



A TECHNICAL REPORT OF THE RELATIONSHIPS BETWEEN AN ASSESSMENT OF PROBLEM SOLVING STYLE AND CREATIVE PROBLEM SOLVING

**Scott G. Isaksen
Creativity Research Unit
The Creative Problem Solving Group, Inc.**

**David Geuens
Department of Business and Economics
VLEKHO Hogeschool for Science and Art**

Executive Summary

The purpose of this study was to examine the relationships between VIEW: An Assessment of Problem Solving Style (Selby, Treffinger, Isaksen & Lauer, 2004a), and the preference for learning and using of the specific tools, guidelines, stages and components of the current version of creative problem solving (Isaksen & Treffinger, 2004). This study, conducted by Geuens (2006), can be considered a part of a larger program of research called the Cognitive Styles Project, so the previous work done within the program will be summarized to provide an understanding of the broader context for the research.

The highlights from this study include:

- Significant relationships between all three dimensions of VIEW and various CPS tools, guidelines and process stages.
- Findings on the Orientation to Change dimension from VIEW were similar to previous findings using the KAI.
- New insights for the Manner of Processing dimension of VIEW showing, for example, that internals do favor Brainwriting.

- New insights for the Ways of Deciding dimension of VIEW showing that Task-Oriented deciders reported many more significant relationships for both learning and applying CPS.

In general, even though this was a very exploratory study, there was support for the use of VIEW in improving our understanding of style differences for learning and applying CPS.

Cognitive Styles Project

The Cognitive Styles Project (CSP) is a program of research that fits within a larger creativity research initiative described as ecological (Isaksen, Puccio & Treffinger, 1993). The main idea of an ecological framework is to assert that the most complete picturing of creativity stems from considering all aspects of the creativity system. This includes examining the contingencies surrounding the creative person, the creative process, the outcomes of creativity, as well as the environment or climate that supports creativity. The CSP was initiated at the Center for Studies in Creativity, Buffalo NY, and was launched in the early 1980's to study the links between person and process. The origin of the Cognitive Styles Project stems from an earlier research initiative, the Creative Studies Project, also conducted mainly in Buffalo.

The Creative Studies Project was based on the work of Osborn (1953) and Parnes (1966). The Osborn-Parnes approach to creative problem solving (CPS) was examined experimentally to see if training in this approach would positively impact the creative ability of the participants. Some of the earliest studies conducted by Parnes and his associates evaluated the effects of creative problem solving programs and methods (Meadow & Parnes, 1959; Meadow, Parnes & Reese, 1959; Parnes, 1961; 1963; Parnes & Meadow, 1959; 1960), however there was a general lack of experimental evidence of the impact of an eclectic and comprehensive training effort on a variety of creative abilities.

The Creative Studies Project began with a pilot program at the State University College at Buffalo in 1969, and included a four-semester series of creative studies courses for the experimental group. This two-year experimental project provided enough empirical support for the undergraduate coursework to

enable the college to approve the upgrading of these courses to regular credit-bearing elective status in 1972 (Khatena & Parnes, 1974; Noller & Parnes, 1972; Parnes, 1987; Parnes & Noller, 1972 a & b; Parnes & Noller, 1973; and Reese, Treffinger, Parnes & Kaltsounis, 1976). This instructional program has become well established in the research activities of other scholars (Basadur, Graen & Green, 1982; Buijs & Nauta, 1991; Cramond, Martin & Shaw, 1990; De Schryver, 1992; Geschka, 1993; Rose & Lin, 1984; Torrance, 1972; 1986; 1987; Shack, 1993).

Although the two-year program was very successful for the experimental subjects who remained for the entire program, there were some subjects who chose to drop out of the program. The experimental and control subjects who continued the program were initially comparable on nearly all the personality assessments conducted. There were some interesting findings, however, regarding those experimental and control group members who dropped out. They possessed characteristics such as: more directed toward deviancy or culturally disapproved behavior, in closer contact with their primary processes, freer, more impulsive, more likely to drop out of college, less responsible and more anxious (Parnes, 1987). Dropouts seemed to be more interested in artistic forms of creativity and withdrew because of their disappointment in the nature of the course. The implications and more extensive description of the findings of the dropouts are reported extensively in Parnes & Noller (1973) and Parnes (1987). This link to individual differences formed the basis for the Cognitive Styles Project.

The purpose of the Cognitive Styles Project was to better understand the individual differences associated with learning and applying CPS. The aim was stated as improving our understanding of what works for whom, and under what circumstances (Isaksen, 1987). Those who have collaborated on this project have produced more than 30 master's theses, doctoral dissertations, and scholarly publications. Although this project was initiated at the Center for Studies in Creativity, work has continued at the Creative Problem Solving Group and its Creativity Research Unit, the Center for Creative Learning, and by other interested colleagues and students.

Definitions of Style

There is a diversity of definitions, theories, constructs, and assessments of cognitive styles (Vernon, 1973). Despite the lack of clarity, a few trends are discernible. For example, nearly all these constructs of style seem to differentiate style from ability. Kogan (1976) indicated that the general ability domain focuses on level of performance, whereas the cognitive style domain deals with the manner in which individuals acquire, store, retrieve, and transform information. Despite the apparent and broad interest, there are also those who do not place much value on the concept of cognitive styles given the apparent confusion between ability and modality and a lack of robust programs of research (Miller, 1987; Tiedemann, 1989).

The study of cognitive styles has also been seen as a subset of the discipline of cognitive psychology. Hayes (1978) indicated that cognitive style was concerned with a variety of mental processes including memory, learning, comprehending language, problem solving, and creativity. He also asserted that cognitive style existed on the borderline between intellectual function and personality. Willerman (1979) referred to cognitive styles as filter mechanisms that function to sort what and how we perceive and process information.

Within the field of cognitive psychology, there is considerable interest and effort being focused on the issue of cognitive styles. Goldstein and Blackman (1978) discussed the nature of cognitive styles and explained that it is a hypothetical construct designed to explain the mediation between stimulus and response in a manner that describes characteristic ways in which individuals conceptually organize the environment. Martinsen and Kaufmann (1999) have identified five main issues associated with cognitive styles and creativity. They point out that: most researchers have made a distinction between cognitive styles and abilities, cognitive styles can be placed at the intersection between personality and cognition, styles may be more strongly related to higher-order strategies rather than task-specific ones, most style constructs have been defined as being bipolar, and theories of cognitive style need to be related to more general theories of cognition and personality.

Guilford (1980) indicated that what some call cognitive styles may be called cognitive controls, cognitive attitudes or cognitive system principles. Messick (1984) added cognitive preferences, structural properties of the cognitive system, preferred or habitual decision-making strategies, ingrained strategies of learning and knowledge acquisition, and cognitive consequences of personality trends to the ever increasing list of cognitive-style conceptualizations. He reviewed the variety of definitions and proposed that all the alternative conceptions imply consistent individual differences, suggest deeper roots in personality structure, and tend to be pervasive.

Cognitive styles have also been linked to cognitive strategies (Kaufmann, 1995). Styles seem to be more spontaneously applied without conscious deliberation, whereas strategies seem to be more a matter of choice and training. The areas of learning strategies and meta-cognition are also intimately linked to these two concepts (Forrest-Pressley, MacKinnon & Waller, 1985; Weinstein & Mayer, 1986; Wittrock, 1986). Messick (1984) pointed out that forming and choosing cognitive strategies may be subject to change through conditions of learning. He asserted that individuals are able to learn a variety of strategies, some of which may be more consonant with their preferred style. He also asserted that individuals might be able to make a shift to less congenial strategies that are more effective for particular tasks.

The broader concept of style has been linked with learning style (Dunn & Dunn, 1978), psychological type (Myers & McCauley, 1985), cognitive style (Kirton, 1978, 1994) and more recently to problem-solving style (Selby, Treffinger, Isaksen & Lauer, 2004a). Selby, Treffinger, Isaksen and Lauer (2004b) defined problem-solving styles as consistent individual differences in the ways people prefer to plan and carry out generating and focusing activities, in order to gain clarity, produce ideas, and prepare for action.

Results from the Cognitive Styles Project

One of the initial thrusts of the CSP was aimed at an improved understanding of various approaches to understanding of individual differences by examining numerous style assessments. Wittig (1985) conducted the initial study by

examining the relationship between children's learning style and varying levels of divergent thinking ability. She used Dunn & Dunn's Learning Style Inventory (Dunn & Dunn, 1978) to assess the style preferences of third-grade children and found various significant differences in those students with high and low divergent thinking ability. Her study was replicated and extended by McEwen (1986) who found similar results with older children.

Corbett-Whitier (1986) also used the Dunn and Dunn's Learning Style Inventory (LSI) as a measure of style and examined its relationship to the various factors of the Torrance Tests of Creative Thinking (TTCT; Torrance, 1974). She also found a number of significant relationships between the LSI and the TTCT.

The next major phase of the project was to examine the available instrumentation to see which assessment approaches would be most fruitful for use in the instruction-oriented research program. The project then involved the Myers-Briggs Type Indicator (Myers & McCaully, 1985), the Kirton Adaption-Innovation Inventory (Kirton, 1976), and the Style Delineator (Gregorc, 1982).

Joniak and Isaksen (1988) examined the psychometric properties of and relationships between the Kirton Adaption-Innovation Inventory (KAI) and Gregorc's Style Delineator. The KAI had acceptable properties but the Style Delineator was dropped from the project due to its inadequate psychometric properties (O'Brien, 1990; Sewall, 1986).

Level and Style of Creativity

Another major thrust of the CSP was the examination of the conceptual separation of creative level or ability from modality or preferred style. A number of publications have summarized the progress and potential of this level-style distinction (Isaksen, 2004; Isaksen & Dorval, 1993; Kaufmann, 2004).

Isaksen and Puccio (1988) studied the relationship between KAI, a measure of style, and the TTCT, a measure of creative level. They reported small, positive, and significant correlations between the abilities of fluency, flexibility and originality of the TTCT and an innovative style of creativity on the KAI.

Teft (1990) conducted a follow-up to this study. She used factor-analysis to examine the relationship between the TTCT, KAI, and MBTI. Her results confirmed

Kirton's assertion and Goldsmith's (1987) findings of an orthogonal relationship between creative level and creative style. She reported that the TTCT and the KAI loaded on two separate factors (level and style, respectively). However, she also found relationships between the KAI and the "Creativity Index" and two of the dimensions of the MBTI. She concluded that the KAI was a sound measure of creativity style and that the assessments used to measure creative level may have been contaminated with style variables.

One implication of her findings concerns the use of the MBTI, a measure of style, as a means for determining level of creative performance. In her study, Teft reported a strong correlation between the Creativity Index (CI) of the MBTI and the style factor, as well as a lack of significant correlation between the CI and the level factor. This suggests that the CI is more a measure of style than level. However, as Teft pointed out, Gough (1981) developed the CI to predict level of creative talent. Theoretically, the MBTI is a measure of style and should not be able to predict level. Gough's use of a style measure to predict level of creative talent demonstrates the conceptual confusion that exists in creativity research and practice. It also suggests that the level-style distinction may be helpful to researchers interested in assessing creative performance by providing conceptual clarity to creativity constructs and forcing the development of better and more conceptually sound measures of level and style.

The CSP broadened its focus by structuring an examination of the concept of mental imagery as a mode of cognitive processing. Dorval (1990) used the level-style distinction to organize the measures used to assess level and style of both creativity and imagery. He used the Revised Minnesota Paper Form Board Test (MPFB) developed by Likert and Quasha (1941) to measure visual imagery ability and the Individual Differences Questionnaire (IDQ) developed by Paivio (1971) to measure preference for imaginal and verbal modes of cognitive processing.

Similar to previous results (Isaksen & Puccio, 1988), Dorval reported small but significant relationships between the measures of level and style of creativity. However, he found no significant relationships between the MPFB and the imaginal or verbal scales of the IDQ. The strongest findings concerned the relationship between creativity style and preference for imagery. Those with an innovative style

on the KAI reported stronger preferences for both imagery and verbal modes of cognitive processing. These results suggested the IDQ was a measure of style or preference for mode of cognitive processing, while the MPFB test was a measure of level of visual imagery ability. Finding no significant relationships between assessments of level and style of imagery supported Dorval's assertion that the level-style distinction found in the general creativity domain was also present for the concept of imagery.

This line of research continued with work conducted by Isaksen, Dorval and Kaufmann (1992). They focused specifically on the style relationships between creativity and imagery reported by Dorval (1990). They found that individuals with an innovative style of creativity had a higher general level of preference for conscious symbolic processing (both verbal and imaginal in nature). Those with an innovative preference on the KAI had a stronger preference for the imaginal mode of symbolic processing than verbal processing. These findings again suggested there are individual differences in how people prefer to use cognitive processing in their approaches to creativity and that the level-style distinction may be a productive approach to understanding creativity and related concepts.

Other results

Further work within the CSP included pursuing a deeper understanding of style and exploring the applications of the KAI. For example, Selby (1991) examined the psychometric suitability of the KAI for students of middle school age. Selby, Treffinger, Isaksen and Powers (1993) published the results from this dissertation and indicated that using the KAI with younger students was not recommended as the reliabilities fell well below .70.

Kaufmann, Isaksen and Lauer (1996) used the KAI in a study to explore the Glass Ceiling effect in organizations. They studied women in managerial roles and found that females in these roles had a stronger preference for an innovative style of creativity and problem solving. In discussing their findings, they suggested that females pursuing managerial positions needed to utilize these preferences to break through the glass ceiling within many organizations.

In another study with organizational implications, Isaksen, Babij and Lauer (2003) studied the relationship between the KAI and the Leadership Practices Inventory (LPI). They found significant correlations between KAI and two of the six dimensions of the LPI, a measure designed to assess behaviors associated with extraordinary leadership. Both the Challenging the Process and Inspiring a Shared Vision dimensions of the LPI were found to relate to a more innovative style preference on the KAI.

The next major phase of the Cognitive Styles Project focused on identifying the key dimensions of style that would help provide insight to those learning and applying CPS. Houtz, et al. (2003) examined the relationship between the KAI and the Basadur CPS Profile (Basadur, 1991), an assessment with direct application to learning and applying CPS. They reported that Basadur's generator scores were significant and positively correlated to all scores on the KAI, illustrating a key relationship between the KAI and at least one aspect of CPS.

Isaksen, Lauer and Wilson (2003) studied the relationship between the KAI and the MBTI. They summarized the findings from previous research and used a larger sample in their study. They found that the KAI was significant and positively correlated with the Intuitive perceptual preference from the MBTI. No significant correlations were found between the KAI and preferences for Introversion – Extroversion or Thinking – Feeling dimensions on the MBTI.

In a more current phase of the CSP, Selby, Treffinger, and Isaksen have developed a measure called VIEW to assess problem-solving styles. They were influenced by their practical experiences in education and business as well as Kirton's theory and KAI, Jungian theory and the MBTI, Dunn and Dunn's approach to understanding and measuring learning styles, and the work of Martinsen and Kaufmann (1999) on assimilators and explorers from a Piagetian perspective. VIEW includes three main dimensions of problem-solving style: explorer-developer orientation to change, internal-external manner of processing, and task-person orientation to decision making.

Style and CPS

Since one of the main aims of the CSP was to understand individual differences in learning and applying CPS, many of the studies examine the general relationship of style to various aspects of CPS. DeLuca (1981) conducted an initial study within the project. She examined the impact of a special education program including CPS and how differences in style affected the results. Zilewicz (1986) found that students with different styles reported strong differences in how they learned and applied CPS methods and techniques. He used Gregorc's (1982) measure of style and found that undergraduate students in creative studies classes, whose scores were different on the Style Delineator, showed clear differences in the way they perceived and ordered information, generated and evaluated ideas, worked with groups, and carried out plans of action. In short, he found that individuals with different cognitive styles reported different strengths and weaknesses. When students had similar cognitive styles, they demonstrated similar strengths and weaknesses on various aspects of the CPS process.

Puccio (1987) found that scores on the KAI were able to discriminate the fluency and originality of problem statements generated by students when solving a real task provided from the railroad industry. In examining the effect of style and fluency on the originality of problem statements, he found that fluency accounted for most of the variance in the predicted behavior. Although Puccio's results did not support Kirton's orthogonality assertion, he suggested that further investigation of the concepts was necessary to bring additional clarity to the level-style question.

Murdock, Isaksen and Lauer (1993) examined the stability of cognitive style preferences by giving the KAI to students before and after a full-semester course in CPS. They found that student's cognitive style preferences were not affected by deliberate training in CPS.

A series of studies examined the relationship between style and preferences for learning and the application of various CPS tools. Hurley (1993) found quantitative and qualitative relationships between style of creativity as measured by the KAI and the use and application of specific CPS tools and techniques. Key quantitative differences showed that adaptors enjoyed idea systems and deliberate converging techniques. Innovators preferred more numerous divergent idea-

generating techniques and more primary convergent techniques. Qualitatively, adaptors enjoyed practicing techniques in order to feel comfortable. On the other hand, once those with an innovator preference had an insight, they immediately wanted to converge and implement the idea. Schoonover (1996) replicated these findings and added insight into which specific tools were preferred and used more frequently by both adaptors and innovators.

Wheeler (1995) used the Productivity Environmental Preference Survey (PEPS; Price, Dunn & Dunn, 1991), the Strong-Campbell Interest Inventory (Strong & Campbell, 1974), and a survey designed to examine behavioral preferences for stages and components of CPS. He reported numerous significant correlations between the PEPS and the Strong-Campbell Interest Inventory and self-reported preferences associated with various stages and components of CPS.

Although specific CPS tools are likely to be style neutral, there is evidence that people of varying style orientations have distinctly different preferences for particular kinds of tools, phases within stages, and specific stages of CPS (Basadur, Graen & Wakabayashi, 1990; Rickards & Puccio, 1992).

The majority of the recent studies within the CSP used the KAI as the measure of style. The KAI is based on a single theoretical continuum called adaption-innovation. Since VIEW was developed to assess three dimensions of problem-solving style, it was important to initiate an exploratory study to examine its usefulness in understanding the empirical relationship to learning and applying CPS. This represents an initial study aimed at accomplishing this goal.

Method

Invitations to participate in the study were sent to 110 people. Each had completed an Igniting Creative Potential (ICP) course. This three-day course introduces each participant to 17 creative problem-solving tools, eight guidelines (four generating and four focusing), as well as to eight specific stages of the creative problem solving process. Trainers of all courses utilize the same design. The ICP course is based on the current version of CPS called CPS version 6.1 (Isaksen & Treffinger, 2004; Treffinger & Isaksen, 2005). A variety of instructional materials are used in

the course (Isaksen & Tidd, 2006; Isaksen, Dorval & Treffinger, 2000; Treffinger, Isaksen & Stead-Dorval, 2006).

The sample consisted of two main groups of participants. Sixty-five subjects had completed the ICP course provided by the Creative Problem Solving Group (CPSB) and forty-five had completed the course through training provided by the US Department of Defense (USDOD). Completed surveys were obtained from 72 subjects, providing a response rate of 65%. Forty-two, of the 65 from CPSB, and 30 of the 45 from the USDOD completed the surveys. The sample consisted of 43 males with a mean age of 45, and 29 females with a mean age of 37.

Participants had completed the VIEW assessment during their training, so these data were readily available. VIEW: An Assessment of Problem-Solving Style assesses three independent dimensions of problem-solving style. Orientation to Change (OC) addresses the questions: "How do I prefer to deal with boundaries and parameters?" "How do I feel about and react to structure?" and "How do I prefer to respond to novel challenges?" Scores below the mean on this dimension indicate the Explorer style. In ordinary use, an "explorer" is an individual who thrives on venturing in uncharted directions, seeks to break new ground, and follow adventurous or promising new possibilities wherever they may lead. Scores above the mean on the OC scale indicate the Developer style. In ordinary use, a "developer" is an individual who brings tasks to fulfillment, who begins with the basic elements or ingredients and then organizes, synthesizes, refines, and enhances them, forming or shaping them into a more complete, functional, useful condition or outcome.

The second scale within VIEW is called Manner of Processing (MP) and addresses the questions: "How do I prefer to manage information and its flow when problem solving?" "When do I share my thinking?" and "Does interacting with others build or spend energy?" Scores below the mean indicate a preference for an "External" style of processing. Individuals who exhibit a well-developed preference for this style draw their energy from interaction with others, discussing possibilities, and building from the ideas of others. Scores above the mean reflect a preference for an "Internal" style of processing. Those with a well-developed Internal style look first reflectively to their own inner resources and draw energy from their reflection.

The third scale within VIEW is called Ways of Deciding (WD) and addresses such questions as: “What factors get first priority when I focus or decide?” “Where do I start?” and “How do I make trade-offs?” Scores on this scale indicate whether one’s primary focus in decision-making is on “People” or “Task.” Individuals with scores below the mean tend to focus on the People style as their primary emphasis when deciding. They consider first the impact of choices and decisions on people’s feelings and support, and on the need for harmony and positive relationships. Scores above the mean indicate a focus on the Task style. Those with this focus tend to look first at choices and decisions that are logical, sensible and can be justified objectively. They prefer making judgments that are impersonal, based on well-reasoned conclusions.

VIEW has demonstrated acceptable psychometric properties (Selby, Treffinger, Isaksen & Lauer, 2004b; Treffinger, 2005). The most recent master database for VIEW (as of the end of December, 2005) included 10,151 subjects. Based on 8,488 subjects who provided age data, the mean age is now 39.8 (SD = 11.6; range, 12 - 82). The database includes 4,316 male respondents (42.5%), 5,723 female respondents (56.4%), and 112 respondents (1.1%) who declined to state their gender. Table 1 summarizes several important descriptive statistics for each of VIEW’s three dimensions: Orientation to Change (OC), Manner of Processing (MP), and ways of Deciding (WD), based on 10,151 responses.

Statistic	Orientation To Change	Manner Of Processing	Ways Of Deciding
Mean	74.6	30.1	34.6
Standard Deviation	15.8	9.2	8.5
Median	75.0	30.0	35.0
Mode	72.0	32.0	32.0
Minimum	18.0	8.0	8.0
Maximum	126.0	56.0	56.0
Skewness	-0.27	0.18	-0.15
Kurtosis	0.18	-0.27	-0.26
Standard Error of Measure	5.68	3.89	3.40

Table 1: VIEW Descriptive Statistics

The means for the 72 subjects included in this study were 67.2 for OC, 28.9 for MP and 39.1 for WD. This sample has a slightly more exploratory preference for OC, is close to the observed mean for MP, and a slightly more task oriented mean for WD.

For the purpose of this study, a survey was designed to assess the extent to which the participants enjoyed learning and used the CPS tools, guidelines and stages. The survey contained 33 questions for which the participants could indicate both their level of enjoyment and use. A short summary of each of the 33 items was included to help the participants remember to what item they were referring. The level of enjoyment was assessed through a question: "The extent to which I enjoyed learning..." The five-point response scale included (1) Hated it, (2) Disliked it, (3) Neutral, (4) Liked it, and (5) Loved it. The level of use was assessed through the stem: "The extent to which I use..." The five-point response scale included (1) Never, (2) Rarely, (3) Sometimes, (4) Frequently, and (5) Very Often. The participants were also given the option to indicate that they did not know or did not remember. Participants were sent an explanation of the study as well as an invitation to participate and a link so that they could complete the survey on the web.

Results

The results for the survey are shown in Table 2. This table includes the number of participants who completed each question as well as the mean, range and standard deviation for the extent of enjoyment and use.

	ENJOY				USE			
	<i>N</i>	<i>Range</i>	<i>Mean</i>	<i>SD</i>	<i>N</i>	<i>Range</i>	<i>Mean</i>	<i>SD</i>
TOOLS								
Brainstorming	72	1-5	4.33	0.73	72	1-5	4.25	0.97
Brainstorming With Post-Its®	72	3-5	4.45	0.58	72	1-5	4.43	0.96
Brainwriting	71	1-5	3.70	0.85	71	1-5	2.74	1.19
Forced Fitting	65	2-5	3.69	0.81	65	1-5	2.52	0.95
Imagery Trek	64	1-5	3.59	0.90	65	1-5	2.05	0.93
Ladder of Abstraction	72	2-5	3.89	0.81	72	1-5	3.09	1.23
Morphological Matrix	63	1-5	3.54	0.69	64	1-5	2.35	0.99
SCAMPER	64	1-5	3.56	0.79	64	1-5	2.29	1.03
Visually Identifying Relationships	65	2-5	4.00	0.75	65	1-5	2.47	1.12
ALUo	72	3-5	4.10	0.65	72	1-5	3.15	1.10
Evaluation Matrix	68	2-5	3.89	0.76	68	1-5	3.35	1.11
Criteria	67	3-5	3.83	0.64	67	1-5	3.49	0.98
Highlighting	71	3-5	4.28	0.51	71	1-5	3.97	1.06
Musts/Wants	68	2-5	3.76	0.71	69	1-5	3.24	1.02
Paired Comparison Analysis	71	2-5	3.96	0.76	71	1-5	2.94	1.27
Selecting Hits	66	3-5	4.12	0.54	67	1-5	3.85	1.08
SML	65	3-5	3.71	0.54	66	1-5	2.93	0.97
GUIDELINES								
Deferring Judgment	72	3-5	4.38	0.58	72	1-5	4.18	0.98
Striving for Quantity	71	2-5	4.14	0.70	71	1-5	3.94	1.05
Freewheeling	71	3-5	4.35	0.59	71	1-5	3.84	1.12
Seeking Combinations	72	3-5	4.27	0.55	72	1-5	3.92	0.90
Using Affirmative Judgment	71	1-5	4.12	0.69	71	1-5	3.63	1.12
Being Deliberate	67	1-5	3.93	0.82	67	1-5	3.62	0.98
Considering Novelty	70	3-5	4.28	0.59	70	1-5	3.68	1.03
Staying on Course	67	1-5	3.97	0.72	68	2-5	3.84	0.94
STAGES								
Constructing Opportunities	61	1-5	3.72	0.80	61	1-5	3.23	1.10
Framing Problems	71	3-5	4.07	0.66	71	1-5	3.62	1.07
Exploring Data	65	1-5	3.91	0.76	65	1-5	3.66	1.02
Generating Ideas	71	3-5	4.30	0.57	71	1-5	4.00	1.08
Developing Solutions	63	2-5	3.87	0.71	63	1-5	3.44	0.99
Building Acceptance	64	1-5	3.89	0.78	64	1-5	3.36	1.07
Appraising Tasks	66	1-5	4.13	0.77	66	1-5	3.88	1.06
Designing Process	64	1-5	3.98	0.88	65	1-5	3.64	1.14

Table 2: CPS survey descriptives

Orientation to Change

The results for this dimension of VIEW are included in Table 3. Explorers reported significantly higher levels of both enjoyment and use of Brainstorming with Post-its®. They also reported a significantly higher level of use of the Advantages, Limitations, Unique Qualities and Overcoming Limitations (ALUo) tool. Explorers also reported more enjoyment of two of the four guidelines for generating, and significantly higher use of all four of these guidelines. They also reported higher levels of enjoyment and use for considering novelty as one of the four guidelines for focusing, as well as higher levels of use for using affirmative judgment.

When it comes to the various stages within the current CPS framework, explorers reported more enjoyment for learning both the Framing Problems and Generating Ideas stages.

	ENJOY					USE				
	Explorer (N)	Developer (N)	Df	F	Sig	Explorer (N)	Developer (N)	Df	F	Sig
TOOLS										
Brainstorming	4.43 (37)	4.23 (35)	71	1.405	.240	4.39 (37)	4.11 (35)	71	1.414	.238
Brainstorming with Post-Its®	4.61 (37)	4.29 (35)	71	6.038	.016	4.73 (37)	4.11 (35)	71	8.159	.006
Brainwriting	3.78 (37)	3.62 (34)	70	.618	.434	2.97 (37)	2.50 (34)	70	2.792	.099
Forced Fitting	3.82 (35)	3.53 (30)	64	2.090	.153	2.63 (35)	2.40 (30)	64	.964	.330
Imagery Trek	3.75 (37)	3.37 (27)	63	2.803	.099	2.17 (37)	1.89 (28)	64	1.401	.241
Ladder of Abstraction	3.84 (37)	3.94 (35)	71	.296	.588	3.30 (37)	2.86 (35)	71	2.384	.127
Morphological Matrix	3.43 (34)	3.68 (29)	62	2.056	.157	2.41 (35)	2.28 (29)	63	.290	.592
SCAMPER	3.59 (34)	3.53 (30)	63	.075	.785	2.39 (34)	2.17 (30)	63	.758	.387
Visually Identifying Relationships	4.09 (33)	3.91 (32)	64	.985	.325	2.62 (33)	2.31 (32)	64	1.247	.268
ALUo	4.19 (37)	4.00 (35)	71	1.445	.233	3.46 (37)	2.81 (35)	71	6.822	.011
Evaluation Matrix	3.83 (37)	3.97 (31)	67	.514	.476	3.41 (37)	3.27 (31)	67	.265	.608
Criteria	3.77 (36)	3.90 (31)	66	.657	.421	3.63 (36)	3.33 (31)	66	1.606	.210
Highlighting	4.33 (36)	4.23 (35)	70	.740	.393	4.17 (36)	3.77 (35)	70	2.556	.114
Musts/Wants	3.86 (36)	3.66 (32)	67	1.333	.252	3.39 (37)	3.07 (32)	68	1.662	.202
Paired Comparison Analysis	3.97 (37)	3.94 (34)	70	.030	.862	3.00 (37)	2.88 (34)	70	.148	.701
Selecting Hits	4.09 (35)	4.16 (31)	65	.317	.575	3.83 (36)	3.87 (31)	66	.023	.880
SML	3.75 (33)	3.67 (32)	64	.395	.532	3.06 (33)	2.79 (33)	65	1.310	.257
GUIDELINES										
Deferring Judgment	4.53 (37)	4.23 (35)	71	5.024	.028	4.47 (37)	3.86 (35)	71	7.607	.007
Striving for Quantity	4.27 (37)	4.00 (34)	70	2.682	.106	4.22 (37)	3.65 (34)	70	5.498	.022
Freewheeling	4.57 (37)	4.12 (34)	70	12.008	.001	4.16 (37)	3.50 (34)	70	6.682	.012
Seeking Combinations	4.40 (37)	4.14 (35)	71	3.905	.052	4.16 (37)	3.66 (35)	71	6.027	.017
Using Affirmative Judgment	4.31 (36)	3.92 (35)	70	6.290	.014	3.80 (36)	3.46 (35)	70	1.636	.205
Being Deliberate	3.97 (36)	3.87 (31)	66	.253	.617	3.74 (36)	3.47 (31)	66	1.247	.268
Considering Novelty	4.51 (36)	4.03 (34)	69	13.878	.000	4.05 (36)	3.29 (34)	69	10.729	.002
Staying on Course	3.92 (35)	4.03 (32)	66	.428	.515	3.88 (36)	3.78 (32)	67	.195	.660

STAGES

Constructing Opportunities	3.71 (32)	3.72 (29)	60	.005	.946	3.45 (32)	3.00 (29)	60	2.568	.114
Framing Problems	4.24 (37)	3.89 (34)	70	5.491	.022	3.72 (37)	3.52 (34)	70	.622	.433
Exploring Data	3.95 (37)	3.86 (28)	64	.212	.647	3.80 (37)	3.46 (28)	64	1.783	.187
Generating Ideas	4.44 (36)	4.15 (35)	70	4.902	.030	4.14 (36)	3.86 (35)	70	1.206	.276
Developing Solutions	3.81 (32)	3.93 (31)	62	.472	.495	3.50 (32)	3.37 (31)	62	.263	.610
Building Acceptance	3.92 (36)	3.86 (28)	63	.096	.758	3.54 (36)	3.12 (28)	63	2.449	.123
Appraising Tasks	4.18 (36)	4.07 (30)	65	.330	.568	3.92 (36)	3.83 (30)	65	.096	.758
Designing Process	4.00 (35)	3.97 (29)	63	.023	.880	3.76 (36)	3.48 (29)	64	.960	.331

Table 3: Anova results for Orientations to Change

Manner of Processing

The results for this dimension of VIEW are shown in Table 4. Internals reported significantly higher levels of enjoyment for learning the Brainwriting tool. Externals reported significantly higher levels of use of the Evaluation Matrix.

Externals reported higher levels of enjoyment for the generating guideline of striving for quantity. They also reported higher levels of enjoyment for the focusing guideline of using affirmative judgment. Externals also reported higher levels of use of the staying on course focusing guideline.

	ENJOY					USE				
	Internal (N)	External (N)	Df	F	Sig	Internal (N)	External (N)	Df	F	Sig
TOOLS										
Brainstorming	4.36 (36)	4.31 (36)	71	.102	.750	4.08 (36)	4.43 (36)	71	2.255	.138
Brainstorming with Post-Its®	4.54 (36)	4.36 (36)	71	1.792	.185	4.49 (36)	4.37 (36)	71	.240	.626
Brainwriting	3.48 (35)	3.92 (36)	70	4.969	.029	2.66 (35)	2.83 (36)	70	.358	.551
Forced Fitting	3.81 (31)	3.58 (34)	64	1.270	.264	2.74 (31)	2.33 (34)	64	3.201	.078
Imagery Trek	3.58 (32)	3.59 (32)	63	.002	.962	2.07 (32)	2.03 (33)	64	.019	.890
Ladder of Abstraction	3.86 (36)	3.92 (36)	71	.083	.775	3.28 (36)	2.89 (36)	71	1.784	.186
Morphological Matrix	3.41 (29)	3.65 (34)	62	1.932	.170	2.40 (30)	2.31 (34)	63	.142	.708
SCAMPER	3.56 (32)	3.56 (32)	63	.000	1.00	2.34 (32)	2.23 (32)	63	.197	.659
Visually Identifying Relationships	4.17 (30)	3.86 (35)	64	2.830	.097	2.73 (30)	2.24 (35)	64	3.215	.078
ALUo	4.06 (36)	4.14 (36)	71	.322	.572	3.39 (36)	2.90 (36)	71	3.587	.062
Evaluation Matrix	4.05 (34)	3.74 (34)	67	3.099	.083	3.71 (34)	2.98 (34)	67	8.132	.006
Criteria	3.87 (33)	3.79 (34)	66	.266	.608	3.62 (33)	3.36 (34)	66	1.270	.264
Highlighting	4.34 (35)	4.22 (36)	70	.984	.325	4.11 (35)	3.83 (36)	70	1.255	.266
Musts/Wants	3.77 (35)	3.75 (33)	67	.012	.912	3.44 (36)	3.02 (33)	68	3.135	.081
Paired Comparison Analysis	3.89 (36)	4.03 (35)	70	.590	.445	3.11 (36)	2.77 (35)	70	1.267	.264
Selecting Hits	4.23 (30)	4.03 (36)	65	2.413	.125	4.10 (31)	3.64 (36)	66	3.145	.081
SML	3.73 (34)	3.69 (31)	64	.092	.762	3.03 (34)	2.81 (32)	65	.819	.369
GUIDELINES										
Deferring Judgment	4.40 (36)	4.36 (36)	71	.098	.755	4.17 (36)	4.18 (36)	71	.001	.977
Striving for Quantity	4.31 (36)	3.97 (35)	70	4.192	.044	4.14 (36)	3.74 (35)	70	2.561	.114
Freewheeling	4.49 (35)	4.22 (36)	70	3.702	.058	3.91 (35)	3.78 (36)	70	.273	.603
Seeking Combinations	4.35 (36)	4.19 (36)	71	1.455	.232	3.94 (36)	3.89 (36)	71	.068	.795
Using Affirmative Judgment	4.29 (35)	3.95 (36)	70	4.509	.037	3.86 (35)	3.41 (36)	70	2.917	.092
Being Deliberate	3.84 (32)	4.00 (35)	66	.596	.443	3.53 (32)	3.70 (35)	66	.465	.498
Considering Novelty	4.30 (34)	4.25 (36)	69	.147	.703	3.76 (34)	3.60 (36)	69	.424	.517
Staying on Course	4.09 (33)	3.85 (34)	66	1.840	.180	4.06 (34)	3.61 (34)	67	4.032	.049

STAGES

Constructing Opportunities	3.80 (31)	3.63 (30)	60	.641	.427	3.17 (31)	3.30 (30)	60	.208	.650
Framing Problems	4.14 (35)	4.00 (36)	70	.784	.379	3.74 (35)	3.51 (36)	70	.838	.363
Exploring Data	3.83 (30)	3.97 (35)	64	.523	.472	3.87 (30)	3.48 (35)	64	2.409	.126
Generating Ideas	4.40 (35)	4.20 (36)	70	2.126	.149	4.06 (35)	3.95 (36)	70	.179	.674
Developing Solutions	3.87 (30)	3.87 (33)	62	.002	.965	3.63 (30)	3.26 (33)	62	2.324	.133
Building Acceptance	3.80 (30)	3.97 (34)	63	.748	.390	3.60 (30)	3.14 (34)	63	3.013	.088
Appraising Tasks	4.24 (31)	4.03 (35)	65	1.206	.276	3.97 (31)	3.80 (35)	65	.416	.521
Designing Process	3.97 (32)	4.00 (32)	63	.021	.886	3.81 (33)	3.46 (32)	64	1.553	.217

Table 4: Anova results for Manner of Processing

Ways of Deciding

The results for Ways of Deciding (WD) dimension of VIEW are shown in Table 5. All the significant differences on this dimension seemed to favor the task-oriented deciders. They reported higher levels of use of the generating tools of Imagery Trek, Morphological Analysis, and Visually-Identifying Relationships. They also reported higher levels of use of Criteria.

Task-oriented deciders reported higher levels of enjoyment for learning to seek combinations when generating and to stay on course when focusing. They enjoyed the Constructing Opportunities stage of CPS and reported higher levels of use of Appraising Tasks.

	ENJOY					USE				
	<i>Person (N)</i>	<i>Task (N)</i>	<i>Df</i>	<i>F</i>	<i>Sig</i>	<i>Person (N)</i>	<i>Task (N)</i>	<i>Df</i>	<i>F</i>	<i>Sig</i>
TOOLS										
Brainstorming	4.29 (34)	4.37 (38)	71	.183	.670	4.26 (34)	4.25 (38)	71	.007	.932
Brainstorming with Post-Its®	4.49 (34)	4.42 (38)	71	.223	.639	4.40 (34)	4.46 (38)	71	.078	.781
Brainwriting	3.79 (34)	3.62 (37)	70	.664	.418	2.71 (34)	2.78 (37)	70	.064	.801
Forced Fitting	3.69 (29)	3.69 (36)	64	.000	.992	2.38 (29)	2.64 (36)	64	1.236	.271
Imagery Trek	3.40 (29)	3.74 (35)	63	2.315	.133	1.80 (30)	2.26 (35)	64	4.124	.047
Ladder of Abstraction	3.82 (34)	3.95 (38)	71	.411	.523	2.82 (34)	3.32 (38)	71	2.994	.088
Morphological Matrix	3.50 (29)	3.58 (34)	62	.175	.677	2.07 (30)	2.60 (34)	63	4.858	.031
SCAMPER	3.52 (27)	3.59 (37)	63	.141	.708	2.11 (27)	2.41 (37)	63	1.358	.248
Visually Identifying Relationships	3.90 (30)	4.09 (35)	64	.990	.323	2.17 (30)	2.73 (35)	64	4.298	.042
ALUo	4.00 (34)	4.18 (38)	71	1.361	.247	2.98 (34)	3.29 (38)	71	1.448	.233
Evaluation Matrix	3.71 (31)	4.05 (37)	67	3.654	.060	3.11 (31)	3.55 (37)	67	2.674	.107
Criteria	3.67 (31)	3.96 (36)	66	3.618	.062	3.20 (31)	3.74 (36)	66	5.456	.023
Highlighting	4.30 (33)	4.26 (38)	70	.106	.746	3.94 (33)	4.00 (38)	70	.059	.809
Musts/Wants	3.61 (31)	3.89 (37)	67	2.542	.116	3.04 (32)	3.41 (37)	68	2.358	.129
Paired Comparison Analysis	3.94 (33)	3.97 (38)	70	.035	.852	2.70 (33)	3.16 (38)	70	2.350	.130
Selecting Hits	4.03 (30)	4.19 (36)	65	1.461	.231	3.61 (31)	4.05 (36)	66	2.863	.095
SML	3.60 (28)	3.79 (37)	64	2.070	.155	2.72 (29)	3.08 (37)	65	2.276	.136
GUIDELINES										
Deferring Judgment	4.38 (34)	4.38 (38)	71	.000	.993	4.12 (34)	4.22 (38)	71	.180	.673
Striving for Quantity	3.97 (33)	4.29 (38)	70	3.801	.055	3.88 (33)	4.00(38)	70	.231	.632
Freewheeling	4.21 (33)	4.47 (38)	70	3.627	.061	3.64 (33)	4.02 (38)	70	2.160	.146
Seeking Combinations	4.13 (34)	4.40 (38)	71	4.674	.034	3.74 (34)	4.08 (38)	71	2.654	.108
Using Affirmative Judgment										
Being Deliberate	4.15 (33)	4.09 (38)	70	.147	.703	3.76 (33)	3.52 (38)	70	.802	.374
Considering Novelty	3.87 (31)	3.97 (36)	66	.253	.617	3.60 (31)	3.63 (36)	66	.013	.910
Staying on Course	4.16 (33)	4.38 (37)	69	2.423	.124	3.55 (33)	3.80 (37)	69	1.102	.298

STAGES

Constructing Opportunities	3.74 (31)	4.17 (36)	66	6.367	.014	3.66 (32)	3.99 (36)	67	2.227	.140
Framing Problems	3.44 (29)	3.97 (32)	60	7.439	.008	3.01 (29)	3.44 (32)	60	2.345	.131
Exploring Data	4.00 (33)	4.14 (38)	70	.732	.395	3.42 (33)	3.80 (38)	70	2.201	.142
Generating Ideas	3.83 (29)	3.97 (36)	64	.570	.453	3.62 (29)	3.69 (36)	64	.066	.798
Developing Solutions	4.22 (33)	4.37 (38)	70	1.154	.287	3.82 (33)	4.16 (38)	70	1.756	.189
Building Acceptance	3.76 (29)	3.97 (34)	62	1.362	.248	3.31 (29)	3.54 (34)	62	.865	.356
Appraising Tasks	3.89 (29)	3.89 (35)	63	.002	.963	3.26 (29)	3.44 (35)	63	.468	.496
Designing Process	3.97 (29)	4.25 (37)	65	2.103	.152	3.59 (29)	4.11 (37)	65	4.105	.047

Table 5: Anova results for Way of Deciding

Discussion and Conclusions

It appears that there are meaningful style differences in the level of reported enjoyment in learning CPS tools, guidelines and process. There are also differences in the reported level of use of these resources. VIEW: An Assessment of Problem Solving Style (VIEW) also appears to provide additional insights about these differences over previous assessments. Most of our previous research within the CSP utilized the KAI, which does correlate with the Orientation to Change dimension of VIEW. The two additional dimensions of VIEW seem to add more value in identifying and understanding additional style differences.

This was an exploratory study designed to better understand style differences in learning and using CPS. As such, there is a great deal more research that is needed before any definitive comments and conclusions are drawn. First, the sample was compiled from a series of ICP courses given over the past two years. As a result, it would be important to explore the issue of time after training to further research. This may help us better understand how long it takes to acquire higher level of impact and any differences of time after training. For example, style differences in both enjoyment and use could be affected by how long participants have had to apply their learning after the initial training.

Since the data was acquired via survey, we relied on self-report of both enjoyment and use. It would be better to examine actual behavior rather than rely on self-reports. This could include examining some more objective observations and evaluations of actual performance or results indicators, as well as assessments of the kind of task and climate within which the performance was observed. This kind of research would lead us toward a much richer ecological program of research.

Given the exploratory nature of this study, there are numerous limitations that must be identified. One is the size and kind of sample. Although there was a good spread within each of the dimensions of VIEW, a sample size of 72 precludes any definitive conclusions. The sample means showed that this group was more exploratory, external and task oriented. This kind of research must include larger samples that reflect the means derived on VIEW. Further, it is not certain what

kind of impact learning about participants' styles may have had on their self-report assessment of enjoyment and use of CPS. It may be useful to find ways to examine style differences when the participants are not consciously aware of their styles to avoid response bias.

References

- Basadur, M. S. (1991). The first technical manual for the Basadur Simplex Creative Problem Solving Profile (CPSP) Inventory. Ancaster, Canada: Center for Research in Applied Creativity.
- Basadur, M. S., Graen, G. B., & Green, S. G. (1982). Training in creative problem solving: Effects on ideation and problem finding in an industrial research organization. *Organizational Behavior and Human Performance*, 30, 41-70.
- Basadur, M. S., Graen, G., & Wakabayashi, M. (1990). Identifying individual differences in creative problem solving style. *Journal of Creative Behavior*, 24, 111-131.
- Buijs, J. & Nauta, K. (1991). Creativity training at the Delft school of industrial design engineering. In T. Rickards, P. Colemont, P. Grøholt, M. Parker & H. Smeeke (Eds.), *Creativity and innovation: Learning from practice* (pp. 249-252). Delft, The Netherlands: Innovation Consulting Group - TNO.
- Corbett-Whitier, C. (1986). The relationship of learning style preferences by high school gifted students on the Torrance Tests of Creative Learning. Unpublished master's thesis. State University College at Buffalo, New York: Center for Studies in Creativity.
- Cramond, B., Martin, C. E., & Shaw, E. L. (1990). Generalizability of creative problem solving procedures to real-life problems. *Journal for the Education of the Gifted*, 13, 141-155.
- DeLuca, A. M. (1981). Effects of a pull out program on gifted student's socialization. Unpublished master's thesis. State University College at Buffalo, New York: Center for Studies in Creativity.
- De Schryver, L. (1992). The need for training impact. In T. Rickards, S. Moger, P. Colemont & M. Tassoul (Eds.), *Creativity and innovation: Quality breakthroughs* (pp. 131-134). Delft, The Netherlands: Innovation Consulting Group - TNO.
- Dorval, K. B. (1990). The relationships between level and style of creativity and imagery. Unpublished master's thesis. Center for Studies in Creativity at Buffalo State College, Buffalo, NY.
- Dunn, R., & Dunn, K. (1978). *Teaching students through their individual learning styles: A practical approach*. Reston, VA: Reston Publishing.
- Forrest-Pressley, D. L., MacKinnon, G. E., & Waller, T. G. (Eds.), (1985). *Metacognition, cognition and human performance-Volumes I and II*, New York: Academic Press.
- Geschka, H. (1993). The development and assessment of creative thinking techniques: A German perspective. In S. G. Isaksen, M. C. Murdock, R. L. Firestien & D. J. Treffinger (Eds.), *Nurturing and developing creativity: The emergence of a discipline* (pp. 215-236). Norwood, NJ: Ablex.
- Geuens, D. (2006). Exploratory study of the relationship of problem solving style and the preference for and use of creative problem solving. Unpublished masters thesis in Business Economics study for the Department of Business and Economics of the VLEKHO University for Science and Art. Brussels, Belgium.
- Goldsmith, R. E. (1987). Creative level and creative style. *British Journal of Social Psychology*, 26, 317-323.
- Goldstein, K. M. & Blackman, S. (1978). *Cognitive style: Five approaches and relevant research*. New York: John Wiley & Sons.
- Gough, H. C. (1981, July). Studies of the Myers-Briggs Type Indicator in a personality assessment research institute. Paper presented at the Fourth National Conference on the Myers-Briggs.
- Gregorc, A. F. (1982). *An adult's guide to style*. Maynard, MA: Gabriel Systems, Inc.
- Guilford, J. P. (1980). Cognitive styles: What are they? *Educational and Psychological Measurement*, 40, 715-735.
- Hayes, J. R. (1978). *Cognitive psychology: Thinking and creating*. Homewood, IL: The Dorsey Press.

- Houtz, J. C., Selby, E. C., Esquivel, G. B., Okoye, R. A., Peters, K. M., & Treffinger, D. J. (2003). Comparison of two creativity style measures. *Perceptual and Motor Skills*, 96, 288-296.
- Hurley, C. (1993). The relationship between Kirton Adaption-Innovation style and the use of Creative Problem Solving. Unpublished master's thesis, Center for Studies in Creativity, Buffalo State College, Buffalo, NY.
- Isaksen, S. G. (Ed.), (1987). *Frontiers of creativity research: Beyond the basics*. Buffalo, New York: Bearly Limited.
- Isaksen, S. G. (2004). The progress and potential of the creativity level - style distinction: Implications for research and practice. W. Haukedal, B. Kuvas (Eds.). *Creativity and problem solving in the context of business management* (pp. 40-71). Bergen, Norway: Fagbokforlaget.
- Isaksen, S. G. & Dorval, K. B. (1993). Toward an improved understanding of creativity within people: The level-style distinction. In S. G. Isaksen, M. C. Murdock, R. L. Firestien, & D. J. Treffinger (Eds.), *Understanding and recognizing creativity: The emergence of a discipline* (pp. 299-330). Norwood, NJ: Ablex.
- Isaksen, S. G. & Kaufmann, G. (1990). Adaptors and innovators: A discriminant analysis of the perceptions of the psychological climate for creativity. *Studia Psychologica: The Journal for Basic Research in Psychological Sciences*, 32, 129-141.
- Isaksen, S. G. & Puccio, G. J. (1988). Adaption-innovation and the Torrance Tests of Creative Thinking: The level-style issue revisited. *Psychological Reports*, 63, 659-670.
- Isaksen, S. G. & Tidd, J. (2006). *Meeting the Innovation Challenge: Leadership for Transformation and Growth*. Chichester, UK: Wiley.
- Isaksen, S. G., & Treffinger, D. J. (2004). Celebrating 50 years of reflective practice: Versions of creative problem solving. *Journal of Creative Behavior*, 38, 75-101.
- Isaksen, S. G., Babij, B., & Lauer, K. J. (2003). Cognitive styles in creative leadership practices: Exploring the relationship between level and style. *Psychological Reports*, 93, 983-994.
- Isaksen, S. G., Dorval, K. B., & Kaufmann, G. (1992). Mode of symbolic representation and cognitive style. *Imagination, Cognition and Personality*, 11, 271-277.
- Isaksen, S. G., Dorval, K. B., & Treffinger, D. J. (2000). Creative approaches to problem solving: A framework for change. DuBuque, IA: Kendall/Hunt.
- Isaksen, S. G., Lauer, K. J., & Wilson, G. V. (2003). An examination of the relationship between personality type and cognitive style. *Creativity Research Journal*, 15 (4), 343-354.
- Isaksen, S. G., Puccio, G. J., & Treffinger, D. J. (1993). An ecological approach to creativity research: Profiling for creative problem solving. *Journal of Creative Behavior*, 23 (3), 149-170.
- Joniak, A. J. & Isaksen, S. G. (1988). The Gregorc Style Delineator: Internal consistency and its relationship to Kirton's Adaptive-Innovative Distinction. *Educational and Psychological Measurement*, 48, 1043-1049.
- Kaufmann, G. (1995). A theory of cognitive strategy preferences in problem solving. In T. Helstrup, G. Kaufmann, & K. H. Teigen (Eds.), *Problem solving and cognitive processes* (pp. 45-76). London, UK: Kingsley Publishing.
- Kaufmann, G. (2004). Two kinds of creativity: But which ones? *Creativity and Innovation Management Journal*, 13, 154-165.
- Kaufmann, G., Isaksen, S. G., & Lauer, K. J. (1996). Testing the "glass ceiling" effect on gender differences in upper level management: The case of innovator orientation. *European Journal of Work and Organizational Psychology*, 5, 29-41.
- Khatena, J. & Parnes, S. J. (1974). Applied imagination and the production of original verbal images. *Perceptual and Motor Skills*, 38, 130.
- Kirton, M. J. (1976). Adaptors and innovators: A description and measure. *Journal of Applied Psychology*, 61, 622-629.
- Kirton, M. J. (1978). Have adaptors and innovators equal levels of creativity? *Psychological Reports*, 42, 695-698.

- Kirton, M. J. (1994). A theory of cognitive style. In M. J. Kirton (Ed.), *Adaptors and innovators: Styles of creativity and problem solving* (Updated paperback edition) (pp. 1-33). London: Routledge.
- Kogan, N. (1976). Sex differences in creativity and cognitive styles. In S. Messick (Ed.), *Individuality in learning* (pp. 93-119). San Francisco: Jossey-Bass Publishers.
- Likert, R. & Quasha, W. H. (1941). Revised Minnesota paper form board test (Series AA). New York: The Psychological Corporation.
- Martinsen, Ø., & Kaufmann, G. (1999). Cognitive style and creativity. In M. A. Runco & S. R. Pritzker (Eds.), *Encyclopedia of Creativity – Vol. 1* (pp. 273-282). New York: Academic Press.
- McEwen, P. (1986). Learning styles: Ability and creativity. Unpublished masters thesis, State University College at Buffalo, Center for Studies in Creativity.
- Meadow, A. & Parnes, S. J. (1959). Evaluation of training in creative problem solving. *Journal of Applied Psychology*, 43, 189-194.
- Meadow, A., Parnes, S. J. & Reese, H. (1959). Influences of brainstorming instructions and problem sequence on a creative problem solving test. *Journal of Applied Psychology*, 43, 413-416.
- Messick, S. (1984). The nature of cognitive styles: Problems and promise in educational practice. *Educational Psychologist*, 19, 59-74.
- Miller, A. (1987). Cognitive styles: An integrated model. *Educational Psychology*, 7, 251-268.
- Murdock, M. C., Isaksen, S. G. & Lauer, K. L. (1993). Creativity training and the stability and internal consistency of the Kirton Adaption-Innovation Inventory. *Psychological Reports*, 72, 1123-1130.
- Myers, I. B. & McCaully, M. H. (1985). *A guide to the development and use of the Myers-Briggs Type Indicator*, Palo Alto, CA: Consulting Psychologists Press.
- Noller, R. B. & Parnes, S. J. (1972). Applied creativity: The creative studies project: Part III—The curriculum. *Journal of Creative Behavior*, 6, 275-294.
- O'Brien, T. P. (1990). Construct validation of the Gregorc Style Delineator: An application of Lisrel 7. *Educational and Psychological Measurement*, 50, 631-636.
- Osborn, A. F. (1953). *Applied imagination: Principles and procedures of creative thinking*. New York: Charles Scribner's Sons.
- Paivio, A. (1971). *Imagery and verbal processes*. Holt, Rinehart, and Winston, Inc.
- Parnes, S. J. (1961). Effects of extended effort in creative problem solving. *Journal of Educational Psychology*, 52 (3), 117-122.
- Parnes, S. J. (1963). The deferment-of-judgment principle: A clarification of the literature. *Psychological Reports*, 12, 521-522.
- Parnes, S. J. (1966). *Programming creative behavior*. Buffalo, New York: State University of New York at Buffalo.
- Parnes, S. J. (1987). The creative studies project. In S. G. Isaksen (Ed.), *Frontiers in creativity research: Beyond the basics* (pp. 165-188). Buffalo, NY: Bearly Limited.
- Parnes, S. J., & Meadow, A. (1959). Effects of brainstorming instruction on creative problem solving by trained and untrained subjects. *Journal of Educational Psychology*, 50, 171-176.
- Parnes, S. J. & Meadow, A. (1960). Evaluation of persistence of effects produced by a creative problem solving course. *Psychological Reports*, 7, 357-361.
- Parnes, S. J. & Noller, R. B. (1972a). Applied creativity: The creative studies project: Part I—The development. *Journal of Creative Behavior*, 6, 11-22.
- Parnes, S. J. & Noller, R. B. (1972b). Applied creativity: The creative studies project: Part II—Results of the two-year program. *Journal of Creative Behavior*, 6, 164-186.

- Parnes, S. J. & Noller, R. B. (1973). Applied creativity: The creative studies project: Part IV--Personality findings and conclusions. *Journal of Creative Behavior*, 7, 15-36.
- Price, G.E., Dunn, R., & Dunn, K. (1991). Productivity environmental preference survey: PEPS manual. Lawrence, KS: Price Systems.
- Puccio, G. J. (1987). The effects of cognitive style on problem-defining behavior. Unpublished master's thesis, Center for Studies in Creativity at Buffalo State College, Buffalo, NY.
- Reese, H. W., Treffinger, D. J., Parnes, S. J., & Kaltsounis, G. (1976). Effects of a creative studies program on structure-of-intellect factors. *Journal of Educational Psychology*, 68, 401-410.
- Rickards, T. & Puccio, G. J. (1992). Problem finding, idea finding and implementation: An exploratory model for investigating small-group problem solving. In P. Barrar & C. L. Cooper (Eds.), *Managing organisations in 1992: Strategic responses* (pp. 247-263). London: Routledge.
- Rose, L. H. & Lin, H. T. (1984). A meta-analysis of long-term creativity training programs. *Journal of Creative Behavior*, 18, 11-22.
- Schoonover, P. F. (1996). The preferences for and use of creative problem solving tools among adaptors and innovators. Unpublished doctoral dissertation. Walden University.
- Selby, E. (1991). The Kirton adaption-innovation inventory as a tool for assessing problem solving styles in eighth grade students. Unpublished doctoral dissertation, Walden University.
- Selby, E. C., Treffinger, D. J., Isaksen, S. G., & Lauer, K. J. (2004a). Defining and assessing problem-solving style: Design and development of new tool. *The Journal of Creative Behavior*, 38, 221-243.
- Selby, E. C., Treffinger, D. J., Isaksen, S. G., & Lauer, K. J. (2004b). VIEW technical manual. Sarasota, FL: Center for Creative Learning.
- Selby, E. C., Treffinger, D. J., Isaksen, S. G. & Powers, S. V. (1993). Use of the Kirton Adaption-Innovation Inventory with middle school students. *Journal of Creative Behavior*, 27 (4), 223-235.
- Sewall, T. J. (1986). The measurement of learning style: A critique of four assessment tools. Green Bay, Wisconsin: Wisconsin Assessment Center.
- Shack, G. D. (1993). Effects of a creative problem solving curriculum on students of varying ability levels. *Gifted Child Quarterly*, 37, 32-38.
- Strong, E. K., & Campbell, D. P. (1974). Strong vocational Interest Blank - Form T325. Stanford, CA: Stanford University Press.
- Teft, M. (1990). A factor analysis of the TTCT, MBTI, and KAI: The creative level-style issue re-examined. Unpublished master's thesis, Center for Studies in Creativity at Buffalo State College, Buffalo, NY.
- Tiedemann, J. (1989). Measures of cognitive styles: A critical review. *Educational Psychologist*, 24 (3), 261-275.
- Torrance, E. P. (1972). Can we teach children to think creatively? *Journal of Creative Behavior*, 6(2), 114-143.
- Torrance, E. P. (1974). Norms-technical manual of Torrance tests of creative thinking. Bensenville, IL: Scholastic Testing Service.
- Torrance, E. P. (1986). Teaching creative and gifted learners. In M. C. Wittrock (Ed.), *Handbook of research on teaching - third edition* (pp. 630-647). New York: MacMillan.
- Torrance, E. P. (1987). Teaching for creativity. In S. G. Isaksen, (Ed.), *Frontiers of creativity research: Beyond the basics* (pp. 189-215). Buffalo, NY: Bearly Limited.
- Treffinger, D. J. (2005). 2005 VIEW Technical Update. Sarasota, FL: Center for Creative Learning.
- Treffinger, D. J., & Isaksen, S. G. (2005). Creative problem solving: History, development, and implications for gifted education and talent development. *The Gifted Child Quarterly*, 49, 342-353.

Treffinger, D. J., Isaksen, S. G., & Stead-Dorval, K. B. (2006). *Creative Problem Solving: An introduction* (4th ed.). Waco, TX: Prufrock Press.

Vernon, P. E. (1973). Multivariate approaches to the study of cognitive styles. In J. R. Royce (Ed.), *Multivariate analysis and psychological theory* (pp. 125-148). London: Academic Press.

Weinstein, C. E. & Mayer, R. E. (1986). The teaching of learning strategies. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed). New York: MacMillan Publishing Co. pp. 315-327.

Wheeler, J. (1995). Exploratory study of preferences associated with creative problem solving. Unpublished master's project. Center for Studies in Creativity, Buffalo State College, Buffalo, NY.

Willerman, L. (1979). *The psychology of individual and group differences*. San Francisco, CA: W. H. Freeman Company.

Wittig, C. V. (1985). Learning style preferences among third graders high or low on divergent thinking and feeling variables. Unpublished master's thesis, Buffalo State College, Buffalo, NY.

Wittrock, M. C. (1986). Students' thought processes. In M. C. Wittrock (Ed.), *Handbook of research on teaching - third edition* (pp. 297-314). New York: MacMillan Publishing Co.

Zilewicz, E. (1986). Cognitive styles: Strengths and weaknesses when using CPS. Unpublished master's project, Center for Studies in Creativity at Buffalo State College, Buffalo, NY