize a celebrity disguised with a baseball cap and sunglasses jogging down the street. Obstacles could also lead people to think of a more creative Christmas menu, estimate their own consumption of

alcohol to be lower than it actually is when comparing themselves to Serena Williams, or perceive more similarities than dissimilarities between two TV shows. Such possibilities are currently being addressed.

Implications for Dealing with Life's Obstacles

From Lewin's (1935) perspective, a global processing response to obstacles is adaptive, because is allows for a birds-eye perspective that facilitates perceiving the entire problem situation and might make it easier to find ways around an obstacle. In line with this reasoning, Kruglanski and colleagues propose that whenever a means to a goal is blocked or fails, people may need to shift means (Kruglanski & Jaffe, 1988; Kruglanski, Shah, Fishbach, Friedman, Chun, & Sleeth-Keppler, 2002), that is, select another means from a pre-existing set (see also Martin & Tesser, 1989) or generate new ones. Assuming that cognitive representations of goal systems are based on networks of associated goals and means (Kruglanski et al., 2002), it might be that the first step towards accomplishing a means shift would be to broaden one's perspective and look beyond the means that is being obstructed.

A more global, integrative processing style might also help people determine how exactly an obstacle stands in the way of accomplishing a task or reaching a goal and might help to keep both obstacle and goal in mind while searching for solutions. In line with this view, research by Oettingen and colleagues (e.g., Oettingen, 2000; Oettingen et al., 2000; Oettingen, et al., 2001; Oettingen & Stephens, 2009) suggests that focusing only on some parts of a situation rather than its entirety, for example, by solely dwelling on the negative aspects of present reality or solely thinking about how nice it would be to attain the desired future without relating the present to the future, leads people to neglect the fact that they need to take active steps in order to move from where they are to where they want to be. Moreover, without considering how aspects of the present stand in the way of reaching a desired future, it seems difficult to determine which steps would be the most appropriate ones in a given situation.

Finally, global processing might help people who are very focused on their goal to open up to information that might seem irrelevant to the goal itself, but contains cues that might help them deal with the obstacle or decide whether or not to persist and invest further effort into the current task or goal (see Förster et al., 2010). Generally, findings suggest that when people deliberate which goal to pursue, they tend to process information in a

relatively open-minded manner that allows them to take into account as much information as possible to make a good choice, whereas once they have chosen a goal, they tend to process information in a more focused and selective manner that helps them filter out goal-irrelevant information (Fujita, Gollwitzer, & Oettingen, 2007; Gollwitzer, 1990; Heckhausen & Gollwitzer, 1987; see also Gable & Harmon-Jones, 2008). When an obstacle hinders progress, switching to a more global processing style might allow people to become more receptive again to information that was unimportant for reaching the goal before, but might now help to overcome the obstacle or decide whether it is still feasible to persist in light of the new circumstances (see Carver, 1996; Carver & Scheier, 1981, 1990a, 1990b, 1998; Jostmann & Koole, 2009; Wrosch et al., 2003; Wrosch et al., 2003).

Notably, a global processing response to obstacles does not guarantee success, because people still need to choose which might be the best way to overcome the obstacle and because some situations or tasks might naturally benefit from a more detailed and analytic processing style than from an encompassing, integrative one (see Friedman & Förster, 2008). To illustrate, imagine a mathematics student who is trying to finish a homework assignment in the library. That student might experience the noise of other people whispering as highly interfering with the task and thus respond with global processing. Unless this would lead the student to look for a more tranquil area or request the people to be quiet, the quality of the assignment would be likely to suffer, because analytic tasks benefit more from a local, detailed processing style (Förster, 2009; Friedman & Förster, 2008). Furthermore, although the student might have found other quiet areas in the library, all of them might already be occupied. Thus, trying to ignore the sound and focus on the task at hand might actually help the student, if doing so would induce a more local processing style that is beneficial for analytic tasks. Yet, to fully understand the role of global versus local processing in dealing with life's obstacles and to develop strategies that will help people overcome those obstacles, future research needs to investigate in more detail when global processing is an adaptive cognitive response to obstacles and when it is not.

CONCLUSION

In this chapter, obstacles and their effects were reviewed on the basis of a 2 x 3 typology that distinguishes between potentially surmountable and

insurmountable obstacles on the one hand, and their affective, motivational, and especially cognitive consequences on the other hand. Based on this review, several questions and possible directions for future research emerged. One general question that seems worth further consideration concerns the role of objective versus subjective (in)surmountability in shaping people's responses to obstacles. For instance, it might be that unless a person also subjectively accepts that an obstacle is impossible to overcome, that person might treat it as surmountable and therefore keep ruminating, experience stronger negative affect upon repeated failure, and yet, through increased engagement (see Higgins, 2006), attribute more value to a blocked goal.

Furthermore, because obstacles not only influence people's affect, motivation, performance on cognitive tasks they interfere with, or how much people think about blocked goals, but can also influence the more general ways in which people perceive and process information from their environment, it is likely that the consequences of obstacles are more far-reaching than researchers to date would have expected. Thus, it is important for future research further investigate possible consequences of the basic cognitive processes that are set in motion when people face an obstacle, as well as the interplay between people's cognitive, affective, and motivational responses to obstacles.

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Chapter 5

NEW THINKING ABOUT THINKING AND RAMIFICATIONS FOR TEACHING

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ABSTRACT

Since the early 1990s, there has been a concentration of effort aimed at maximizing student achievement in school education and rectifying the debilitating effects of failure. In 1994, a Carnegie Corporation Taskforce on Student Achievement drew on new research in a variety of fields, including the emerging 'new neurosciences', to refute the narrow assumptions and findings of conventional educational research and to assert that effective learning requires a response that is as much about affect and social dynamics as about cognition. In so doing, it challenged the erstwhile dominant thinking about thinking and its ramifications for teaching, re-defining learning to incorporate into the notion of 'intellectual depth' matters of communicative competence, empathic character and self-reflection as being at least as significant to learning as the indisputably important technical skills of recall, description, analysis and synthesis. The chapter will explore the research findings of the new neurosciences and the implications of their new thinking about thinking for effective teaching. It will draw especially on a range of research insights into effective teaching based on application of these findings, including drawing on data from a number of research projects from the

Australian Government's Quality Outcomes and Values Education Programs.

OLD THINKING ABOUT THINKING IN TEACHING

Such was the sense of certainty that accompanied earlier research insights into thinking that its so-called 'empirical findings' became virtual canons that were beyond critique, much less refutation. Hence, the findings of Piaget, Kohlberg, Erikson, Parsons, Skinner and co. provided the indisputable foundations of thinking about thinking for teaching and teacher education. In fact, in retrospect, their findings were essentially linear, deterministic and based on surprisingly more limited evidence than the apparent surety of their postulations would lead one to expect. In the end, they have constrained teaching and reduced the power that should be associated with the role of the teacher far more than tends yet to be acknowledged. Like so much of the social science paradigm that stemmed from the heyday of nineteenth-century science, these theories have failed to inform teaching in the way that it requires (Jorg et al., 2007; Lovat, 2008).

Some of the older thinking about thinking was expressed in linear stage development theory, be it of maturation, socialization, motivation or learning itself. Especially in educational psychology, these are the theories that have tended to dominate much of what is referred to in teaching and teacher education as the 'foundations'. Interestingly, in spite of serious counter-research by the likes of Gilligan (1982), Hoffman (2000) and Zahn-Waxler et al. (1979), Freudian, Piagetian and Kohlbergian research seems often to have been presented in fairly uncritical fashion as offering the firmest and most empirically sound bases for thinking about intellectual development.

The reason for this is that arguably these latter 'giants' of psychosocial understanding relied heavily on a combination of observation and rationalistic analysis. Their slightly lesser known critics, on the other hand, rested much of their critique on recourse to the affective. Gilligan, for instance, saw Kohlberg's thesis of moral development as being biased in favour of the male disposition towards rules and regulations as holding sway over considerations of caring and relationships, considerations more germane to women. In similar vein, Hoffman regarded morality as being principally emotionally rather than cognitively driven, so calling into question classical Freudian theory, and Zahn-Waxler and co. identified pro-social behaviour in children much earlier than proposed by Piaget because they concentrated on expressions of care and

empathy, rather than the demonstrations of cognitive advance that lay at the centre of Piagetian theory.

The above critiques of classical developmental theory were early warning signs of the revolutionary new insights about human functioning being uncovered by the new neurosciences. We will return to examine them in greater detail but, for now, suffice it to say that they are turning on their head notions that human development can be ascertained and understood purely with reference to the cognitive domain and rationalistic assumptions. The role of affect is being seen increasingly as more than an adjunct or added extra in explaining all manner of human development. It is being seen as an indispensable component of all that we have understood by the cognitive and rational. 'Cognition and affect' is a nexus and this insight has profound implications for teaching and school education.

It is worth noting, as an aside, that the narrow instrumentalism to be found in the classical cognitive theories was matched by similar paradigms of thought in socialization theories. Psychology that led to disjoined cognition theory and sociology that led to deterministic theory of socialization became the bedfellows of the foundations of teaching and teacher education. The result was an inevitable pessimism about the capacity of teaching and schooling to impact on an individual's learning potential, once impaired cognition and (almost inevitably) the allied disadvantages wrought by heritage and socio-economic environment had been demonstrated.

When one peruses the average sociology text designed to support the foundations of teaching and teacher education, one is struck by the dominance of paradigms of thought that juxtapose deterministic and conflict (or neo-Marxist) theoretical positions, perhaps softened by some Weberian moderation around the thinking of symbolic interactionism. These courses tend to give the impression that educational sociology is a fairly remote discipline that has little power other than to analyse and speculate about social phenomena as they pertain to schools, finally giving the impression that the real choices are either to become reconciled to the fact that the students in one's care as a teacher will be determined by forces beyond their own or the teacher's control, or else to form them into bands of neo-Marxist rebels who will forge their own proletarian revolution. Neither of these options really offer future teachers much hope that they will be able to make a real difference to the lives of their students, least of all for those who need intervention most because of their heritage, disadvantage or disability. While updated a little, much of the determinism of Talcott Parsons ('Families are the factories of life') and Christopher Jencks ('What comes out of the school is what went in') seems

still to be essentially in place, with the only alternative for a teacher who wants to make a difference being in resistance if not demolition of the hegemony.

NEW THINKING ABOUT THINKING IN TEACHING

The potential for new thinking about thinking to replace the older foundations of teaching was what first impelled the revolutionary thought behind the Carnegie Report (1996). This was partly evidence emanating from the new neurosciences (Bruer, 1999). The new neurosciences represent a set of research findings concerned with the brain, its constitution and functioning, and hence a range of related issues around cognition, thinking and learning. In turn, the new neurosciences, in contrast with many of their older forebears, establish contingent relationships between cognition, affect and sociality. In other words, emotional and social developmental factors are inherent in cognitive development.

As an example, Antonio Damasio's (cf. Damasio, 2003; Immordino-Yang & Damasio, 2007) main interest is in the neurobiology of the mind, especially concerning those systems that underpin memory and emotion. His work is associated with the notion of the cognition/affect/sociality nexus, a way of conceiving of emotion, feelings and social competence as not being separate so much as inherently part of all rational processes. The scientific rigor of his experimental work, together with the strength of his findings and those of others (Rose & Strangman, 2007), is causing educationists to re-think many of their assumptions about a range of developmental issues, including that of learning itself. After all, if Damasio is correct, then those dominant conceptions of thinking that regard development as linear, rational and progressive, regardless of emotional and social development, are turned on their heads:

> Modern biology reveals humans to be fundamentally emotional and social creatures. And yet those of us in the field of education often fail to consider that the high-level cognitive skills taught in schools, including reasoning, decision making, and processes related to language, reading, and mathematics, do not function as rational, disembodied systems, somehow influenced by but detached from emotion and the body. (Immordino-Yang & Damasio, 2007: 3)

Furthermore, the taxonomic notion that cognitive learning outcomes can somehow be separated from affective ones comes to be seen as a faulty

assumption. For example, the idea that literacy training can be achieved through mastery instruction and testing, without reference to the physical and emotional ambience within which the learning is occurring nor moreover to the levels of confidence and self-esteem of the learner, appears to be naïve in the extreme. Above all, Damasio's work implies a refutation of the pessimism that the old foundations unwittingly imposed on the potential of teaching to break through barriers of disadvantage. Damasio's work implies optimism that, if teaching is directed to all the developmental measures, including emotion and sociality, rather than just the allegedly separable cognitive measures, then the potential to engage the interests and attention of those not easily engaged is enhanced. After all, it is the many issues of emotionality and sociality related to heritage, disadvantage and disability that serve to block the learning interest of many students in school, rather than merely a raw and separated cognitive ability or the lack thereof. Teaching that is sensitive to and addresses these realities has been shown to be more effective in drawing in such a clientele as well as making learning more engaging for all. These claims will be confirmed with evidence below.

Another theorist whose work impinges on new thinking about thinking is Daniel Goleman (1996; 2001; 2006), a trained cognitive theorist who has become associated most with notions of social and emotional intelligence, and hence social and emotional learning. Goleman has demonstrated in his work that social intelligence (SQ) and emotional intelligence (EQ) are at least as vital to sound cognition as the traditional notion of IQ. Indeed, the evidence would suggest that they are in fact the key to the demonstration of effects normally associated with IQ. For teaching and teacher education, the implication is that IQ, a notion that has been prominent in teaching, is not fixed, free-standing and determinative of student achievement as an isolated factor, with all the impelling pessimism about the capacity of teaching to make any real difference to what is already set in stone. IQ in fact denotes a highly contextualized phenomenon, at least in part dependent on other factors about one's current state of wellbeing of body, mind, emotion and sociality. As such, the effects normally associated with IQ are not merely the expressions of genetic and environmental advantage or disadvantage, and so unable to be impacted on by teaching intervention. They are in fact measures that can be affected and effected by well-informed and well-constructed teaching that is aimed at all the developmental measures.

Like Goleman, Robert Sternberg (2007) is a trained psychologist and, in his case, psychometrician. Like Goleman, Sternberg's training would naturally have led to acceptance of the more linear cognitive notions of thinking

identified above. Sternberg however is also a convert to seeing cognition as part of a broader mix of human factors. Sternberg refers to different forms of intelligence, namely, analytic, synthetic and practical, involving a fuller range of human capabilities than is understood by the more limited and rationalistic notions of intelligence. In his case, he was not only critical of the traditional IQ test but actually devised a more sophisticated intelligence test based on his broader theory of intelligences. Damasio, Goleman and Sternberg would seem to owe much to the foundational thought of Howard Gardner (1983) around multiple intelligences.

Martin Seligman (2004), also a psychologist, is one who has taken to the older paradigms of thought in his own discipline with a particularly sharp critique. Known best for his work on positive psychology, he is heavily critical of traditional forms of psychology for their emphasis on the negative, the helpless and the pessimistic, so impelling thinking that leads to depression and feelings of hopelessness. For him, psychology must become more conscious of and adept at effecting positive thinking in order to engender feelings of optimism and control. In recent times, he has done much work in applying his theory of positive psychology to schools and education where he clearly sees the negative impact of earlier foundational thinking.

As illustrated above, it is not merely psychology that deals with the phenomenon of thinking nor psychology alone that has impacted so negatively on the foundational thinking of teaching. The work of Jurgen Habermas (1972; 1974; 1984; 1987; 1990), philosopher and sociologist, would seem to be central to new thinking about thinking in the modern world. Habermas's theory of knowing fits well with the neuroscientists' work on multiple intelligences and, furthermore, he develops a theory of social engagement and action that justifies optimism on the part of any social agency, including teaching, to be able to make a difference as long as it goes about its central business of knowing in a comprehensive and holistic way. Habermas rests his notion of effective social action (namely, *praxis*) on people reaching the most sophisticated levels of knowing. In other words, in contrast with more dated foundational thinking about knowing as mainly a cognitive function, Habermas posits that the deepest forms of knowing actually rest on effective social and moral citizenship, rather than on the allegedly separable cognition. Habermasian thought has potential to deepen profoundly not only our understanding of the full human developmental capacities that are implied in effective teaching but, by dint of inference, to stretch our conceptions of the role of the teacher as well.

The genius of Habermas as a foundational character in thinking about the kind of thinking needed in effective teaching is that he is, at one and the same time, a modern and an ancient character. That is, he is a modern theorist whose work speaks to his time but also rests on the scholarship of the ages. His balanced appraisal of the most sophisticated knowing being one that relies as much on human communication and knowing of self as it does on empirical facts and figures is reminiscent of the moderation of Aristotelian thought about human virtue, whereby one knew what was right, cared about one's fellows and knew how to translate this knowing and feeling into practical action. For Aristotle (1985), knowing in this way led to the most complete forms of human happiness.

So, to be introduced to Habermas is to be introduced to Aristotle and then it is a case of where to stop as the potential to uncover all of the foundations of thought relevant to an agency of human service, like teaching, become available to the teacher educator. Be it with reference to the heritage of classical Islam, Christendom or more recent forces, courses could be constructed for the student teacher not only for induction into one's own civilization but with crucial learning points for the future teacher about the true fundamentals of the trade. For Abu al-Ghazzali (1991), for instance, the medieval Muslim Sufi who relied so much on Aristotelian thought, there was one fundamental belief above all others. This was that care and trust were the indispensable features of any authentic human relationship and furthermore that this authenticity rested on practical action. That is, impelled by one's belief in an active and caring God, one should take any opportunity of human engagement to make a difference for the good. In Christendom, Thomas Aquinas (1936), whose thinking was inspired by both Aristotle and al-Ghazzali, *synderesis* was the inborn disposition given by God to the human being that allowed for authenticity in any relationship to take the form of practical action for good. So, Habermas as a foundation can lead back as far as we might wish to go in introducing students to the heritage of their thought but also in countering any of the pessimism of the 'old' social sciences that might persist in the thinking of the systems into which they will be employed.

IMPLICATIONS OF THE NEW THINKING
ABOUT THINKING FOR TEACHING

The notion that thinking is not a separable cognitive function but one that is enmeshed in a matrix of emotional and social development is well captured

Terence Lovat

by Haim Ginott (1969) in his epithetic warning to teachers: 'in order to think well, a child must feel well.' It is a notion that much recent educational research has confirmed. For example, Ken Rowe (2004) noted that, of all the teacher qualities nominated by those students who achieve best at school, it was their beliefs about care and trust in relation to the teacher that were paramount. While the more predictable measures of demonstrable content knowledge and stimulating teaching styles were as evident as one would expect, they rarely stood alone and appeared to be relative to the greater indicator of student confidence that the teacher was trustworthy and had the student's best interests at heart. Similarly, Bill Louden et al. (2004) concluded that it was difficult to pick likely student effects from simple observation of teacher practice. One might caricature the findings of this study in suggesting that lying behind the relationship between practitioner and student was the far more powerful relationship between elder and younger person.

Hence, constructing educational regimes that focus exclusively or even overly on a denuded conception of cognition, without equal and integrated attention to all the developmental measures including emotional, social, moral and spiritual, are doomed to fail those who need them most. This is fairly much what the Carnegie Report, cited above, said. After all, the achievers will probably achieve however badly we do our formal education. If absolutely necessary, the achievers could, for the most part, receive their tuition outside of formal education. It is the portion of society for whom formal education, public or religious, was primarily formed in the nineteenth-century, who have especial needs around holistic education. It is this portion of the population that has the greater need around matters of self-esteem, confidence and, often, social, emotional and moral development. Far from the popular commentary that continues to claim that the academic needs of this portion of the population (ie. the 'failing tail') would be served by more mastery instruction and further testing around the 'basics' of learning, the foundations identified above would help to explain why all the mastery instruction and testing in the world will achieve nothing if the whole person, social, emotional, moral and spiritual, as well as intellectual, is not drawn in to a positive, encouraging, caring and trusting learning ambience where the relationship(s) between teacher and student, and student and student, are the priority.

THE NATIONAL FRAMEWORK FOR
VALUES EDUCATION IN AUSTRALIAN SCHOOLS

The Australian Government's commitment to quality outcomes and values education has provided the opportunity for the theses and related evidence outlined above to be tested in multiple settings and using an array of educational criteria. In the 2004 Federal Budget, 29.7 million dollars was allocated to build and develop a national values education program, guided by the *National Framework for Values Education in Australian Schools* (DEST, 2005). The National Framework has driven a number of important projects related to best practice in schools, teacher education, parents and other stakeholders and resources. The largest project, the *Values Education Good Practice Schools Project* (VEGPSP), impacted on 316 Australian schools in 51 clusters. The schools were drawn from all sectors across all States and Territories, with many of the clusters consisting of schools from across the sectors of public, private and religious. Throughout its two stages, VEGPSP involved over 100,000 school students and over 10,000 teachers. At its core were the 51 Cluster Leaders (senior teachers) and their University Associates (academic mentors). Between these two functions, the research and practice nexus of the project was assured.

While cluster projects varied, they were all guided by the conceptual basis of the National Framework, as well as its guiding principles and core values. The guiding principles were explicitly connected with the charter for schooling explicated by Federal, State and Territory Ministers in the *National Goals for Schooling in the Twenty First Century* (MCEETYA,1999), the so called 'Adelaide Declaration'. The Adelaide Declaration represented a marked shift in educational philosophy as it had progressed in the later part of the twentieth century. The instrumentalist and reductionist tendencies of much educational research of the second half of the twentieth century had led to a range of late twentieth century reports that had tended to narrow the goals of schooling to those of job and career preparation, with similarly narrow perspectives on the kinds of competencies and outcomes required of effective learning. The Adelaide Declaration recovered much of the far richer vision of the nineteenth century educational foundation charters, including being explicit about the comprehensive role for schools in matters of citizenship and the specific role of values formation as a core function of effective schooling. The Declaration also showed sensitivity to contemporary concerns around human development in specifying that "… schooling provides a foundation for young Australians'

intellectual, physical, social, moral, spiritual and aesthetic development."
(MCEETYA, 1999)

The *National Framework for Values Education in Australian Schools*
(DEST, 2005) built on the broad perspectives offered by the Adelaide
Declaration in making the specific link with values education as a means of
facilitating its lofty and comprehensive goals for schooling. It spoke of values-
based education as a way of addressing some of the social, emotional, moral,
spiritual and aesthetic developmental issues that schooling tends to neglect.
Specifically, it stated that such education has potential to strengthen students'
optimism, self-esteem, sense of personal fulfilment, ethical judgment and
social responsibility. Furthermore, it asserted that values education is essential
to effective schooling, integral to all key learning areas, crucial to wellbeing
and reflective of good practice pedagogy. The Framework rationale made
explicit reference to the language of quality teaching as both supporting and
being enhanced by values education. Herein, was the vital link with effective
teaching, the 'double helix effect' (Lovat & Toomey, 2009) that sees the
comprehensive learning implied by the Carnegie definition (intellectual depth,
communicative competence, empathic character, self-reflection) more readily
and easily achieved in the learning ambience created by values education. The
VEGPSP Stage 1 and 2 Final Reports (DEST, 2006; DEEWR, 2008) offered
ample evidence that a well-constructed values education has potential for
profound effect on the whole educational system, affecting such variables as
school ethos, teacher practice, classroom climate, student attitudes and
behaviours, parental and community connections, as well as student attention
to academic work.

Much of the language of the testimony provided by teachers and
university associates in the reports captured well the intersection between
matters relating to enhanced academic attainment and the depth of thinking,
affirmative classroom climate and positive relationships implied in the nexus
between effective teaching and values education. The Stage 1 Report (DEST,
2006) spoke richly of an array of learning features that were enhanced by the
various values education projects. These features included: quality teaching
and pedagogy; holism in the approach to student development; quality
relationships at all levels; values being both modelled and enunciated in the
curriculum; enhanced intellectual depth in both teacher and student
understanding; greater levels of student engagement in the mainstream
curriculum; student willingness to become more involved in complex thinking
across the curriculum; increased pedagogical approaches that match those
espoused by quality teaching; greater student responsibility over local, national

and international issues; greater student resilience and social skills; improved relationships of care and trust; measurable decline in the incidence of inappropriate behaviour; greater student awareness of the need to be tolerant of others, to accept responsibility for their own actions and their ability to communicate; improved students' sense of belonging, connectedness, resilience and sense of self; reflective change in the participant teachers and schools; provision of the opportunity to explore from within and reflect on identity and purpose; changed approaches to curriculum and pedagogy; enhanced students' ability to articulate feelings and emotions; impelling the emotional development of the students; evident transference in all aspects of classroom teaching and in the students' ability to deal with conflict in the playground; calmer and more cohesive classroom atmosphere; creation of a comfort zone for discussing emotions; improved levels of happiness for staff and students; development of higher order thinking skills; impelling restorative pedagogical practices; changing the ways teachers related with students; improving engagement and commitment of pupils, teachers and parents; valuing the need to create interpersonal intimacy and trust in the classroom; and, the 'ripple' or 'trickle-down' effect that values education has across the school.

Beyond these general sentiments, substantial testimony included the following:

> … the documented behaviour of students has improved significantly, evidenced in vastly reduced incidents and discipline reports and suspensions. The school is … a 'much better place to be'. Children are 'well behaved', demonstrate improved self-control, relate better to each other and, most significantly, share with teachers a common language of expectations of values. Other evidence of this change in the social environment of the school is the significant rise in parental satisfaction. (p. 41)

> Everyone in the classroom exchange, teachers and students alike, became more conscious of trying to be respectful, trying to do their best, and trying to give others a fair go. We also found that by creating an environment where these values were constantly shaping classroom activity, student learning was improving, teachers and students were happier, and school was calmer. (p. 120)

> … has provided many benefits to the students as far as a coordinated curriculum and learning experiences that have offered a sense of belonging, connectedness, resilience and a sense of self. However, there has been none more significant than the reflective change that has occurred in the participant teachers and schools. (p.185)

Terence Lovat

Similarly, the Stage 2 Report (DEEWR, 2008) uncovered the vital link between a values approach to pedagogy and the ambience it created with the holistic effects of this approach on student behaviour and performance. In Stage 2, a number of features of the broad values approach were clarified. These included the role of the teacher being seen to be even more central than had previously been recognized, the explicitness of the pedagogy around values being seen to be determinative, and the role of an experiential or 'service learning' component coming to be seen as a particularly powerful agency in effective teaching. The following quotes are indicative of these features:

> … focused classroom activity, calmer classrooms with students going about their work purposefully, and more respectful behaviour between students. Teachers and students also reported improved relationships between the two groups. Other reports included improved student attendance, fewer reportable behaviour incidents and the observation that students appeared happier. (p. 27)
> We observed that those teachers whose classrooms were characterized by an inclusive culture of caring and respect and where character development played an important and quite often explicit role in the daily learning of students were those same teachers who also demonstrated a high level of personal development, self-awareness of, and commitment to their own values and beliefs. (p. 39)
> Uniformly, teachers report that doing something with and for the community increases the students' engagement in their learning. This resonates with an interesting but relatively new proposition in education: when students have opportunities to give to their community, to something beyond themselves, it changes their attitude to the learning tasks. (p. 41)

Thus, the VEGPSP Stage 1 and 2 Reports illustrate the dynamics of the reciprocal interaction between values education and effective teaching. Courtesy of their evidence, we have ample demonstration that a well-constructed, clear and intentional values education program being integrated into the fabric of the school has the potential to bring transformational changes in the ethos of the school and the learning environment of the classroom, extending to student and teacher behaviour, beneficial effects on student motivation to learn and more than a hint of improved academic achievement.

As illustrated in the quote above, by the time the Stage 2 Report was compiled, there was a growing indication that the vast array of anecdotal data

and teacher testimony were testable in some way. This led directly to the *Project to Test and Measure the Impact of Values Education on Student Effects and School Ambience.*

TESTING AND MEASURING THE IMPACT OF VALUES EDUCATION

As asserted above, the thesis about the inextricable link between values education and quality teaching, as well as the particularly beneficial effects of a service learning component as part of this mix, has been the subject of much anecdotal evidence and strong teacher assertion in the two stages of VEGPSP (DEST, 2006; DEEWR, 2008). Across the three years in which the project rolled out, the nature of the evidence was shifting from being purely qualitative to having a quantitative edge, albeit lacking formal instrumentation and measurement. These latter were brought to bear in the *Project to Test and Measure the Impact of Values Education on Student Effects and School Ambience* (Lovat et al., 2009). In this study, there was interest in all of the claims being made around student effects, with a dedicated focus on arguably the most contentious set of claims, namely those around student academic improvement. Granted the high stakes around this claim, the study was characterized by intensive quantitative as well as qualitative methods of analysis. In the end, the authors believed there was sufficient tested evidence to support the claim that a well crafted values education program, functioning as best practice pedagogy and therefore following the criteria of quality teaching and eliciting the goals implied by service learning, has potential to impact on a range of measures normally associated in other research programs with student achievement and effective schooling. These measures included, in turn, school ambience, student-teacher relationships, student and teacher wellbeing, and student academic diligence.

Concerning the matter of school ambience, evidence was elicited from students, teachers and parents that spoke of a "… 'calmer' environment with less conflict and with a reduction in the number of referrals to the planning room" (Lovat et al., 2009, p. 8). Of student-teacher relationships, there was evidence of a " … rise in levels of politeness and courtesy, open friendliness, better manners, offers of help, and students being more kind and considerate … the main impact of values education on student-teacher relationships appeared to be a greater understanding of each other's perspective or at least to

Terence Lovat

have a greater respect for each other's position" (p. 9). About student wellbeing, the report provided evidence of " … the creation of a safer and more caring school community, a greater self-awareness, a greater capacity for self-appraisal, self-regulation and enhanced self-esteem" (p. 10). Arguably, the most surprising and unexpected evidence was that concerned with the factor of student academic diligence. Here, the report spoke at length about students "… putting greater effort into their work and 'striving for quality', 'striving to achieve their best' and even 'striving for perfection'. The aspect of students' taking greater pride in their work and producing quality outcomes for their own pleasure was also mentioned by both teachers and parents" (p. 6). The report continues:

> Thus, there was substantial quantitative and qualitative evidence suggesting that there were observable and measurable improvements in students' academic diligence, including increased attentiveness, a greater capacity to work independently as well as more cooperatively, greater care and effort being invested in schoolwork and students assuming more responsibility for their own learning as well as classroom 'chores'. (Lovat et al., 2009, p. 6)

The mainly quantitative data that underpin the claims above were supplemented in the study by a number of case studies drawn from schools, primary and high schools, from across the country and across the sectors. In summarizing the effects of values education noted among the case studies, the report says:

> Overwhelmingly, the strongest inference that can be drawn from the case studies, when taken together as a collective case study, is that as schools give increasing curriculum and teaching emphasis to values education, students become more academically diligent, the school assumes a calmer, more peaceful ambience, better student-teacher relationships are forged, student and teacher wellbeing improves and parents are more engaged with the school … Moreover, the case studies suggest that any relationship between values education programs and the quality of student attitude, parent involvement, interpersonal relations and the like is much more complicated than simply being the case that values education in and of itself produces such quality teaching effects. Rather, it seems clear that the fit between values education and quality teaching is better described not as one having an impact on the other, but rather as the two of them being in harmony. That is, values education, academic diligence, school ambience and coherence, student and teacher wellbeing, the quality of interpersonal relationships and,

up to a point, parental participation harmonize in some way. The closer the attention a school gives to explicitly teaching a set of agreed values, the more the students seem to comply with their school work demands, the more conducive and coherent a place the school becomes and the better the staff and students feel. (Lovat et al., 2009, p. 12)

CONCLUSION

Much of the thinking about thinking that has dominated educational theory and assumptions about effective teaching is being reassessed in our own time. Under the weight of a combination of forces, many of the older paradigms of learning that resulted from those earlier assumptions are being seen to be wanting. These forces include new neuroscientific evidence that renders much twentieth-century thinking about thinking, and allied pedagogical practices, inadequate to the task of learning in the twenty-first century. They include also the evidence brought forward by the Carnegie Task Force that access and equity had been poorly served by these theories and practices and that schools and educational systems, rather than heredity and disadvantage, had to accept much of the blame for student failure. They include research around effective pedagogy that has shown how much more holistic an enterprise it is than can be conveyed merely by concern for content and technique. Allied to this is the force of new evidence about effective teaching, showing the inextricability of foundational theory that sets teachers up to see thinking as a contextual feature of human development, being reliant on all other aspects of development, including social, emotional, moral, spiritual and aesthetic. Such evidence is in abundance in the research projects emanating from the Australian Government's Quality Outcomes and Values Education programs. This evidence has sealed the fate of the older narrow and denuded foundations that cast thinking in purely cognitive terms.

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Chapter 6

NEW THINKING FOR SOCIAL MARKETING

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ABSTRACT

This article establishes that a new way of thinking is needed in the field of social marketing and that change demands a shift from transactional to relational thinking. Social marketing is still dominated by prescriptive interventions; however, this transactional logic is incapable of responding to the complexities of contemporary multi-option, pluralist societies, in which there will be no universal agreement on a single way of life. Relational thinking can help to de-construct the taken-for-granted "truths" and fundamental contradictions in current thinking as it provides a new logic that sees consumers not as targets, but as the main drivers of the value creation process. The shift from transactional to relational thinking opens new opportunities, new challenges and has deep implications for the theory and practice of social marketing. It is a complex shift that requires fundamental changes not only in values and assumptions but also on resources, skills, competencies and organizational structures.

INTRODUCTION

Relationship marketing provides a completely new way of thinking about social problems; it helps to uncover fundamental contradictions in current thinking; and it can change a field that is still dominated by prescriptive interventions and behaviour change objectives (Hastings, 2003). This article establishes that relational thinking can help social marketing respond to the complexities of contemporary pluralist societies. However, despite the theoretical potential, it is difficult to transfer relationship marketing to real-life social marketing programmes. This article discusses the challenges and the implications involved and, in particular, emphasizes that social marketing needs reflexive and self-critical thinking in order to de-construct its prevailing paradigm and start re-constructing an alternative.

VALUE PLURALISM

Values are conceived of as guiding principles in life which transcend specific situations, may change over time, guide selection of behaviour, and which are part of a dynamic system with inherent contradictions. Value pluralism is based on the idea that there is a plurality of equally final, equally reasonable goods and moral ends which are incompatible, incomparable, and incommensurable with one another. It is the idea that there are several values which may be equally correct and fundamental and yet in conflict with each other. As explained by Woodall (2003), the modern idea of value pluralism (Berlin, 1969) restates the work of Max Weber and Friedrich Nietzsche, who insisted upon the irreducible plurality of value spheres. Value pluralism is contrasted with all forms of monism which supports the expectation that all genuine moral values must somehow fit together into a single harmonious system. From such a system, supposedly, there would be a single correct answer to any moral problem.

However, modern societies are multi-option societies. As Luckmann (1996) explains, within an open market logic, a number of suppliers competes for the preference of a public that is confronted with the possibility, and the necessity, of choice between alternative sets of meanings, beginning at the level of material consumption and ending at conceptions of the good life. Pluralism forces people to choose and, Luckmann emphasizes, most people feel insecure in a confusing world full of possibilities. Pluralism has created

new institutions for the production and communication of meaning—different sorts of psychotherapy, professional counselling, self-help literature, special courses in adult education, several areas of social work and the mass media. These institutions mediate between the individual and the patterns of society; however, to function as true mediating and intermediary institutions, they must see the individual as an active producer of meaning, values and world views.

In a world of moral conflict, disagreement and dilemma, there will be no universal agreement on a single, perfect way of life. This has serious implications for social marketing and demands critical thinking. Social marketers have to re-question their assumptions about what customers want, need and value, re-define their role in society and try to respond to relevant questions: How can they contribute to the *meaning budget* of society? How can they help individuals to overcome disorientation without contributing to alienation? How can they address the balance between the best and the suitable values?

Relationship marketing can potentially help social marketing to re-position itself in the value pluralist society. Tzokas and Saren (1997) see relationship marketing as "the process of planning, developing and nurturing a relationship climate that will promote a dialogue between a firm and its customers which aims to imbue an understanding, confidence and respect of each others´ capabilities and concerns when enacting their role in the market place and in society" (p. 106). The fundamental idea is that dialogue moves us beyond the individual to a focus on the larger social and cultural context in which we live: it works to bring integration and wholeness perspective into the day-to-day decisions we make. Similarly, Gummesson (1994) calls to view relationships as they develop in the market place and society, as a whole, and their interdependence. Such an approach allows relationship marketers to expand the bases of consumer satisfaction by addressing consumers´ attributions to value. Dialogue means fostering openness (Senge, 1990) which will imply questioning the deeply ingrained assumptions that influence how marketers understand the world. Because these assumptions have an enormous impact in action, dialogue is not only about deepening understanding but also about making positive changes in the world (Bakhtin, 1981).

RELATIONAL THINKING AND RELATIONSHIP MARKETING

Morgan and Hunt (1994) posit that relationship marketing (RM) refers to all marketing activities directed toward establishing, developing and maintaining successful relationships. In the literature there is no agreement on a definition of relationship marketing. Different authors have different perspectives; however, as Gummesson (1997) points out, no definition of relationship marketing will ever be precise and all inclusive, as they can only be used as vehicles for thought, as perspectives or as indications of essential properties of a phenomenon. He sees relationship marketing as a marketing approach that is based on relationships, interactions and networks. As he explains, the shift in the marketing paradigm means that the 4P´s (traditional marketing mix) develop their role from being founding parameters of marketing to one of being contributing parameters to relationships, networks and interaction. The really significant contribution of relationship marketing is the emphasis that it puts on the process of value creation through collaboration and cooperation and in that sense, many believe that it has the potential to be the foundation for a theory of marketing (Grönroos, 1994a, 1994b; Gummesson, 1997, 2002; Parvatyar and Sheth, 2000).

The role and contribution of the so-called Nordic School of Services and of Nordic authors to relational thinking is particularly relevant (e.g., Grönroos, 1994a, 1994b, 1996, 2000, 2004; Gummesson, 1994, 1997, 1998, 2002). They helped to extend the notion of relationship marketing from service marketing to general marketing to the point of defining RM as the new marketing paradigm. In the 1990s, the Nordic school had developed into a RM school of thought. As Aijo (1996) explains, it is easy to understand why the concept of RM first became evident in service marketing: the customer is an integral part of the marketing and delivery process, and this demands a close relationship between the service provider and the customer. An integral part of services marketing is the fact that the consumption of a service is a process consumption rather than outcome consumption. Nordic school sees also marketing more as a marketing-oriented management than as a separate function. Hence, managing services is at the core of relationship building and maintenance. RM is supported by other factors like, for example, the development of customer databases and direct marketing techniques, but these alone are not sufficient. Relationship marketing requires much more than that. Grönroos (2000) emphasizes that common mistakes when discussing RM follow from a failure to understand the philosophical shift. It´s a new

paradigm, not just a new model, and it has serious strategic implications (Grönroos, 1996):

- defining the firm as a service business and focus on the competences and resources in the relationship;
- managing the firm from a process management perspective;
- developing partnerships and networks.

Defining the Firm as a Service Business

Relationship marketing strategy requires that the supplier knows the long-term needs of customers better. Customers do not only look for goods or services, they demand a much more holistic service offering including information, delivering, updating, repairing… Grönroos (1996) emphasizes that competing with the core offering is not enough. Instead, firms have to compete with the total service offering which demands the management of critical resources (human resources, technology, knowledge and time).

A Process Management Perspective

An ongoing relationship with customers, where customers look for value in the total service offering, requires internal collaboration among functions and departments which are responsible for different elements of the offering: e.g. the core product itself, advertising the product, delivering the product, taking care of complaints…The whole chain of activities has to be coordinated and managed as one total process. As pointed by Grönroos (1996), a process management perspective is very different from the functionalistic management approach based on scientific management. Functionalistic management allows for sub-optimization because each function and corresponding department is more oriented towards specialization within its function than collaboration between functions. This creates sub-values but not total value.

Terence Lovat

Partnerships and Networks

Relationship marketing is based on cooperation with customers, other stakeholders and network partners. This means firms will not view one another from a win-loose perspective but will rather benefit from a win-win situation, where the parties work as partners. This demands trust and commitment (Grönroos, 1996).

Besides pointing the main strategic implications of relationship marketing, one of the main contributions of the Nordic school researchers is their conceptualization of relationship marketing as a value creation process that combines and integrates several key processes. The relationship marketing perspective is based on the notion that on top of the value of products and/or services that are exchanged, the existence of a relationship between two parties creates additional value for the customer and also for the supplier or service provider (Grönroos, 2000). The relationship it self becomes the focus of marketing and four areas are vital for the successful execution of a relationship marketing strategy (Grönroos, 2000, 2004): an interaction process as the core of RM; a communication and a dialogue process supporting the development and enhancement of relationships; a value process as the output of RM.

However, the implementation of a value creation process can be complex and difficult. As Tzokas and Saren (1997) postulate, the value creation process is incomplete without the consumers active involvement and indeed the consumer, not the firm, is the primer driver of the value creation process. A dialogue process is needed to achieve mutual understanding, confidence and to assure that consumers´ own unique means of value creation are taken into account. However, that does not happen often (Saren and Tzokas, 1998). Similarly, Gummesson (1997) proposes that inadequate basic values and their accompanying procedures—the wrong paradigm—is the biggest obstacle in marketing. Besides the misunderstanding of what a paradigm is, he argues that other major obstacles to the paradigm shift are concerned with the absence of ethics He asserts that relationship marketing has to represent genuine change in values and ethics and that means to include the acceptance—in action, not only in rhetoric—of interactive relationships and a *win-win* situation; of both the buyer and the seller and other parties being drivers of a network of relationships; of long-term relationships being advantageous to the parties involved; and of the customer being a co-producer of value and a partner.

SOCIAL MARKETING CHALLENGES

Andreasen (1994) emphasizes that marketing, whether social or commercial, is about human behaviour – changing, reinforcing and encouraging it. Social marketing connotes what is social and what is marketing. The meaning of social marketing – like that of marketing itself – is to be found in the unique problems that confront the discipline (Bagozzi, 1975). Social marketing needs to affirm its identity, so, it is important to focus on the unique contributions it can make about understanding and influencing human behaviour (Andreasen, 2003).

Social marketing is the application of commercial marketing technologies to the analysis, planning, execution and evaluation of programmes designed to influence the voluntary behaviour of target audiences in order to improve their personal welfare and that of their society (Andreasen, 1995). The ultimate objective of social marketing is to benefit target individuals or society and not the marketer (different from commercial and non-profit marketing). The basic means of achieving improved welfare is through influencing and, many times, changing behaviour. Many social programmes are preventive in character which means that, strictly speaking, social marketing is about influencing behaviour, not necessarily changing it. However, as explained by Andreasen (2003), the term behaviour change has come to be accepted shorthand for the broader definition.

Hastings and Saren (2003) emphasize that social marketing theory and practice are developing towards more complex and ambitious modes of analysis and understanding. They embrace Lazer and Kelly´s (1992) definition of the discipline: social marketing is concerned with the application of marketing knowledge, concepts and techniques to enhance social as well as economic ends. It is also concerned with the analysis of the social consequences of marketing policies, decisions and activities. Hastings and Saren (2003) agree with Andreasen (2003) that the behaviour change agenda will continue to be very important; however, they believe that social marketing can make an enormous contribution in the growing field of critical marketing.

Social marketing has particular characteristics that make relationship marketing potentially applicable: the absence of the profit motive; the focus on high involvement decisions; complex and multifaceted behaviours; changes that take a long time; the relevance of trust and the need to target the most needy and hard-to-reach groups in society. There is convergence about the potential of relationship marketing for social marketing (Andreasen, 2001;

Peattie and Peattie, 2002; Hastings et al, 2002; Glenane-Antonadis, 2002; Hastings, 2003). The relational approach is being advocated in the literature as an alternative to the "intervention mentality" (Hastings, Stead and Mackintosh, 2002). Hastings (2003) emphasizes that to move to relationships is not a rejection of behaviour change as a key social marketing goal but a recognition that progress towards this goal is much more likely to occur if we adopt the inclusive and strategic vision that relational thinking demands. This raises important challenges that will now be analysed.

Overcoming the Persuasion Logic

Unlike commercial marketers, social marketers are expected to act in society´s interests and not in their own and this role requires that they pay extraordinarily close attention to the ethics of the goals they choose and the means they choose to get there (Andreasen, 1995). Concerning the goals, Andreasen raises the question of who decides what is good for the individual or society in a social marketing programme. Because there are no simple answers, he argues that the focus on the consumer is a good starting point. Brenkert (2002) emphasizes that, because social marketers target people who may not believe they suffer from a problem, social problems are identified independently of what any particular person or people may or may not believe. Therefore, he suggests that an ethical solution would require marketers to examine various processes and criteria that extend beyond the values of a particular social marketer. Brenkert discusses the ethical issues of privatization regarding social problems that arise when social marketers act on behalf of governmental agencies or organizations. He points out the difference between attempting to satisfy people´s wants and giving people a voice in a process whereby their wants are satisfied: the latter is essential to their self-determination and a democratic society. Sometimes targets are regarded by social marketers as being in need of persuasion, rather than as being engaged in a process, bounded by rights, within which they come to understand that change is needed.

Overcoming the Social Service Mentality

Social marketing is very different from commercial marketing but, as explained by Andreasen (1995), many field practitioners, with little experience

with marketing, often copy what looks to them like the best practices of the commercial sector without recognizing the premises that drive these practices. Social marketers are often dealing with high-involvement behaviours for which target customers often have very ambivalent or negative feelings. He describes high-involvement behaviours as those about which individuals care a great deal, where they see significant risks, where they think a lot before acting and where they frequently seek the advice of others. Working at such a deep level demands that social marketers need to really understand the complex motivations involved (Andreasen, 1995).

However, as pointed out by Andreasen, many organizations see customers as the problem and resist to marketing research, which reflects a social service mentality. The right mindset is, he suggests, a customer-centred mindset: the organization is led by its customers and does not try to make customers serve the organization´s purpose. The organization´s mission is to meet the target´s needs and wants. Rather than thinking the customer is somehow wrong for being reluctant to change, social marketers must recognize that the behaviours marketers want may not be desirable or possible from the consumer´s perspective. The assumption is that customers have very good reasons for doing what they are doing so the marketer´s challenge is to respond to those reasons.

Balancing the Individual and the Social

MacFadyen et al. (2001) point that social marketing is in the business of entrenched, taboo or even illegal behaviours and their resolution may involve the conflicting interests of the social marketer, the consumer and the wider society. Social marketers must decide which behaviours to address, ultimately prioritizing certain issues over others and, implicit in this, advocating the desirability of certain lifestyles or habits. This is a relevant ethical challenge that social marketers have to face. A complementary ethical challenge is raised by Brenkert (2002) who argues that to be effective, not simply in some temporary manner but in the long run, social marketers must consider the social context of the problem they seek to resolve. He emphasizes that targets must be motivated to change but, for this to be ethically grounded, social marketers must seek not only incentives for those they target but justifications set with in the larger contexts they inhabit. Consequently, theories of individual and social change that take a broader, more inclusive perspective

may be relevant for social marketing as they understand people´s lives in an everyday sense.

Similarly, Hastings (2003) emphasizes that the behaviours being targeted by social marketers typically fit into a desirable lifestyle that needs long term support and reinforcement. Even when they are one type actions, as individual immunizations, relationship issues such as source credibility and trust will be important. As he explains, long term health improvement is dependent on much more than the short term avoidance of illicit substances; it requires a broadly based positive lifestyle which in turn demands supportive individual knowledge and attitudes and a constructive environment. Multi-component programmes try to get that balance between the individual and the social levels. However, they also raise challenges as analysed next.

Multi-component Programmes: Overcoming the Functionalistic Perspective

The main argument in support of multi-component interventions is they are theoretically appropriate for the prevention of behaviours that have multiple determinants: individual, peer, social and environmental. These programmes will include different levels of influence and different channels: youth, school, parents/family, community organization, mass media and policy. Multi-component interventions are presumed to produce stronger effects than single component programmes because the different components reinforce or amplify one another and combine to produce a greater and longer lasting effect (Pentz et al, 1997). As explained by Stead and Hastings (2003), a further strong argument supporting multi-component programmes is that the process of developing and implementing them encourages collaboration between different organizations and sectors. This is very important to assure sustaining intervention effects beyond the formal funding period (Peterson et al., 1992; Pentz, 1996).

However, this collective of people and organizations raises important challenges. There is the danger that each function/department is more oriented towards specialization within its function than collaboration between functions. These programmes are normally funded, developed and delivered by different organizations and delivery, in particular, can get even more complex when it is devolved to numerous organizations (e.g. schools, doctors). Furthermore, some delivery agents may not approve or have any allegiance to the funder or the developer. This raises different sorts of challenges: need to

define who is the responsible for the relationship and need to focus on developing consistency and integration of the "collective". Moreover, this will potentially affect the management perspective of programmes, one of the main strategic issues of relationship marketing**.**

Partnerships and Networks: Prioritizing and Handling Multi-relationships

Relationships have and can be built with many different stakeholders. Hastings (2003) developed a multi relationship model of social marketing - buyer, internal, lateral and supplier relationships - adapted from Morgan and Hunt (1994):

- Buyer partnerships: an important distinction is between the ultimate consumer (such the smoker) and the funder (such the government health department). Building relationships with the funder enables social marketer to influence the setting of the policy agenda.
- Supplier partnerships: relationships with, for example, market research providers help bridge cultural differences between the private and public sector and ensure that progress is built on matched agendas.
- Lateral relationships: with those that control the social contexts (government, community agencies) and competitors; strategic alliances with competing social marketers can improve competitiveness and prioritize issues which is vital in the current fragmented social marketplace.
- Internal relationships: in order to build the right mindset in the organization as a whole.

The form relationships in social marketing take may vary - at least in terms of whom the relationship is built with - but, as Hastings (2003) explains, the principle of relational thinking holds true throughout. This multiplicity of potential relationships presents opportunities and challenges: one of them is how to prioritize and handle them.

Critical Evaluation: Going beyond Current Frameworks

Critical marketers question both the processes and outcomes of marketing. Hastings and Saren (2003) argue that the developments in relational thinking have important critical marketing implications. In particular, the effects of marketing on issues like social exclusion and the creation of false needs and identities affect health and consumer behaviour. Social marketing is in a good position to deconstruct them, to bridge the social and commercial world and to help devise solutions when problems are revealed.

Further, social marketers´ legitimacy is greater if they are critical about themselves and especially about their assumptions or taken for granted "truths". From a critical perspective, the challenge is to make those assumptions explicit so they can be contested, compared with alternatives and potentially changed (Eakin et al, 1996).

Relational thinking can also challenge current health promotion evaluation frameworks and potentially increase its critical power. In this context, process evaluation is particularly relevant as it looks inside the so-called *black box,* emphasizing how programmes operate rather than behavioural objectives. When inspired by relationship marketing, process evaluation frameworks are better prepared to de-construct the visions that shape programmes and better understand the consequences of those visions in the assumptions, design and implementation of programmes (Marques, 2008).

CONCLUSIONS

Relationship marketing is not a "lip service". It is a new foundation for thinking that requires strategic vision and a sense of the whole, with profound theoretical and practical implications. The transference of relationship marketing to social marketing has implications in the very definition of social marketing. Behaviour change is the ultimate goal but the process of building relationships has to be explicitly included. The transference of relationship marketing demands a broader and multidisciplinary theoretical base. Social marketing will continue to learn with commercial marketing but also needs to learn more with sociology and philosophy, especially in regard to knowledge about values and their role in human behaviour. A more reflexive and self-critical social marketing is needed which means turning to itself, de-construct its own contradictions and face its challenges. Over-reliance on expertise and

experience can be dangerous because it leads to misconceptions about the social marketers` role. Instead, they have to re-question their assumptions and taken-for-granted truths and re-centre consumers in the broader social context of their lives. This implies that it is not enough to understand their needs; it is fundamental to know how they strive to achieve the results required to fulfil their needs. Consumers` values and consumers` valuation processes have to be understood and incorporated into the programmes. This will demand long timeframes and a strategic investment in resources, namely in human resources with new skills and competencies. A *sense of the whole* is fundamental and it is not enough to be an expert in a specific area of implementation. Implementers and partners have to be fully committed to programmes, deeply understand the full range of elements and components and how it is intended that these contribute to the overall value proposition. Further, this wholeness must be reflected in the organizational structures developed for programmes: it will need to evolve to more flexible and organic structures. This flexibility will also help developing relationships with strategic partners and enhancing the synergetic effect of multi-relationships.

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Chapter 7

TRANSLATING DESIGN THINKING FOR SCIENTISTS

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ABSTRACT

Historically, design has been viewed as an activity for design professionals. Typically, the focus of design has been the intentional creation of products, structures, or systems to address the needs of firms and individuals. Why should scientists be interested in design? One reason is an ethical one, as twenty-first century realities may require the participation of everyone to have a say in our designed world. The overall purpose of this chapter is to raise the awareness of scientists and other readers to a form of thinking called design thinking. The term has been familiar to many design disciplines and most recently has been touted by members of the business community as a mindset for an entire organization. One of the sub-disciplines of design is that of design management, providing guidance on the use of design thinking across the entire organization. The first section of this chapter will review the design thinking literature across different levels of activity, including design and society, design and organizations, design and education, and design and

the designer. The second section will suggest ways to help scientists understand and use design thinking. What is a scientist to do with this information? This section will be organized in three sub-sections; namely, understanding design thinking, the relevance of design thinking, and envisioning the future.

Keywords: design, design thinking, design management, design studies, sustainability, socially responsive design, wicked problems (5121)

INTRODUCTION

Design thinking is an iterative process that enables everyone, not just designers to explore problems and creatively answer the question "How do we make it better?". People in all disciplines are capable of using design thinking, but it is necessary to understand what is meant by design thinking to be able to use it effectively. Historically design thinking has been situated in academic venues related to traditional design disciplines, such as those in architectural, environmental, graphics, interior, and urban design fields, as well as in engineering and product design. However, we are now experiencing an explosion of design thinking in business, organizational management, knowledge management, and education. New design fields include information design, service design, interaction design, and web design. We are also witnessing some companies attempting for the first time to integrate design thinking with their more scientifically based approaches such as Six Sigma to improve product and service offerings (Beckman, 2009).

Scientists have been engaged in discussions around design in the context of intelligent design for decades (House, 2008; Dembski, 1998; Morris & Parker, 1987). Intelligent design as referenced in scientific conversations relates to the natural world, and addresses design as a possible factor in the creation of life forms as we know them. Based on the writings, deep divisions exist among scientists regarding this topic. Design thinking as a term may be associated with intelligent design given the sharing of specific words, but our approach to design thinking deals exclusively with the man-made world. Design thinking in our view includes products, organizations, systems, etc., and does not delve into the realm of intelligent design as debated within many scientific disciplines.

The relationship between design and other fields of study has been a subject of discussion and discourse for many decades. The primary areas of

study have come to be viewed as three overlapping disciplines (Cross, 2007); namely, science, humanities, and design, each asking a different question along the continuum of knowledge. Science is situated in the natural world, and through experimentation, classification, and analysis, describes "what is". The humanities focus on the human experience, and through analogy, induction, and criticism, work to "portray 'it'". Finally, design concentrates on the man-made world, and through modeling, synthesis, and abduction, seeks to determine "how to make it better" (Cross, 1982). Based on the current understanding of the orientation of each of the major disciplines (science, humanities, design), we recognize the fundamental differences, but strongly acknowledge that within each of the disciplines, the "what, why, and how" informs the others.

VIEWS OF DESIGN THINKING

In this section of the chapter, the contemporary views on design thinking have been organized into four levels of concern, including that of design and society, organizations, education, and the designer.

Design and Society

Daniel Pink's (2006) popular book, *A Whole New Mind*, defines the coming of the "Conceptual Age," characterized by an "*economy and a society built on the inventive, empathic, big-picture capabilities…*" This Conceptual Age is a direct response to the Information Age and will require different skills and abilities, often associated with right-brain thinking, for survival and success. Pink challenges the reader to consider three questions: "Can someone overseas do it cheaper? Can a computer do it faster?" and "Am I offering something that satisfies the nonmaterial, transcendent desires of an abundant age?" The "Whole New Mind" refers to the ability to creatively and innovatively respond to those questions. This right-brain aspect of the "new mind" has the capacity for what Pink calls "senses," including that of design, story-telling, symphony (putting pieces together), empathy, play, and meaning. Design, Pink reminds us, is everywhere. We live in a humanly-designed world. Design is accessible to everyone, although business is actively embracing design as a business process. He believes that future success will go

to people who can move quickly and master these sensory abilities and apply them appropriately in today's culture.

However, humans hold a narrow view of culture, of what "being human" means. Despite being in the era of cultural awareness, there still exists a lack of understanding and resistance to other cultures. Other peoples can be better understood *through* their culture, one aspect of which is their designed world. The benefit to such a stance can develop a true cultural appreciation by everyone, but also an awareness of the role in design in creating this designed world. Designers and informed laypeople have a role in sustainment. An unsustainable world, says Fry (2003), is a "failure of design" (p. 78). He cites a new kind of design knowledge that will be needed to inform education, practice, and economics. Design thinking, he says, "is not natural. It is learned in that unnaturalness we call culture" (p. 73). What is needed by designers, scientists, and others will be the ability to see the nature of things differently, carry on a global conversation among all peoples, and develop a stronger reflective capability. "What arrives last is a retreat into conventional design practice and the design of things" (p. 81). Some businesses are beginning to realize that the success of their products or services will depend on understanding the human experience, rather than manipulating the culture with products (Riley, 2003).

Richard Farson (2008) believes that design and design thinking are powerful tools to address our current social and economic problems. In *The Power of Design*, he discusses the need to develop a concept of metadesign, or "the design of design." Metadesigners include and transcend the traditional design professions, and according to Farson, have the capabilities of re-visioning major systems such as healthcare, education, and criminal justice. He sees metadesigners as leaders with the responsibility of using systems thinking to foster and manage innovation today. This text does not define design per se or identify working principles. However, *The Power of Design* is a big picture advocacy of design and designers is useful in exploring the implications for thinking about individuals as well as professionals taking on a larger role in society.

Design and Organizations

The terms design and design thinking have found their way into business firms, resulting in numerous books touting their value to their success. David Burney of Red Hat, an open source computing company adopted design

thinking because its ideas mirror the idea behind open source software. Burney says that design thinking involves everyone in design " because it makes it easier for those outside the design industry to focus the idea of design as a way of thinking about solving problems, a way of creating strategy by experiencing it rather than keeping it an intellectual exercise, and a way of creating and capturing value (Hyer, 2009)." The growing attraction of design thinking, according to Burney, is that it focuses on innovation rather than on traditional business processes, such as small-scale product improvement, efficiency, and top-down view of people, "need to know" attitudes and hidden agendas. Design thinking, according to Burney, is not a methodology, but a cultural way of thinking.

A key feature that cuts across most of these books on design and design thinking is customer involvement in the design. One example with a typical business title is *Do you matter? How great design will make people love your company.* (Brunner & Emery, 2006). The main idea here is that "Design establishes a *relationship* between your company and your customers." The authors cite the importance of designing a successful total customer experience, or risking total failure of the business. They discuss strategies for becoming a successfully design-driven business through awareness, commitment, implementation, and vigilance. Organizations must be designed from the top down, meaning that management must embrace the design process, as well as bottom up, embraced by everyone to be "design driven." Successful design, one focused on innovation, cannot be an add-on to existing products, spaces, or work.

IDEO is a consulting and design firm that is widely recognized as a firm on the leading edge of innovation. The author of *The Ten Faces of Innovation* (Kelley & Littman, 2005), Tom Kelley has developed a set of "human personas" that have been tested continually in IDEO's innovation work. He first identifies the "devil's advocate," the individual whose negativity ends all discussion of what is possible, as the most destructive role to innovation. Next, he describes three groups of personas that are highly effective in countering the negative effects of the devil's advocate. First, the "Learning Personas" are driven to continually expand knowledge and grow. Second, the "Organizing Personas" understand how organizations move forward and use that understanding to create a balance between innovation and realism, allowing for growth and forward movement. Finally, the "Building Personas" make innovation happen by using the knowledge from the "Learning Personas" and the organizational skills from the "Organizing Personas." According to Kelley,

when companies value and encourage these sets of roles, creativity, design thinking, and innovation will flourish.

Lockwood (2010) defines design thinking as a human-centered process for innovation and enablement. Key features are involving the consumer, collaborating in teams, creating prototypes, and visualizing concepts. A distinguishing tenet in Lockwood's view, integrates creative ideas with the traditional aspects of the firm. Design management and leadership are addressed in Lockwood's contribution to this book. He addresses the issues involved in moving a firm to a design thinking organization with a particular emphasis on service design, where the emphasis is on designing emotionally positive consumer experiences, as contrasted with the traditional focus on product design.

Complementing the Lockwood articles is Martin (2009), who identifies the "roadblocks" to the adoption of design thinking in the firm. These roadblocks occur in one or more of the three stages of what Martin calls the knowledge funnel, or the narrowing of mysteries of impossible problems to heuristics (i.e., rules of thumbs) to algorithms (i.e., calculable procedures). One mistake that firms make is to write off unsolvable problems at the mystery stage or to leave identified opportunities, the heuristics, in the hands of executives or specialists. At the algorithm stage Martin says some firms don't follow-through and free up human activity by actually coding an algorithm and allowing computing to take over the task. Human and financial capital is thus tied up with tasks that could be off-loaded to computing.

Design and Education

The evolution of design thinking is sometimes represented as a series of generations (Bousbaci, 2008). The first generation of design thinking and design methods (1950s – 1960s) depicted the designer as rational and logical (Broadbent & Ward, 1969; Simon, 1996), a reaction to the early view of the designer as intuitive and artistic. Reacting to this systematic view in the 1960s through the 1980s was a second generation focus on participatory processes (Alexander, Ishikawa, & Silverstein, 1977; Cross, 1972) and a third generation attempt to understand a designer's thinking processes (Rowe, 1987). Moving beyond looking at designers in their traditional forms of practice, Cross (1981) and Schön (1987) advocated a reflective approach, seeing design in a broader context.

Design Thinking by Rowe (1987) is a collection of ideas, theories, and systems related to design thinking and design inquiry in architecture. The work is comprehensive, and the author provides a historical overview of the doctrines of problem-solving. Much of his discussion centers around the information-processing theory, the prominent approach at that time to creative problem-solving. Rowe describes the design process as episodes of heuristic reasoning within which problems are identified, defined, and solutions are explored. He discusses well-defined problems, ill-defined problems, and wicked problems, and discusses the influence of different problems on the design process required within architectural design. Ultimately this is a well-documented work providing a scholarly overview of design inquiry within the field of architecture.

Nigel Cross' articles on *Designerly Ways of Knowing,* published in *Design Issues* in the 1980's were expanded into a text (2006, 2007). Cross's work has provided a foundation for situating design into our educational systems as an equal to science and humanities. He identifies design as a valuable and necessary knowledge base that asks the question "how can we make it better?" in relation to science's study of "what is," and humanities' quest for "how does it affect me?" The major idea of Cross's work is that design abilities exist in everyone and that design should be a part of a general education. These "core features of design ability: include an ability to resolve ill-defined problems; adopt solution-focusing strategies; employ abductive, productive, appositional thinking (e.g., reason from function to form); and ability to use non-verbal, graphic and spatial modelling media. The value of such abductive, "what might be" thinking for individuals and for business and other institutions, is the ability to consider change and to move past what for business is only "incremental" improvement. For decades Cross has challenged us to reconsider the critical nature of design thinking in our culture. His message is particularly valuable today as we begin to create new approaches to our economic, healthcare, and international systems.

Another influential design practitioner book was Schön's *Educating the Reflective Practitioner* (1987), which was set in the architectural design studio. Here Schön discusses the reflective habits of new designers as they design or reflection-in-action. Schön reminds readers that technique and artistry are both necessary in the development of a design professional. Design thinking is most closely addressed in the chapter on the design process, particularly how one frames and re-frames a design process and brings past experiences to bear. Also, in the chapter on the paradox of learning to design Schön discusses the difficulty some students have with the demands of an architectural curriculum

and the challenges of having a dialogue with the instructor throughout. Educators, in particular, frequently cite this text, particularly those in teacher education, as the current academic image of the teacher is that of a reflective professional.

Design and Designer

According to Lawson (2005) in *How Designer's Think*, "design is a form of thinking skill, which can be acquired and developed." He presents an accessible discussion of design thinking set in the context of design process and practice, typically within the professions of visual design, including architecture, interior design, and industrial/product design. Designers, as he believes, must employ almost equal parts of convergent and divergent thinking to produce successful design solutions. Lawson talks about the historical progression from initial writing on the design process to evidence-based study in all areas of design. He acknowledges that the study of design thinking is in its earliest stages, and that much more work is necessary in this field. Finally, unlike most other comparable works, Lawson proposes a model of design activity and thinking based on Nigel Cross's earlier work, but expands Cross's ideas to incorporate new knowledge about the thinking and design processes, essentially problem solving for architects.

Brown (2009), the CEO of IDEO, characterizes design thinking as a means to leverage what humans already know to tackle a broader range of problems than before. The key for what Cross would label as abductive thinkers ("what might be") is that the outcomes of design must be *technologically feasible* and that the innovation must make *business sense*. Brown sees design thinking as a means to help skilled practitioners think like a designer, to couple one's technical abilities with a new empathic sensibility of what humans need. The key, according to Brown, is to balance possibility with reality.

Features of design thinking, as viewed by Brown, can be characterized in four ways. The first feature is a focus on people, observing them, developing empathy, and developing new insights on human needs. The initial focus has been for design to meet basic needs but increasingly to the designing of emotionally-satisfying experiences. A second feature of design thinking is a different view on problems. The constraints of problems are readily embraced by design thinkers who recast problems as projects. Constraints are not so much resolved as placed in an appropriate balance. The process to address

these opportunities is nonlinear. A third feature is the thinking processes employed in design thinking. Brown cites two paired sets of mental states that design thinkers work between. Convergent thinking is making decisions about choices, while divergent thinking creates options. Designers also move between analysis or studying the problem-opportunity with synthesis or extracting structure and pattern from the data. A fourth feature of design thinking is the range of tools to be used. These can include visual thinking, prototyping, storytelling, collaborating, and the physical and electronic spaces for collaboration.

DESIGN THINKING FOR SCIENTISTS

The second part of this chapter summarizes the information assembled from recent writing on the subject of design thinking and synthesizes it into topics to help both design and science professionals see relationships between the disciplines based on design thinking. This section is organized into 3 areas of discussion: understanding design thinking, the relevance of design thinking, and envisioning the future.

Understanding Design Thinking

Given the large number of design professions, the term design thinking is a challenging topic to address in a simple and cohesive fashion. Each design field tends to discuss the topic within its own parameters, making interdisciplinary collaboration and inclusion of "non-design" fields in the design thinking conversation difficult at best. Recognizing the lack of a comprehensive, inclusive definition of design thinking, we have attempted to provide an overview of current approaches through our discussion of the literature. Figure 1 provides a visual summary of design thinking based on current publications reviewed in the first section of this chapter.

Design thinking in the 21st century, based on the writings and apparent current trends, addresses all areas of the designed world, and indicates that everyone can be a "designer". Such a stance implies the need for design and an understanding of design process to be a part of the education of all people. Ideally design should be taught with the same commitment as the STEM disciplines (science, technology, engineering, and mathematics), and valued on

the same level. Design thinking is a different way to think about the designed world and every person's role in what our future designed world looks like. Those who think like designers tap very different skills and use very different tools. As the information in Figure 1 indicates, design thinking is inclusive, values innovation, balances divergent and convergent thinking, and is based on abductive logic to consider "what might be?" and "how can we make it better?". But the question remains: "what is the relevance of design thinking in relation to the scientific disciplines?".

Culture and society	All people have a role in sustainability; all designers have a role in the designed world.
	See how other cultures see the world and designed features.
	Design "re-visions" human needs (e.g., healthcare, education, communities, criminal justice).
Involvement of people	Design process spans all business functions.
	Design management and leadership are necessary business functions.
	Design process includes customer, client.
Focus of activity	Innovation over incremental improvement
	User need vs. business need
	Focus on consumer, client experience over product
	Problems/solutions are seen as opportunities/responsiveness
	Design must be technologically feasible and make business sense
How one thinks	Everyone has design abilities; promote in general education
	Use brain's right side senses: design, story, symphony, empathy, play, meaning
	Balance convergent (decisions) and divergent (options) thinking
	Visual tools
	Reflectivity
	Visual tools
	Heuristic reasoning
Design process	Collaborate in teams; physical and electronic spaces for collaboration
	Tackle impossible problems, embrace constraints
	Use abductive logic, or consider "what might be"
	Visualize concepts
	Develop and test out prototypes, iterate revisions.

Figure 1. Design Thinking Features.

Relevance of Design Thinking

Both science and design share goals of solving problems on various levels. The method each discipline embraces is different, and requires different skills and thought processes for success. It has been long-accepted that the scientific method centers around problem-solving to find out the nature of what exists; it is analytic. At the same time, design method is constructive, seeking to provide solutions through inventing things with value that do not yet exist (Gregory, 1967). Design is utility enhanced by significance (Pink, 2006), and it is critical to understand "what is" as a basis for providing utility. Products, systems, spaces…science contributes to utility by providing elements in both traditional (existing) forms, and in new combinations to form appropriate materials. Designers create ways to use these new combinations, or vision new (sometimes seemingly impossible) outcomes and rely on scientific and technological thinking to formulate methods to make the visions real. According to Lockwood (2010) "design is the key to bringing innovation to life" (pg. xv). Science is the key to discovering and recognizing what currently exists. While design provides the outlet for the use of scientific discoveries, scientific involvement provides modifications and improvements to allow for even more innovative products and uses. Collaborative efforts between design and scientific thinking provide unexplored opportunities for even greater innovation, and communication, understanding, and valuing between the disciplines is vital for this to occur.

Attempts have been made in the past to model design thinking on the scientific process. The rationale for these activities are varied, but are thought to include providing a greater perception of value to the design disciplines (Cross, Naughton, & Walker, 1981). Design cannot be reduced to a linear, formulaic approach. While there have been attempts to create this unrealistic approach to the design process, design is a fundamentally different way of thinking. It is not better or worse, simply different. Discussion continues today (Simon, 1996) but there is greater acceptance of the essential differences and resulting value of design thinking in relation to, not as a mirror of, scientific methods. This is an important concept to adopt since it will be the combination of all methods that will bring about true innovation and change.

The complicated nature of today's world has led to a preponderance of problems that reflect a level of complexity equal to those of the current world situation. Rittel and Webber (1973) identified human-centered problems as "wicked" in their early works, and identified characteristics of wicked problems that differ from the traditional problems often encountered by

scientists. Wicked problems are complex, dynamic, and open-ended. Often the problem is as dependent on the solution as the solution is on the problem. As one portion of the problem is solved, the problem reorganizes itself into a new and different problem or set of problems. Human perceptions of the problem change, stakeholders change, resources and priorities change, and the problem(s) morph as a result. Solutions are not clear, and continue to change throughout the process. Wicked problems defy scientific approaches since they cannot be bounded or clearly hypothesized, and are only solved when the solution is considered "good enough".

Science cannot function in isolation. The discoveries made about the natural world are part of the human-centered issues prominent today, and frequently become very complex, wicked problems. For example, scientific discoveries about the natural world's response to man-made intrusions influence human decisions about funding for more natural world exploration. Additional discoveries lead to changed perceptions, leading to more (or less) support for continued exploration. Political, social, moral, aesthetic, health, and other issues and influences impact this one simple example, leading the scientist squarely into a wicked problem scenario. Design thinking involves subjective assessments, as opposed to objective assessments valued by the science community. Responsible subjective assessments are different, but no less valuable in today's culture. They are credible and useful in addressing complex real world issues, as opposed to valid and reliable in normative science (McFall & Beacham, 2008). It is the subjective assessment provided by design thinking that most effectively addresses the wicked problems we face today.

Envisioning the Future

Design is about *radical innovation* (Lockwood, 2010), while science values incremental understanding and the resulting incremental improvement that is tied to reliability and validity. Design often relies on rapid prototyping, failing fast, and unbounded idea generation. Science is typically hypothesis driven and discoveries, approaches, and new knowledge is bounded or significantly influenced by current understanding of an issue in the formation of that hypothesis. Designers, while obviously influenced by current information, are continually looking to explore uncharted areas with few if any boundaries during the initial ideation or exploration process. The boundaries are acknowledged only after the idea-generation has produced directions for

design solutions. Scientific methods strive to discover characteristics by isolating them or "correcting for" outside influences. Design is holistic and seeks to understand contextual influences and perceptions as a part of the exploration and problem-solving. While these statements and the associated disciplines may appear to be opposite in every way, they are, in actuality, two sides of the same coin. They are interdependent, and finding and embracing the synergy between the activities is the key to a successful future.

While not all scientists may choose to engage in design thinking, it is important to realize that our culture is quickly understanding the value and importance of innovation, and design thinking is currently recognized as the primary method of fostering innovative and creative approaches. As a result, scientists will more frequently be tasked with collaborative opportunities to use their discoveries of "what is" to create a new reality that supports innovative solutions to wicked (or seemingly impossible) problems. By expanding the understanding of design thinking to professionals in the STEM disciplines, and acknowledging the value of collaborative design and scientific thinking, innovation and exploration can occur with far more effective results. True collaboration will only be possible if scientists have at least a preliminary understanding and grasp of design thinking. At that point, the collective efforts will provide the vehicle for scientists to harness the power of design thinking for new ideas in scientific discovery.

CONCLUSION

Our culture has historically come to highly value the incremental approach over risk-taking. Design thinking challenges the current traditional process, but is more responsive to the evolving culture we currently see globally. Change is happening. There is a place for all types of approaches, but before we can be truly successful, each discipline must find ways to value differing views of moving forward. Scientific approaches are critical in the understanding of the natural world, and provide a foundation upon which we must build to improve our quality of life. Design thinking provides the innovation required to address the demands of today's fast-paced, user-oriented, risk-taking culture. Science grounds us, design moves us forward. Both are vital. Both must be valued. Understanding between disciplines is the first step towards massive changes in the way design and science collaborate and re-envision a new world.

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INDEX

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