GERARD J. PUCCIO
RUSSELL A. WHEELER
VINCENT J. CASSANDRO

Reactions to Creative Problem Solving Training: Does Cognitive Style Make a Difference?

ABSTRACT Creative Problem Solving (CPS), a well-documented methodology for developing creative-thinking skills, has often been the focus of studies that have examined the impact of creativity training. The purpose of the present study was to extend this line of research in two ways. The first objective was to evaluate participants' reactions to specific elements of a CPS course. Here participants were asked to rate the CPS components, stages, principles, and tools for enjoyment and future value. The second objective was to examine whether participants' reactions to the CPS training varied in accordance to their cognitive style preferences. The inventory used to measure cognitive style is called FourSight. FourSight identifies respondents' preferences in terms of four key elements of the creative process: problem identification (i.e., Clarifier), idea generation (i.e., Ideator), solution development (i.e., Developer), and implementation (i.e., Implementer). Eighty-four participants were enrolled in various graduate and undergraduate courses in CPS. Participants completed FourSight at the beginning of their respective course and at the conclusion they responded to a survey in which they evaluated various aspects of CPS for enjoyment and value. Overall evaluation of the CPS courses indicated that participants associated the greatest enjoyment and future value with tools, principles, and stages that were primarily orientated towards divergent thinking. Analysis of participants' reactions in light of their FourSight preferences revealed two distinct types of reactions to the course content. One form of response was labeled true-to-type, for example, individuals who expressed high Clarifier preferences found learning the Gather Data stage of CPS to be more enjoyable than those with low

Clarifier preferences. The second type of reaction was referred to as a complementary relationship. This type of relationship between the course and the participant's style seemed to indicate a desire to develop a skill that is perhaps outside of one's style preference. For example, participants with strong Ideator preferences were more likely to associate higher levels of future value with the Prepare for Action component of the CPS process. The implications of these and other findings are discussed.

INTRODUCTION

Perhaps the most comprehensive investigation of the impact of creativity training was the Creative Studies Project carried out in the 1970s (Noller & Parnes, 1972; Parnes, 1985; Parnes & Noller, 1972a, 1972b, 1973). Creative Problem Solving (CPS), originally developed by Osborn (1953) some 20 years before the Creative Studies Project, was one of the main creativity models featured in the curriculum offered to undergraduate students over a two-year period (i.e., four courses over four semesters). The main issue addressed in this study was whether students' creative-thinking skills could be enhanced through explicit training in creativity. Parnes and Noller adopted many of Guilford's Structure-of-the-Intellect tests to determine if various mental abilities were significantly enhanced among students randomly assigned to the creativity program. Results showed a clear pattern in which the creativity students out performed the control group on most post-test measures. For example, the experimental group showed significantly higher scores on measures of divergent production, convergent production, and cognition.

Since the Creative Studies Project numerous researchers have continued to examine the impact of CPS training (e.g., Everhart, Kernodle, Turner, Harshaw & Arnold, 1999; Firestien & McCowan, 1988; Hurley, 1993; Keller-Mathers, 1990; Neilson, 1990; Place, McCluskey, McCluskey & Treffinger, 2000; Schack, 1993; Torrance & Presbury, 1984). In fact, it appears as though CPS has been one of the most extensively researched models for teaching creativity and perhaps one of the most successful. Rose and Lin (1984), for example, used meta-analysis to assess the effects of a number of creativity training programs, including CPS. These authors concluded that, "The substantial impact of Osborn and Parnes CPS on verbal creativity combined with the conclusions from both Torrance's and Parnes and Brunelle's reviews provide strong evidence to support the effectiveness of this program" (p. 21).

The studies cited above, as well as numerous other impact studies, addressed the fundamental question as to whether creative abilities could be developed through explicit educational programs. Evidence yielded by such studies indicates that training does enhance creativity skills. Now that the fundamental issue in regard to creativity training has been addressed, it is time for impact research to evolve into more interactive research designs. Recently creativity researchers have called for more systemic and comprehensive investigations of creativity, that is, studies that incorporate more than one facet of creativity (Csikszentmihalyi, 1990; Helson, 1988; Murdock & Puccio, 1993). Growth in our understanding of creativity puts contemporary researchers in a position to design studies that better reflect the multi-faceted nature of creativity described by the some of the pioneers in our field (e.g., MacKinnon, 1978; Mooney, 1963; Rhodes, 1961; Stein, 1968). These early scholars suggested that creative behavior emerges out of the interaction of four basic domains, namely person, process, product, and environment. The view that creativity is best understood as an interaction of diverse sets of variables or from a systems approach is readily apparent in many recent theoretical models, such as the work of Amabile (1996), Csikszentmihalyi (1999), Harrrington (1990), and Puccio, Talbot, and Joniak (2000). Harrington, who used biological ecosystems as a metaphor, suggested that, "Psychologists should undertake systematic studies of creative ecosystems and the functional relationships and interdependencies that support or impede creative processes and creatively active individuals within them" (pp. 151-152). The present study sought to take up the call for more interactive research designs by examining the interplay between creativity training and the cognitive style preferences of training participants.

Although the Creative Studies Project focused mainly on studying outcomes associated with the creative process, Parnes and Noller did observe an apparent interaction effect between students' personalities and the nature of the curriculum. Parnes and Noller (1973) found significant differences when they compared the personalities of those students who remained with the Creative Studies Project versus those who dropped out. For example, significant differences for female participants showed that those who withdrew from the creativity courses had personalities that were more inclined to be attracted to artistic creativity. Parnes and Noller observed that, "Many who dropped because of their disappointment in the nature of the

course had expected more emphasis on creative activities in the arts" (p. 19). In general, Parnes and Noller believed that the significant differences with respect to personality indicated that the drop-outs were people who preferred quick idea production as opposed to a systematic and disciplined approach to the creative process, as taught through CPS.

To further explore the apparent person-process interactions initially discovered as part of the Creative Studies Project, researchers at the Center for Studies in Creativity embarked on a program of research called the Cognitive Styles Project. Isaksen, Puccio, and Treffinger (1993) described the aim of this research as, "To examine the nature of the interactions between preferred ways of processing information and creative problem-solving behavior" (p. 53). Studies within this program of research incorporated various measures of cognitive style to examine whether systematic differences emerged among individuals engaged in CPS per se or behaviors associated with the creative process (Isaksen, et al, 1993). For example, Zilewicz (1986) used Gregorc's Style Delineator (Gregorc, 1982) to show that students with different cognitive styles reported quite different strengths and weaknesses when solving problems. Puccio (1987), using Kirton's Adaption-Innovation Inventory (Kirton, 1994), found that students with more innovative cognitive styles were more fluent and original when asked to generate problem statements based on a real business problem. Again using Kirton's measure, Hurley (1993) found a relationship between students' cognitive style preferences and use of CPS up to one-year after training. For example, innovators were more likely to use divergent-thinking tools such as Forced Relationships and Visual Connections, whereas individuals with more adaptive preferences were more likely to use the convergent-thinking tool Paired Comparison Analysis. For some CPS tools the students' cognitive style preference were a stronger predictor of eventual use than were the students' own ratings of the perceived future value of the tool collected at the conclusion of the course. Although Hurley's study was limited to one graduate course (n = 35), it does demonstrate the benefit of examining the impact of CPS training through the lens of cognitive style.

The present study extends the line of inquiry into the relationship between cognitive styles and CPS training. We used a measure of cognitive style, called FourSight (formerly titled the Buffalo Creative Process Inventory), to examine whether students with different preferences had significantly different

reactions to CPS training. FourSight was designed to assess respondents' preferences for different aspects of the creative process (Puccio, 1999, 2001). The essential theoretical underpinning to FourSight is that the creative process involves a series of distinct mental operations that can be described via the CPS model, and that people possess different degrees of preference for these mental operations. The items that comprise FourSight were based on descriptions of the mental activities associated with the various stages of the CPS process model. Factor analysis of these items reflects four preferences (Puccio, 1999, 2001). These preferences are referred to as Clarifier (i.e., a focus on problem clarification), Ideator (i.e., a focus on idea generation), Developer (i.e., a focus on solution development), and Implementer (i.e., a focus on taking action).

Since FourSight was designed to measure preferences associated with the creative process, it was expected that the expression of such preferences would be significantly related to students' reactions to CPS training. Specifically, we believed that students with different cognitive styles would report significantly different levels of enjoyment in regard to learning the various CPS components, stages, principles, and tools. Also, we believed that perceptions regarding the value (i.e., usefulness in the future) associated with learning the various aspects of CPS would differ according to students' cognitive styles. Furthermore, we were interested in the nature of such relationships, which we thought might come in two main forms. Would these relationships be driven by a desire to use aspects of CPS to complement one's natural tendencies? For example, high Clarifiers might enjoy and find great value in learning tools that enhance idea generation. Alternatively, would students react most favorably to those aspects of CPS that naturally fit their present cognitive style preferences? For example, high Clarifiers might enjoy most and see the greatest value in CPS tools designed to help define the problem.

The purpose of the present study was twofold. First, we set out to establish a baseline understanding of participants' overall reactions to various elements of a CPS course. Specifically, what aspects of CPS did participants find most enjoyable to learn, as well as what aspects of CPS they felt would be most useful for them in the future. Many of the past studies of CPS, such as those cited earlier, have focused on training effects and have not assessed participants' reactions to the course content. Second, after establishing the overall reaction to the

course content we investigated the degree to which participants' reactions varied with their cognitive style preferences.

METHOD

Participants

The study involved a total of 84 students (73 graduate and 11 undergraduate) enrolled in CPS courses taught at Buffalo State, State University of New York. The courses were taught during the spring, summer and fall semesters of 2000. The title of the graduate courses was "Principles in Creative Problem Solving" and the undergraduate course was titled "Creative Approaches to Problem Solving". The mean score for those participants who reported their age was 32.49 (n = 59). Sixty-nine participants reported their gender. There were 25 males and 44 females.

Procedure

At the beginning of each CPS course students were asked to complete the FourSight inventory during class time. FourSight is designed to measure people's preferences for the four basic operations within the creative process, namely problem identification, idea generation, solution development, and implementation. The version of FourSight used in this study contained 30 items, each item is a self-descriptive statement designed to reflect one of the four mental operations associated with the creative process. Respondents are asked to indicate the degree to which each statement is descriptive of him or her along a five-point scale, the poles of the scale are labeled "not like me at all" and "very much like me". FourSight is comprised of four scales that correspond to the four basic areas of mental operation within the creative process. The scales are Clarifier (7 items), Ideator (9 items), Developer (7 items), and Implementer (7 items). Previous research with a larger sample revealed adequate internal consistency for these scales (Puccio, 2001). Puccio (2001) reported Cronbach alpha coefficients as follows: Clarifier .78 (n = 296); Ideator .81 (n = 293); Developer .79 (n = 296); and Implementer .81 (n = 294).

High scores for the Clarifier preference indicate a focus on making sure the problem is understood before potential solutions are created. High scores for the Ideator preference indicate a tendency to enjoy using one's imagination to generate many possible solutions to a problem. High scores on the Developer scale reflect a tendency to use analysis to refine a broad idea into a workable solution. Finally, a high score for the Implementer scale is indicative of an individual who is bent on moving ideas from the drawing board to reality as quickly as possible.

Each course involved about 40 hours of instruction in CPS. The spring and fall courses were taught over a 15-week time period, while the one summer course was delivered over five weeks. Different instructors taught the courses; however, the course content remained relatively similar. The same CPS model was taught in each course, but instructors used different language and labels in reference to the model. Table 1 provides a summary of the course content. This table is organized into four categories: components, stages, principles, and tools. These categories represent main features of the CPS process. Components refer to the three major areas used to organize the six CPS stages. The stages represent specific problem-solving activities. Each of the six CPS stages contains a divergent (i.e., generating options) and convergent phase (i.e., evaluating options), the principles are used to guide thought in these phases. Finally, tools refer to specific strategies used within the stages of the process. Like the principles, the tools can be sorted by those designed to foster divergent or convergent thought. Each item is followed by a brief explanation. The depiction of the CPS process presented in Table 1 is based on the work of Miller, Vehar, and Firestien (2001).

TABLE 1. Course Content: CPS Components, Stages, Principles and Tools.

Elements of CPS	Description
Components:	
Explore the Challenge	Combination of the first three CPS stages (see below)
Generate Ideas	Idea Generation stage only
Prepare for Action	Combination of Select & Strengthen Solutions and Plan for Action stages
Stages:	
Identify Goal, Wish, Challenge	Finding a broad issues to which CPS might be applied
Gather Data	Developing a deeper understanding of the situation
Clarify the Problem	Identifying specific problems that must be resolved
Generate Ideas	Producing tentative solutions
Select & Strengthen Solutions	Evaluating and refining the most promising solutions
Plan for Action	Developing an implementation plan

TABLE 1.
continued

Elements of CPS	Description
Principles:	
General Principles	
Dynamic Balance	Using both divergent and convergent thinking
Divergent Thinking	Generating many original and unique options
Convergent Thinking	Evaluating options
Divergent Principles	
Defer Judgment	Learning to suspend evaluation
Strive for Quantity	Generating many possibilities
Seek Wild & Unusual	Producing original concepts
Build on Other Ideas	Making combinations among options
Convergent Principles	
Be Affirmative	Using positive forms of evaluation
Be Deliberate	Evaluating options systematically
Check Your Objectives	Remembering the goal to be accomplished
Improve Ideas	Refining and elaborating on options
Consider Novelty	Staying open to unique options
Tools:	
Divergent	
Brainstorming	Following divergent thinking guidelines to generate many possibilities
Stick'em Up Brainstorming	Brainstorming with Post-it™ notes
Brainwriting	Recording options individually and silently then swapping worksheets
Forced Connections	Using random stimuli to generate options
Word Dance	Replacing words within a problem statement to find new meaning
SCAMPER	Posing various questions to generate new ideas
Visual Connections	Using visual stimuli to generate new options
Ladder of Abstraction	Redefining a problem by asking 'why' and 'what's stopping you'
Excursions	Using mental imagery to generate options
Convergent	
Highlighting	Sorting and clustering options along themes
Praise First	Refining solutions by identifying strengths and overcoming weaknesses
Card Sort	Prioritizing options
Evaluation Matrix	Using criteria to screen options

At the end of the course the students completed a paper-and-pencil survey designed to assess Level One in Kirkpatrick's (1996) model for evaluating training programs. Level One is referred to as Reaction. According to Kirkpatrick (1996) Level One focuses on "how well the trainees liked a particular training program . . . evaluating in terms of reaction is the same as measuring the feelings of the conferees" (p. 295). Level Four, the highest level in Kirkpatrick's model, focuses on results — that is what participants accomplish after training that is directly attributed to the training content. The post-course survey contained three parts. The first part asked respondents to evaluate how much they enjoyed learning the various aspects of the CPS process. The second part had participants rate how valuable various aspects of the CPS process would be for them in the future. Both of these parts of the survey included sections that contained specific elements of the CPS process. These sections were the three CPS components, the six CPS stages, twelve CPS principles and thirteen CPS tools. Within these sections participants rank ordered the elements from high to low for both enjoyment and future value (i.e., a one was assigned to the most enjoyable or valuable, a two for the next most enjoyable or valuable, and so on). The third part of the post-course survey contained three open-ended questions. These questions asked participants to comment on what they found to be most valuable from the course and to describe how they might apply the course content in their personal and professional lives.

RESULTS

Descriptive Results

Means and standard deviations were calculated for the FourSight inventory. To make it easier to compare these statistics across scales — recall that the Ideator scale contained two more items than each of the other three scales — the mean and standard deviation were calculated on the raw total score for each scale divided by the number of items for that scale. The mean score represents the average response along the five-point continuum, again this ranged from one (not like me at all) to five (very much like me). The mean and standard deviations were as follows: Clarifier $M = 3.57$, $SD = .68$; Ideator $M = 3.62$, $SD = .70$; Developer $M = 3.41$; $SD = .73$; and Implementer $M = 3.66$, $SD = .72$. Mean scores and standard deviations across the four scales were quite similar. The mean scores are approximately one point greater than the mid-point of the five-point response continuum, which indicates that participants tended to find the FourSight items as being descriptive of themselves.

Table 2 presents the means, standard deviations, minimums, and maximums for each measure of student enjoyment regarding elements of the CPS process. The highest rated of the three components was Generate Ideas (M = 1.50, SD = .75), followed by Explore the Challenge (M = 2.12, SD = .75) and Prepare for Action (M = 2.38, SD = .69). The difference between Generate Ideas and the other two components is notably large in comparison to their respective standard deviations. Given these results it is not surprising that Generate Ideas **was** the highest ranked stage (M = 2.46, SD = 1.69), with the lowest ranked stage being Plan for Action (M = 4.58, SD = 1.42). The highest rated principles were the Defer Judgment (M = 3.56, SD = 2.65) and Divergent Thinking (M = 3.86, SD = 2.97), while the lowest rated were the Be Deliberate (M = 8.63, SD = 2.67) and Check Your Objectives (M = 8.36, SD = 3.15) principles. Of the CPS tools, Stick'em Up Brainstorming (M = 3.13, SD = 2.70) and Brainstorming (M = 4.17, SD = 3.13) were the highest ranked, while Excursions (M = 9.95, SD = 2.99) and Card Sort (M = 9.85, SD = 2.83) were the lowest rated. It is important to note that the difference between the lowest and highest rated principles, stages, and tools exceed their respective standard deviations in size (i.e., a difference greater than one standard deviation represents a large effect size). Students' overall reactions to what was most enjoyable clearly favor the more divergent aspects of the CPS process.

Table 3 presents the means, standard deviations, minimums, and maximums for each measure of ranked future value regarding the elements of the CPS process. The highest rated of the three components was Generate Ideas (M = 1.74, SD = .76), followed by Explore the Challenge (M = 1.93, SD = .83) and Prepare for Action (M = 2.33, SD = .75). The differences between Generate Ideas and the other two components were attenuated — relative to their respective standard deviations — in comparison to those found for the enjoyment of learning variables, yet still mirrored the previously described pattern of findings. Of the CPS stages, the highest ranked were the Clarify the Problem (M = 2.75, SD 1.47) and Generate Ideas (M = 2.98, SD = 1.64) stages, with the lowest ranked stage being the Plan for Action (M = 4.50, SD = 1.68) stage. In contrast to the results in Table 2, the participants emphasize the future value of understanding how to Clarify the Problem over their enjoyment of learning the stage itself. The highest rated principles were the Defer Judgment (M = 3.68, SD = 2.88) and Divergent

TABLE 2. Descriptive Statistics for Enjoyment of Learning Variables.

Variable	*M*	*SD*	Minimum	Maximum	*N*
Components:					
Explore the Challenge	2.12	.75	1	3	84
Generate Ideas	1.50	.75	1	3	84
Prepare for Action	2.38	.69	1	3	84
Stages:					
Identify Goal, Wish, Challenge	3.39	1.66	1	6	84
Gather Data	3.61	1.46	1	6	84
Clarify the Problem	3.01	1.70	1	6	84
Generate Ideas	2.46	1.69	1	6	84
Select & Strengthen Solutions	3.88	1.54	1	6	84
Plan for Action	4.58	1.42	1	6	84
Principles:					
Dynamic Balance	6.13	3.46	1	12	83
Divergent Thinking	3.86	2.97	1	12	84
Defer Judgment	3.56	2.65	1	11	70
Strive for Quantity	5.63	2.79	1	12	84
Seek Wild & Unusual Ideas	4.59	3.22	1	12	83
Build On Other Ideas	5.77	2.46	1	12	84
Convergent Thinking	7.03	2.90	1	12	76
Be Affirmative	7.20	2.84	1	12	84
Be Deliberate	8.63	2.67	1	12	84
Check Your Objectives	8.36	3.15	1	12	84
Improve Ideas	7.44	2.96	1	12	62
Consider Novelty	6.60	3.29	1	12	84
Tools:					
Brainstorming	4.17	3.13	1	13	84
Stick'em Up Brainstorming	3.13	2.70	1	12	84
Brainwriting	4.37	2.87	1	13	84
Forced Connections	5.65	3.08	1	13	84
Word Dance	9.29	2.78	2	13	49
SCAMPER	9.32	2.71	1	13	76
Visual Connections	6.25	2.97	1	13	83
Ladder of Abstraction	7.43	3.22	1	13	61
Excursions	9.95	2.99	1	13	44
Highlighting	6.75	2.86	1	13	84
Praise First	6.90	3.08	1	13	77
Card Sort	9.85	2.83	2	13	54
Evaluation Matrix	8.12	3.30	1	13	82

TABLE 3. Descriptive Statistics for Future Value Variables.

Variable	*M*	*SD*	Minimum	Maximum	*N*
Components:					
Explore the Challenge	1.93	.83	1	3	84
Generate Ideas	1.74	.76	1	3	84
Prepare for Action	2.33	.75	1	3	84
Stages:					
Identify Goal, Wish, Challenge	3.46	1.88	1	6	84
Gather Data	3.49	1.56	1	6	84
Clarify the Problem	2.75	1.47	1	6	84
Generate Ideas	2.98	1.64	1	6	84
Select & Strengthen Solutions	3.82	1.46	1	6	84
Plan for Action	4.50	1.68	1	6	84
Principles:					
Dynamic Balance	6.21	3.67	1	12	84
Divergent Thinking	4.46	3.15	1	11	84
Defer Judgment	3.68	2.88	1	12	84
Strive for Quantity	6.36	3.22	1	12	84
Seek Wild & Unusual Ideas	6.13	3.53	1	12	83
Build On Other Ideas	5.73	2.97	1	12	84
Convergent Thinking	6.69	2.90	2	12	77
Be Affirmative	7.17	3.17	1	12	83
Be Deliberate	8.33	2.70	2	12	84
Check Your Objectives	7.26	3.16	1	12	84
Improve Ideas	6.68	3.06	1	12	62
Consider Novelty	7.37	3.25	1	12	84
Tools:					
Brainstorming	4.64	3.80	1	13	84
Stick'em Up Brainstorming	3.48	3.01	1	13	84
Brainwriting	4.64	2.96	1	12	84
Forced Connections	5.71	3.26	1	12	84
Word Dance	9.35	2.80	2	13	51
SCAMPER	8.91	3.22	1	13	77
Visual Connections	6.93	2.93	1	13	83
Ladder of Abstraction	6.92	3.26	1	13	61
Excursions	10.47	2.79	2	13	45
Highlighting	6.08	2.57	1	12	84
Praise First	6.63	3.28	1	13	78
Card Sort	9.69	2.80	2	13	54
Evaluation Matrix	7.65	3.10	1	14	82

Thinking (M = 4.46, SD = 3.15) principles, while the lowest rated were the Be Deliberate (M = 8.33, SD = 2.70), Consider Novelty (M = 7.37, SD = 3.25), and Check Your Objectives (M = 7.26, SD = 3.16) principles. The results, once again, mirror those found in Table 2, except for the addition of the Consider Novelty variable to the lowest rated principles. Of the CPS tools, Stick'em Up Brainstorming (M = 3.48, SD = 3.01), Brainwriting (M = 4.64, SD = 2.96), and Brainstorming (M = 4.64, SD = 3.80) were once again the highest ranked, while Excursions (M = 10.47, SD = 2.79) and Card Sort (M = 9.69, SD = 2.80) were the lowest rated.

It is interesting to note that although the overall pattern of findings was remarkably similar across Tables 2 and 3, the variability (i.e., standard deviations) found in Table 3 was consistently higher (i.e., higher in 77% of the variables) than those reported in Table 2. Such a finding indicates that consensus was consistently lower in regard to the future value of these stages/principles/components/etc. than that found in the ratings of the enjoyment of learning variables. As with the results for enjoyment, participants' reactions to what held the greatest future value generally favored the divergent elements of the process.

Multiple Regression Analyses

Regression analyses were conducted to explore two sets of questions. First, what is the pattern of relationships between each FourSight preference and each CPS training variable, while holding all other FourSight preferences constant? Due to the sizable intercorrelations between the FourSight scales (correlations averaging $r = |.35|$), it is important to reexamine the correlational data[1] while removing the shared variation from the analyses. Second, does cognitive style as measured by FourSight, explain variation in each of the ratings of enjoyment and future value of CPS? If the FourSight scales explain a meaningful amount of variation, we can support the contention that cognitive style plays an important explanatory and predictive role in the enjoyment and expected future usage of CPS components, principles, stages, and tools. The first four columns of Tables 4 and 5 present the standardized regression coefficients (β) found when each CPS variable was regressed upon the four FourSight preferences. The fifth and last column in

[1] Zero-order correlations were also explored in these data prior to conducting the multiple regression analyses; however, these statistics are not included in the manuscript in their entirety. Please contact the authors for a detailed description of the effects found for the zero-order correlational data.

TABLE 4. Regression Results with Enjoyment of Learning Variables Regressed upon FourSight Subscales.

Variable	FourSight Subscales Betas (β) Clarifier	Ideator	Developer	Implementer	R^2
Components:					
Explore the Challenge	.17	.09	.15	–.10	.11
Generate Ideas	–.05	–.09	–.21	–.02	.09
Prepare for Action	–.13	–.00	.07	.13	.03
Stages:					
Identify Goal, Wish, Challenge	–.01	–.11	.24	–.12	.06
Gather Data	.34*	.05	–.29	.02	.06
Clarify the Problem	.06	–.09	.29	–.16	.11
Generate Ideas	–.11	.03	–.15	–.02	.05
Select & Strengthen Solutions	.06	.16	–.23	.13	.06
Plan for Action	–.36*	.02	.14	.23*	.13*
Principles:					
Dynamic Balance	–.09	.04	.05	.07	.01
Divergent Thinking	–.04	–.19	.07	.03	.03
Defer Judgment	.17	–.21	–.01	.19	.06
Strive for Quantity	.10	–.02	.03	–.03	.01
Seek Wild & Unusual Ideas	.01	.09	–.30	–.09	.08
Build On Other Ideas	–.07	–.08	–.06	–.11	.05
Convergent Thinking	–.01	–.07	.22	.16	.07
Be Affirmative	.07	.21	.17	–.07	.12*
Be Deliberate	–.13	.09	.08	.18	.06
Check Your Objectives	–.23	.04	.29	.09	.07
Improve Ideas	–.00	.08	–.02	.05	.01
Consider Novelty	.13	.16	–.27	–.15	.06
Tools:					
Brainstorming	–.01	–.21	.00	.07	.04
Stick'em Up Brainstorming	–.25	–.13	.12	–.09	.08
Brainwriting	–.17	–.14	–.03	–.06	.08
Forced Connections	–.02	.03	–.19	–.23*	.10
Word Dance	.02	.14	.06	.23	.10
SCAMPER	–.27	–.01	.28	.03	.05
Visual Connections	–.05	.18	–.08	–.18	.04
Ladder of Abstraction	.27	–.20	.11	.00	.12
Excursions	–.18	.33	–.06	–.11	.12
Highlighting	–.09	–.15	.21	.04	.03
Praise First	.02	.23	.00	–.23	.07
Card Sort	.01	.19	–.10	–.07	.03
Evaluation Matrix	.25	–.25	–.20	.14	.10

Note: The scoring of each ranking variable was reversed for these analyses in order to make the correlations easily interpreted. Each row of Betas corresponds to an individual regression equation. Each row's *R* represents the multiple correlation for that particular regression equation.

TABLE 5. Regression Results with Future Value Variables Regressed upon FourSight Subscales.

Variable	FourSight Subscales Betas (β) Clarifier	Ideator	Developer	Implementer	R^2
Components:					
Explore the Challenge	.20	–.02	.06	–.02	.06
Generate Ideas	.01	–.24	–.10	.01	.08
Prepare for Action	–.24	.27*	.03	.01	.09
Stages:					
Identify Goal, Wish, Challenge	.25	–.01	–.06	–.06	.05
Gather Data	.37*	–.19	–.25	.12	.11
Clarify the Problem	.06	.08	.10	–.17	.05
Generate Ideas	.03	–.24	–.07	.08	.06
Select & Strengthen Solutions	–.37*	.14	.11	.04	.10
Plan for Action	–.38*	.24	.18	.00	.13*
Principles:					
Dynamic Balance	–.01	–.13	.04	.19	.03
Divergent Thinking	–.14	.07	.20	–.06	.03
Defer Judgment	–.29*	–.29*	.43*	–.11	.15*
Strive for Quantity	.28	–.12	–.28	.14	.08
Seek Wild & Unusual Ideas	.01	–.18	–.13	.03	.06
Build On Other Ideas	–.06	–.19	.03	.05	.04
Convergent Thinking	.07	.14	–.01	–.13	.03
Be Affirmative	.12	.22	.03	.01	.09
Be Deliberate	.10	.14	–.10	.18	.07
Check Your Objectives	.06	–.02	.10	.08	.03
Improve Ideas	–.08	.26	–.06	–.19	.07
Consider Novelty	.09	.04	–.16	.07	.02
Tools:					
Brainstorming	.07	–.15	–.18	–.10	.09
Stick'em Up Brainstorming	.06	–.28*	–.04	–.09	.10
Brainwriting	–.08	–.23	–.12	–.05	.14*
Forced Connections	–.13	.00	.01	–.11	.03
Word Dance	–.01	–.17	.11	.36*	.14
SCAMPER	–.09	–.07	.25	.02	.03
Visual Connections	–.12	.34*	–.26	–.10	.14*
Ladder of Abstraction	.10	–.17	.30	–.13	.14
Excursions	–.30	.17	.02	.16	.12
Highlighting	.21	.07	–.21	–.14	.04
Praise First	–.26	.24	.36*	–.12	.15*
Card Sort	–.10	.18	.04	–.00	.04
Evaluation Matrix	.29	.13	–.34*	.05	.07

Note: The scoring of each ranking variable was reversed for these analyses in order to make the correlations easily interpreted.

Tables 4 and 5 represent the amount of variation (R^2) in each CPS variable that is explained by all four FourSight preferences.

It is important to note that the scoring of each ranking variable was reversed for these analyses in order to make the coefficients easily interpreted. Put differently, the rank-ordered variables that formerly had lower scores representing greater enjoyment and higher scores representing decreased enjoyment, are now coded in the opposite direction. Also, although significance testing will be employed in the subsequent analyses, effect sizes that can be considered moderate or better (Rosenthal & Rubin, 1982) will be emphasized along with significance test results. In quantitative terms, we will primarily highlight regression coefficients (βs) and zero-order correlations (rs) where a one standard deviation change in a variable indicates at least a fifth of a standard deviation change in the other variable (i.e., $| r |$ or $| \beta | \geq .20$).

FourSight scales as a predictor of student enjoyment and future value of learning CPS. First, by using multiple regression to remove shared variance, we found that the size of the relationships indicated by the βs was generally less than that indicated by the zero-order correlations; yet, an important exception was found in the Components analyses. The rankings for the Prepare for Action variable increased in magnitude (in comparison to their respective zero-order correlations) for both the Clarifier (original $r = -.07$ for enjoyment and $r = -.14$ for value) and Ideator (original $r = .04$ for enjoyment and $r = .22$ for value) preferences when entered into the regression equation. This suppression effect may indicate that an individual's Developer tendencies interfere with the relationship between the Clarifier/Ideator preferences and their enjoyment and valuation of the Prepare for Action component. Holding Developer scores constant allows for the Clarifier's overall distaste for this component to appear ($\beta = -.13$ and $-.24$), while the Ideator's preference for this component's future value emerges ($\beta = .27$). Notably, all other patterns for the Component variables remained the same as that found in the zero-order correlations, including the Ideator dislike for the Generate Ideas component. Specifically, individuals that receive higher scores on the Ideator scale tend to rate the Generate Ideas component — the most popular component (see Tables 2 and 3) and a component that mirrors their specific style-related preferences — as less valuable than individuals that score low on the Ideator scale. Alternatively, the low Ideators seem to gravitate to the learning of idea generation skills. Also notable, is that while Ideators

appear to enjoy learning about the Explore the Challenge component, they place a greater future value in their learning of the Preparing for Action component.

The regression analyses for the CPS Stages variables revealed a few interesting suppression effects. First, both analyses reveal that the relationship between Clarifiers and the Gather Data stage increased dramatically ($\beta = .34$ and $\beta = .37$, respectively) in comparison to the original zero-order correlation coefficients ($r = .15$ and $r = .16$). A similar increase was found between Developers and the Gather Data stage ($\beta = -.29$ and $\beta = -.25$, respectively compared to $r = -.04$ and $r = -.06$) but in the opposite direction of the Clarifiers. A similar but opposite pattern was found between the Plan for Action stage and Clarifiers/Developers. It appears that a mutual suppression has caused both variables to amplify already existing, but muted, relationships: that is, Clarifiers become more excited about learning the Gather Data stage and less excited about the Plan for Action stage; Developers become less interested in the Gather Data stage, and more interested in the Plan for Action stage.

The regression analyses for the Principles variables revealed no statistically significant betas for enjoyment of learning, although the pattern of the results generally mirrored those found for the zero-order correlations. Although both the Be Affirmative and Be Deliberate principles were not well liked by the participants, the Be Affirmative principle resonated more with the high Ideators and Developers, while the Implementers replaced their counterparts' interest in learning to be affirmative with an interest in learning to be deliberate. Once again, the moderate to large zero-order correlations were consistently attenuated in the regression analyses. Among the principles examined for future value, there was only one, Defer Judgment, that produced significant betas. Here negative relationships were found between this divergent thinking principle and Clarifier ($\beta = -.29$) and Ideator ($\beta = -.29$). Recall the overall results showed the Defer Judgment principle received the highest ranking in regard to future value (see Table 3). In contrast, Developer showed a positive relationship with the Defer Judgment principle ($\beta = .43$). There would appear to be quite opposing views about the future value of the Defer Judgment principle.

The regression analyses for the CPS tools variables reveal a strikingly similar pattern of findings to those found in the zero-order correlations — that is, individuals scoring high on Clarifier, Ideator, and Developer scales do not enjoy or value

many of the standard divergent thinking tools, tools that were among the highest rated for enjoyment and value by all course participants (see Tables 2 and 3). Some important differences did emerge between the zero-order correlation findings and the betas: Ideators value the Visual Connections tool far more when the other preferences are held constant ($\beta = .34$ compared to $r = .15$); and Developers devalued the Evaluations Matrix more so when all other preferences are held constant ($\beta = -.34$ compared to $r = -.07$). Otherwise, the majority of the betas were of a lesser magnitude than their respective zero-order correlations.

The variation explained by the FourSight scales in each of the ratings of enjoyment and future value of CPS. When examining the results for the Principles variables as presented in the final column of Tables 4 and 5, we find that the FourSight scales best predicted the Be Affirmative principle ($R^2 = .12$), the key principle associated with convergent thinking, and Defer Judgment, the key principle associated with divergent thinking ($R^2 = .15$). Of the CPS Stages, the FourSight scales best predicted the Plan for Action stage ($R^2 = .13$), which was significant for both enjoyment and future value. Finally, with respect to the CPS tools FourSight showed its strongest predictive power for the analysis of the future value variables. Analysis of three tools yielded significant results, Brainwriting ($R^2 = .14$), Visual Connections ($R^2 = .14$), and Praise First ($R^2 = .15$). The R^2 of .14 yielded by the tool Ladder of Abstraction was not statistically significant ($p = .08$).

Although the strength of the relationship between creativity styles and students' reactions to CPS training were not as strong as expected, the pattern of results is intriguing. The pattern of results illustrate that the four creativity styles report differential reactions to the same training experience in CPS. These results are sufficiently compelling to warrant continued exploration of the various applications and uses of these creativity styles.

DISCUSSION

Global reactions to a course in CPS indicated that students enjoyed learning most the more divergent aspects of the process. Tools like Brainstorming, Stick 'em Up Brainstorming, and Brainwriting were well received. There were positive reactions to such principles as Defer Judgment, Divergent Thinking, and Seek Wild and Unusual Ideas. The Generate Ideas stage, which has a strong emphasis on divergent thinking, was liked. It is not surprising that students enjoyed learning these elements of the process. The divergent aspects of CPS engage

participants in playful and imaginative thought, which can be fun and enjoyable. Similarly, many divergent aspects of the process were perceived to hold the greatest value after the course.

Subsequent analysis of cognitive style, however, indicated that the global results did not hold for all participants. In fact, quite contradictory results were discovered. The results for Defer Judgment, the key principle for divergent thinking, highlight the contradictory views that appear to have been masked by the aggregate data. Where participants with high Developer preferences associate high levels of value with the Defer Judgment principle, as was found for the student group as a whole, both high Clarifiers and Ideators report a negative view in regard to the future value of this principle. While global results showed a high degree of enjoyment for Stick 'em Up Brainstorming, the high Clarifiers tended to report lower levels of enjoyment for this same tool. These, and other findings, would seem to indicate that global results mask different perceptions of the same course content by participants with different cognitive styles.

Closer examination of the relationships found between the FourSight preferences and reactions to the CPS course revealed two distinctly different patterns. One pattern of relationship highlighted the fact that participants were drawn to aspects of the CPS course that reflected their natural predilections. In contrast, the other form of reaction to the course revealed that in some cases participants seemed to be attracted to course content that complemented their natural proclivity. We refer to the former as the true-to-type relationship. In these cases the results showed that participants enjoyed and saw value in respect to those aspects of the course content that naturally fit their style preferences. Conversely, participants found it less enjoyable to learn and saw less value in regard to aspects of CPS that do not match their style. Complementary relationships, on the other hand, show a tendency to be drawn to elements of the CPS process that add to or round off participants' natural inclinations. By extension in a complementary relationship participants would reject parts of the CPS process that are redundant to skills they already possess. We describe examples of both relationships revealed in the present study.

Participants with high Clarifier preferences enjoyed and associated future value with the CPS stage called Gather Data. This would appear to be a true-to-type relationship as this finding is theoretically consistent with the Clarifier preferences; gathering information is necessary when endeavoring to clarify

a problematic situation. In contrast, Clarifiers did not enjoy and saw relatively less value in conjunction with stages at the back-end of the CPS process; that is, stages focused on developing solutions and creating implementation plans. For example, high Clarifiers saw little future value in respect to the Select & Strengthen Solutions and the Plan for Action stages of CPS. By extension, this would indicate that participants with low Clarifier preferences, those who are less tolerant of the time it takes to clarify situations, did see value with respect to Select & Strengthen Solutions and Plan for Action. Again, this reflects a true-to-type relationship. This attraction to the back-end of the process also emerged, not surprisingly, for those with a high Implementer preference. Participants with high Implementer preferences reported enjoying the Plan for Action stage of the process.

A number of true-to-type relationships emerged in regard to specific CPS tools. For instance, high Developers, individuals who enjoy perfecting and refining ideas into workable solutions, believed the Praise First tool would be of great value to them in the future. Praise First is a systematic evaluation tool that refines ideas by identifying strengths and weaknesses, and then generating ways to further strengthen the idea by addressing some of the key weaknesses. High Ideators believed the Visual Connections tool, a method that uses visual stimuli to generate new ideas, would be useful for them in the future.

In terms of the basic CPS principles for divergent and convergent thinking it is quite intriguing that although Defer Judgment was viewed as the most valuable principle by the training participants, those with a High Clarifier preference did not see great future value with respect to Defer Judgment. This relationship may reflect the Clarifiers tendency to be inclined towards analysis and convergent thinking.

In addition to seeing learners gravitate towards their natural tendencies, we did find examples in which participants appeared to be reaching out for elements of the CPS process that complemented their process preferences. This gives the impression that participants were aware, perhaps unwittingly, of the stages, tools, and principles that would round out their skill base. It was clear for example, that low Ideators saw great value in aspects of the process that would facilitate divergent thought and idea generation. Specifically, they believed the Stick 'em Up Brainstorming tool and the Defer Judgment principle would be useful in the future. Although not statistically significant, the results also indicated that Low Ideators

had an appreciation for the Generate Ideas stage and the Brainwriting tool. Conversely, it is interesting to note that High Ideators, those who have a strong proclivity to think divergently did not see great value in learning the more divergent elements of the CPS process. As noted earlier, Parnes and Noller (1973) observed the same phenomenon among students in the Creative Studies Project. Again, this may indicate that those for whom divergent thinking comes naturally do not find great value in learning a skill they already possess. What high Ideators did find useful was the Prepare for Action component. This component contains two stages, Select & Strengthen Solutions and Plan for Action. This would seem to indicate that high Ideators recognize that they are good at generating ideas, but need to develop the persistence required to refine ideas and to develop specific plans for carrying their ideas forward.

A similar pattern of results was found for the Developer preference. High Developers did not see great value in regard to the Evaluation Matrix tool, a method that applies criteria to judge competing choices. This tool is taught as part of the solution development stage of the CPS process (i.e., Select & Strengthen Solutions). These results would indicate, however, that low Developers did see value in this tool, which complements the fact that they may struggle with solution development. High Developers did find value in learning the Defer Judgment principle. Because of their focus on evaluating solutions, high Developers probably possess a stronger bent towards convergent thinking, as opposed to divergent thinking. Therefore, their observed attraction towards the Defer Judgment principle may reflect a desire to improve their capacity to be better divergent thinkers.

The results of this study show that although participants in CPS training are being exposed to the same course content, they do not interact with the material in the same manner. This insight leads to an important implication for those who teach CPS or other applied process methods. Namely, given the diverse cognitive styles among training participants it is critically important for applied creativity courses to include a balance of approaches and tools. For example, a course narrowly focused on idea generation methods may help those with low Ideator preferences, but offers little for those with high Ideator preferences and perhaps those with other cognitive style orientations. MacKinnon (1978), in discussing some of the findings of his and his colleagues' classic studies of the creative personality, observed:

> These findings point to individual differences in creativity, some persons being strong in just those aspects of the creative process in which others are weak. The implications are obvious: There is no single method for nurturing creativity; procedures and programs must be tailor made, if not for individual students, at least for different types of students. (p. 135).

Another applied strategy that may be drawn from this study is the potential value in using cognitive style instruments, such as FourSight, as part of creativity training programs. An orientation to their cognitive styles may aid course participants as they engage in learning deliberate methods for enhancing their creative-process skills. Course participants who are aware of their natural tendencies can intake course content with an eye towards the strategies that might extend their innate repertoire of skills.

The results of this study may also reveal more general insights about what people with specific cognitive style preferences believe and don't believe they need to do to maximize their creative talents. Ideators, for example, seem to be quite comfortable with their ability to generate ideas; however, they appear to recognize the need to spend more time refining and developing the plethora of ideas they generate. To further enhance their creative output, Ideators also understand that they need to be more persistent in following through on their ideas. Developers may have a sense that they can sometimes be overly analytical and critical, and thus see a need learn to be more open to novel ideas. Future research might want to delve more deeply into the tendencies of each preference as they engage in the creative process. For example, what strategies or skills do Ideators use to successfully manage the creative process and are these strategies and skills different from those that a Clarifier might adopt.

Returning to issues specific to CPS training, the present study was limited to Level One of Kirkpatrick's model for evaluating the impact of training programs. Future studies should examine whether the relationships between course content and cognitive styles extend beyond reactions to the training experience. For instance, researchers might investigate whether changes in behavior post-training relate to the cognitive style preferences of the participants. Additionally, it would be valuable to assess the new behaviors that individuals with different cognitive style preferences actually adopt after training.

REFERENCES

AMABILE, T. M. (1996). *Creativity in context: Update to The Social Psychology of Creativity*. Boulder, CO: Westview.

CSIKSZENTMIHALYI, M. (1990). The domain of creativity. In M. A. Runco & R. S. Albert (Eds.), *Theories o f creativity* (pp. 190-212). Newbury Park, CA: Sage.

CSIKSZENTMIHALYI, M. (1999). Implications of a systems perspective for the study of creativity. In R. J. Sternberg (Ed.), *Handbook of creativity* (pp. 313-335). New York: Cambridge University Press.

EVERHART, B., KERNODLE, M., TURNER, E., HARSHAW, C, & ARNOLD, C. (1999). Gameplay decisions of university badminton students. *Journal of Creative Behavior*, *33*, 138-149.

FIRESTIEN, R. L., & McCOWAN, R. (1988). Creative problem solving and communication behavior in small groups. *Creativity Research Journal*, *1*, 106-114.

GREGORC, A. (1982). *An adult's guide to style*. Maynard, MA: Gabriel Systems.

HARRRINGTON, D.M. (1990). The ecology of human creativity: A psychological perspective. In M. A. Runco & R. S. Albert (Eds.), *Theories o f creativity* (pp. 143-169). Newbury Park, CA: Sage.

HELSON, R. (1988). The creative personality. In K. Gronhaug & G. Kaufmann (Eds.), Innovation: A cross-disciplinary perspective (pp. 29-64). Oslo, Norway: Norwegian University Press.

HURLEY, C. A. (1993). The relationship between the Kirton adaption-innovation style and the use of creative problem solving. Unpublished master's thesis, Buffalo State, State University of New York, Buffalo, New York.

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, 27*, 149-170.

KELLER-MATHERS, S. (1990). Impact of creative problem solving training on participants' personal and professional lives: A replication and extension. Unpublished master's thesis, Buffalo State, State University of New York, Buffalo, New York.

KIRKPATRICK, D. L. (1996). Evaluation. In R. L. Craig (Ed.), *The ASTD training and development handbook: A guide to human resource development* (4th ed., pp. 294-312). New York: McGraw-Hill.

KIRTON, M. J. (Ed.). (1994). *Adaptors and innovators: Styles of creativity and problem solving* (Rev. ed.). London: Routledge.

MacKINNON, D. W. (1978). *In search of human effectiveness: Identifying and developing creativity*. Buffalo, NY: Bearly Limited.

MILLER, B., VEHAR, J., & FIRESTIEN, R. (2001). *Creativity unbound: An introduction to creative process*. Evanston, IL: Thinc Communications.

MOONEY, R. L. (1963). A conceptual model for integrating four approaches to the identification of creative talent. In C. W. Taylor & F. Barron (Eds.), *Scientific creativity: Its recognition and development* (pp. 331-340). New York: Wiley.

MURDOCK, M. C., & PUCCIO, G. J. (1993). A contextual organizer for conducting creativity research. In S. G. Isaksen, M. C. Murdock, R. L. Firestien, & D. J. Treffinger (Eds.), *Understanding and recognizing creativity: The emergence of a discipline* (pp. 249-280). Norwood, NJ: Ablex.

NEILSON, L. (1990). Impact of creative problem solving training: An in-depth evaluation of a six-day course in creative problem solving. Unpublished master's thesis, Buffalo State, State University of New York, Buffalo, New York.

NOLLER, S. J. & PARNES, R. B. (1972). Applied creativity: The creative studies project: Part III– The Curriculum. *Journal of Creative Behavior, 6*, 275-294.

OSBORN, A. F. (1953). *Applied imagination: Principles and procedures of creative problem-solving.* New York: Scribner's Sons.

PARNES, S. J. (1985). The creative studies project. In S. G. Isaksen (Ed.), *Frontiers of creativity research* (pp. 156-188. Buffalo, NY: Bearly Limited.

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.

PLACE, D. J., McCLUSKEY, A. L. A., McCLUSKEY, K. W., & TREFFINGER, D. J. (2000). The second chance project: Creative approaches to developing the talent s of at-risk native inmates. *Journal of Creative Behavior, 34*, 165-174.

PUCCIO, G. J. (1987). The effect of cognitive style on problem defining behavior. Unpublished master's thesis, Buffalo State, State University of New York, Buffalo, New York.

PUCCIO, G. J. (1999). Creative problem solving preferences: Their identification and implications. *Creativity and Innovation Management*, *8*, 171-178.

PUCCIO, G. J. (2001). *Buffalo Creative Process Inventory: Technical Manual.* (Available from Blair Miller & Associates, www.FourSightonline.com).

PUCCIO, G. J., TALBOT, R. J., & JONIAK, A. J. (2000). Examining creative performance in the workplace through a person-environment fit model. *Journal of Creative Behavior, 34*, 227-247.

RHODES, M. (1961). An analysis of creativity. *Phi Delta Kappan*, *42*, 305-310.

ROSE, L. H., & LIN, H. T. (1984). A meta-analysis of long-term creativity training programs. *Journal of Creative Behavior, 18*, 11-22.

ROSENTHAL, R., & RUBIN, D. B. (1982). A simple, general purpose display of magnitude of experimenter effect. *Journal of Educational Psychology, 74*, 166-169.

SCHACK, G. D. (1993). Effects of a creative problem-solving curriculum on students of varying ability levels. *Gifted Child Quarterly*, *37*, 32-38.

STEIN, M. I. (1968). Creativity. In E. F. Boragatta & W. W. Lambert (Eds.), *Handbook of personality theory and research* (pp. 900-942). Chicago, IL: Rand McNally.

TORRANCE, E. P., & PRESBURY, J. (1984). The criteria of success in 242 recent experimental studies of creativity. *The Creative Child and Adult Quarterly*, *9*, 238-243.

ZILEWICZ, E. (1986). Cognitive styles: Strengths and weaknesses when using CPS. Unpublished master's thesis, Buffalo State, State University of New York, Buffalo, New York.

Correspondence and requests for reprints should be addressed to Dr. Gerard J. Puccio, International Center for Studies in Creativity, Chase Hall 244, Buffalo State, State University of New York, 1300 Elmwood Ave., Buffalo, NY 14222, USA or pucciogj@buffalostate.edu.

AUTHOR NOTE At the time of this study Russell Wheeler was a graduate student at Buffalo State. Dr. Cassandro holds the title of Alex F. Obsorn Visiting Professor at the International Center for Studies in Creativity.