

# Conference Schedule and Proceedings of the 2021 KAI Symposium

## Celebrating 45 Years of KAI



The Center for  
Cooperative  
Problem Solving  
at Virginia Tech

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**February 24-25, 2021**



## KAI Symposium Schedule

*February 24, Wednesday, 12:30 PM to 4:30 PM (EST) [or 5:30 to 9:30 PM (GMT)]*

*February 25, Thursday, 9:30 AM to 3:30 PM (EST) [or 2:30 to 8:30 PM (GMT)]*

### Wednesday, February 24

#### **12:30 PM (EST)**

Meet and Greet with Networking

#### **12:45 PM (EST)**

Welcome and announcements from the KAI Distribution Centre, and Center for Cooperative Problem Solving at Virginia Tech

#### **1:00 PM (EST)**

Round 1, Presentation A\*

**Cognitive Style Characteristics and Team Interactions: Selected Research Findings**

*By Daniel Henderson, Nil Ergin, Neeraj Sonalkar, & Kathryn Jablokow, Pennsylvania State University*

Round 1, Presentation B\*

**KAI Theory as a Möbius Strip: A Twist in Thinking about Problem Solving**

*By Eric Kaufman, Virginia Tech*

#### **1:30 PM (EST)**

Round 1, Presentation A\*

**From Red to Black: Achieving Financial Stability by Improving Culture**

*By Anne E. Collier, Arudia*

Round 1, Presentation B\*

**The Evolution of the Cognitive Socio-Behavioral Perspective: Insights from the Integration of Kirton's Cognitive Function Schema and The Organismic Socio-Behavioral Perspective**

*By Chantel Simpson, North Carolina A&T State University, and James Anderson, University of Georgia*

#### **2:00 PM (EST)**

Break

#### **2:15 PM (EST)**

Keynote Speaker - Dr Kanes Rajah, Professor and Executive Director at the Centre for Executive & Professional Development. United Kingdom. **Leading towards A New Abnormal from Lessons Learned**

#### **2:45 PM (EST)**

Break and Wrapping up Questions and Answers with Dr. Kanes Rajah

**3:00 PM (EST)**

A Tribute to Dr. Michael Kirton, originator of Adaption-Innovation theory.

**3:45 PM (EST)**

Facilitated Networking

**4:30 PM (EST)**

Adjourn for the day.

**Thursday, February 25**

**9:30 AM (EST)**

Welcome Back! Announcements for the Day.

**9:45 AM (EST)**

Keynote Speaker – Seth Derner, Co-founder of Vivayic. United States. **Strategies for Working Remotely by Choice**

**10:15 AM (EST)**

Break and Wrapping up Questions and Answers on Keynote Presentation

**10:45 AM (EST)**

Panel Discussion led by Megan Seibel, with panelists: Iwan Jenkins, John Walker, Laura Moncrieffe, and Robert Huddleston. **KAI in Practice: Reflective Insight and Experience**

**Noon to 1:00 AM (EST)**

Lunch on Your Own with Interactive Session

**1:00 PM (EST)**

Round 2, Presentation A\*

**Preferred Problem-solving Styles and Relationship with Leaders' Resiliency**

*By Laura McIntyre*

Round 2, Presentation B\*

**+KAI Applied - How Executive Teams Can Put the Learning to Use Immediately**

*By Nigel Barlow*

**1:30 PM (EST)**

Round 2, Presentation A\*

**Adaption-Innovation Theory Applied in a US Navy Security Training Setting**

*By Sam Crouse, Crouse Training & Consulting, Inc.*

Round 2, Presentation B\*

**How to Win Friends and Influence People—and Get Promoted at the Same Time: A Business-oriented, Practical Application of the KAI Theory During a Pandemic**

*By Iwan Jenkins, The Riot Point*

## 2:00 PM (EST)

### Round 3, Presentation A\*

#### **From Red to Black Revisited: Improving Profitability by Improving Company Culture**

*By Mike Foster, Environmental Business Specialists*

### Round 3, Presentation B\*

#### **Italian Adaptors and Innovators and Entrepreneurship: A First Study**

*By Guido Prato Previde, Decathlon Consulting, and Michael J. Kirton (posthumously)*

## 2:30 PM (EST)

### Round 3, Presentation A\*

#### **Economy of Diversity Management of a Restructured Corporate R&D Team Case Study**

*By Robert E. Samuel and Anthony J. Cevoli*

### Round 3, Presentation B\*

#### **KAI and Graduate Education: An Exploration of International Graduate Students' Mentoring Needs Based on Cognitive Style**

*By, Shreya Mitra, Virginia Tech, and James Anderson, University of Georgia*

## 3:00 PM (EST)

Break

## 3:10 PM (EST)

**KAI in 2021 and Beyond.** By, Nicola Kirton, Curt Friedel, and Megan Seibel

## 3:30 PM (EST)

Adjourn for the day and end of Symposium.

Note. \* Discussants for concurrent abstract presentations are Curt Friedel for "A" presentations, and Megan Seibel for "B" presentations.

+ Distinguishes the abstract is not included in the KAI Symposium Proceedings, either because the author wishes to seek another publication outlet for the presented research, or due to the presentation including proprietary information.

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## **From Red to Black Revisited: Improving Profitability by Improving Company Culture**

*By Mike Foster*

*Environmental Business Specialists*

### **Introduction**

The company is a privately-owned wastewater consulting company. The company founder is in his early sixties and approaching retirement. The company is fortunate to be staffed with numerous talented, young (25 to 35 years old), enthusiastic employees. There is a significant age/knowledge/expertise gap between the founder and the other employees, including the company's leadership and managers. The nature of the business does not lend itself to hiring outside expertise or experience to bridge the gap within the target time horizon of 3 to 5 years. With the intent of the founder maintaining ownership but reducing day-to-day involvement with the company in the near future, it is critical that transfer of knowledge, responsibility, and accountability be accelerated. To accomplish these tasks, the founder decided to focus on creating a matrix of High-Performance Teams, both functional and cross functional. The concept is to create an environment of shared ownership, learning, and accountability.

In October 2019, the author presented *From Red to Black: Achieving Financial Stability by Improving Culture* at the Advanced KAI Workshop in Roanoke, VA. The actual PowerPoint presentation was titled “*Creating and Developing High Performance Teams to Optimize Productivity and Profitability.*” The COVID-19 pandemic presented the company with an opportunity to put the principles and techniques outlined during the workshop into practice under the most unusual of circumstances. As an essential business supporting critical infrastructure, EBS was allowed/required to continue operation providing environmental products and services to our clients, which consist of major pulp and paper and petroleum production facilities. The stay-at-home orders and other restrictions forced the company to implement unique work schedules and arrangements to minimize the number of employees at the office location, which houses the laboratories. The nature of our business and the relative inexperience of our employees had always made the owners’ leery of allowing employees to work from home. However, the COVID-19 restrictions changed everything.

Starting in April 2020, staffing at the main office was reduced from the typical 20 – 30 employees on site daily, to less than ten with the remainder working remotely. The KAI-influenced High Performance Team (HPT) concept was put to a test, as managing cognitive diversity and problem-solving skills became simply the order of the day.

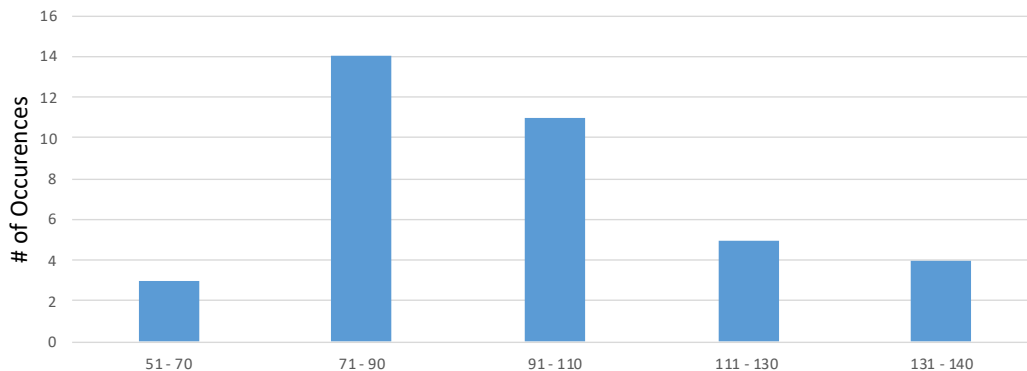
### **How it Works**

The company owner developed and introduced the HPT concept to all employees in 2018. The implementation involved the delivery of a three-component training module consisting of:

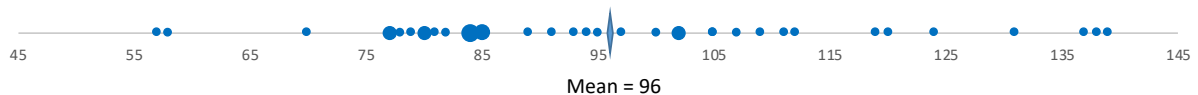
- Individual Servant Leadership Development, based on the writings of Mark Miller of Chick-fil-a, Inc.,
- Servant Leadership-based High-Performance Team Dynamics, based on the writings of Patrick Lencioni of The Table Group, and
- A technical and theoretical foundation of Managing Creative Diversity based on the KAI Theory of Dr. Michael Kirton.

All employees completed the KAI Inventory within the first month of employment and received feedback on the results. The charts below show the distribution of KAI scores for all company employees. The HPT Workshop was approximately two days in duration and consists of lectures, guided discussions, and breakout groups that utilize KAI scores in determining group make-up.

**Chart 1**  
**KAI Score Distribution**



**Chart 2**  
**Distribution of Employee Scores**



### Results and Implications to Date

Four training sessions were conducting for the four employee levels: Directors, Coordinators, Seniors, and Specialists. The course was well-received, and results were noticeable, if not quantitatively measurable. In 2019, productivity increased; employee engagement survey results improved; and employee retention has improved. In 2020, the company owner conducted a second group of sessions for employees hired in 2019. While detailed quantification of the impact of this training and subsequent team performance is difficult, the company experienced higher revenues and greater profitability in 2020 than in 2019 despite the significant communication challenges and travel limitations that were in place most of the year. The volume and quality of creative responses from the employees, regardless of their individual KAI score was noteworthy.

### Future Plans and Advice to Others

The company continues to expand and refine their management and leadership practices that are based on strong team dynamics, Servant Leadership, and KAI Theory. For others desiring to create a similar company culture, the following suggestions are made:

- Creating an HPT culture is a strategy – not a means to an end. It is not the goal.
- Building teams is an iterative process that must be refined continually.
- The incorporation of KAI adds a level of quantification and science which complements the more qualitative components of Servant Leadership

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Lencioni, P. (2016). *The Ideal Team Player*. Jossey-Bass.

Miller, M. (2011). *The Secret of Teams*. Berrett-Koehler Publishers, Inc.



## **Adaption-Innovation Theory Applied in a US Navy Security Training Setting**

*By Sam Crouse*

*Crouse Training & Consulting, Inc.*

### **Introduction**

A United States Navy (USN) technological organization required a change in program security strategy as a weapon system moved from research and development to testing and deployment phases (Defense Acquisition Guidebook, 2004). Program leadership recognized early that centralized education of the entire workforce was key before entering the new phases. Due to the nature of the program, this effort was required at the classified level. However, the matrixed organization (Jackson & Stainsby, 2000, p. 15) had no existing overarching human resource structure capable to execute overall program education and training at the classified level. Because the matrixed organization was composed of military, civil service, industry, and contractor workgroups, this presented a unique challenge to course funding, development, and delivery. Furthermore, each workgroup was comprised of disparate technical disciplines.

Program leadership decided that the Security Professional (SP) discipline was the key to an effective security strategy migration and charged the SP discipline with delivering the homogenous curriculum to the entire matrixed organization. Because the SP discipline's main task was maintenance and enforcement of the existing security strategy through physical, computer and administrative means, few of the SP individuals possessed skills to develop and deliver this type of education program. Therefore, leadership selected a contractor with the requisite skills and clearance levels to study and recommend a plan for execution.

The contractor recommended a Train-The-Trainer (T3) methodology to include employing the SP personnel in the design, development, and delivery of the curriculum. The T3 methodology would also help address the program time constraint. This effort required major problem solving and change at two levels. First, at the organizational level and second, at the SP discipline level. This study focused on the change required to solve the problem set at the SP discipline level.

### **Connection to Adaption-Innovation Theory**

Solving this problem required moving from a mindset of working in a highly protected, closed environment to testing and deploying a weapon system in a more visible, open arena, while still maintaining secrecy. While the SP personnel were part of this change, they were additionally tasked to be agents of change and problem solving for successful program security migration. Kirton defines problem solving broadly as the means, by which life survives by successfully managing ever constant change (2006, p. 26). Kirton further suggests that the challenge provoked by change is affected by cognitive style (examined by Nutt 2006) and is critical in shaping or defining the problem at hand. The success of this effort depended upon the SP individuals 1) accepting the new paradigm (Kuhn, 1996, p. 10) as central to change, 2) adjusting procedures, protocols, and behavior, and 3) communicating the new security paradigm and posture to the entire workforce.

To assist the SP individuals with the above three challenges, the contractor blended Adaption-Innovation (A-I) theory in the four-day T3 workshop as an element to aid in trainer development. Central to this approach was incorporating two aspects of cognitive function aligned closely to

the definition of problem solving. First, *cognitive resource* defined as knowing and identifying the problem; and second, *cognitive effect* defined as proposing solutions for the problem (Kirton, 2011). The contractor applied A-I theory to the three domains (Peeples, 1993) most critical to the paradigm change: the physical/mission domain, the personnel domain, and the information (printed and electronic) domain.

### **Methods/Data Analysis**

The four-day T3 workshop consisted of 1) technical aspects of the weapon system, 2) development of trainer presentation skills and techniques, and 3) fostering the teamwork needed to solve problems during the migration of the security posture.

During the introductory and administrative portion on the first day, a certified KAI practitioner administered the KAI according to the manual (Kirton, 2005) to each class of approximately 15 trainees. On the evening of the first day, the KAI practitioner processed the instruments and kept the results private (the results would not be disclosed until the afternoon of the fourth day). During the second and third day, the trainees were randomly re-seated each day according to KAI result.

On the morning of the fourth (final) day of the course, the trainees were arranged in three teams of approximately five per team for a team building exercise: Team A (more adaptive), Team B (more innovative), and Team C (a blend of adaptive and innovative). The three teams were given a task in the form of a game, each team having the exact same task. After the task was complete, the teams were asked to report 1) their understanding of the task, 2) their approach to solving the task, and 3) their solution. After all teams reported, the entire class was released for lunch.

After lunch, the KAI practitioner presented a session on problem solving. During the presentation, the trainees were asked how the material presented applied to their team building exercise. After A-I theory was presented, the trainees were asked to predict their KAI number. After they had written down their number on a piece of paper, the KAI practitioner distributed a result report to them individually, face down alphabetically in order of their last name. Care was taken to keep results private. The KAI practitioner allowed time for them to read and process the report. Kirton referred to this frequently in his certification lectures as “*the aha moment.*”

Over three years, seven T3 classes yielded 103 KAI results. The data are portrayed in Figure 1.

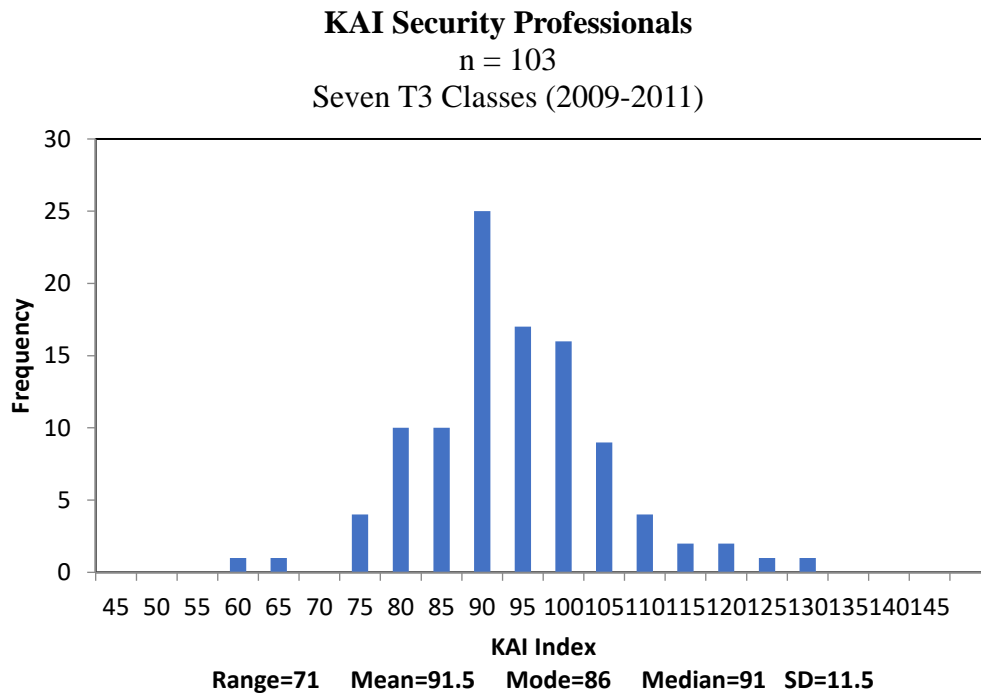
### **Findings and Conclusions**

The overall sample was slightly more adaptive than the theoretical mean of 96, and findings were largely consistent with A-I theory. During the team building exercise, teams with a blend of innovators and adaptors were more successful, their interaction was observed as more vibrant, and team conflict was more noticeable. This was consistent with a similar study (Crouse, 1992).

Although all results were used in constructing the results in Figure 1, there were results (11) that the KAI manual and Dr. Kirton would classify as suspect results. The practitioner ran an analysis without the suspect results but found no appreciable difference in the overall statistics. The frequency of suspect results increased over time. The practitioner believes that as word of the instrument was informally communicated over time, that coping behavior (Kirton, 2006) was a

factor in later classes. Suspect results were more evident in industry trainees (8) versus civil service (3) trainees. It is theorized that these personnel may have felt their jobs may be at risk if they did not fit into an expected mold, but no conclusion is made without further investigation. (Furham, 1990) discussed this need to fake answers to fit into a particular job position.

**Figure 1.**  
*Portrayal of KAI Distribution for Seven T3 Classes*



*Note 1: KAI measurement range: 32-160; theoretical mean: 96.*  
*Note2: Additional descriptive statistics for sample: Minimum 57; Maximum 128; Standard Error 1.13; Sample Variance 131.41; Kurtosis 1.09; Skewness 0.24.*

Further analysis showed that industry personnel were slightly more on the innovative scale than civil service personnel. Anecdotal evidence over the life of the study saw instances of more innovative personnel selecting out of the SP career field. Due to the small sample size, more study is needed to understand if any pressures were present or perceived.

The 103 SP trainers delivered training to over 2,300 personnel during the day-long classes taught over the three-year period. During the education effort, the most productive result was increased dialogue and understanding among the entire workforce regarding the new security posture.

Finally, program leadership learned a great deal from the larger project of re-educating the matrixed and highly networked organization. The learning resulted from the process of education, understanding the problem, and blending differing cognitive styles to solve security posture migration challenges and associated issues. A paradigm cannot be changed by adaptors alone, nor can a new paradigm be sustained by innovators alone. Both are needed in the process.

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## **Economy of Diversity Management of a Restructured Corporate R&D Team Case Study**

*By Robert E. Samuel and Anthony J. Cevoli*

### **Introduction**

As reported by Deloitte (Thompson, 2020), more than \$10 trillion in merger and acquisitions (M&A) transactions have been announced across all industries in the U.S. since 2013; and those surveyed expect total deal volume to continue rising. This observed recent trend has a direct impact on strategic and forward-looking departments of large corporation. Often these strategic teams need to expand and reorganize to a model that best serves the new M&A stakeholders' interest and corporate culture. This study covers a longitudinal case study of a Fortune 100 technology research and development (R&D) department serving as a strategic department during a recent M&A. The research primarily focuses on the economy of diversity management - the balance between value and cost with respect to cognitive style. Additionally, the individual and group dynamics based on the cognitive style qualitative data analysis for the R&D department will be reviewed as it restructured from a flat team to a tiered hierarchy team organizational design.

### **Connection to Adaption Innovation Theory**

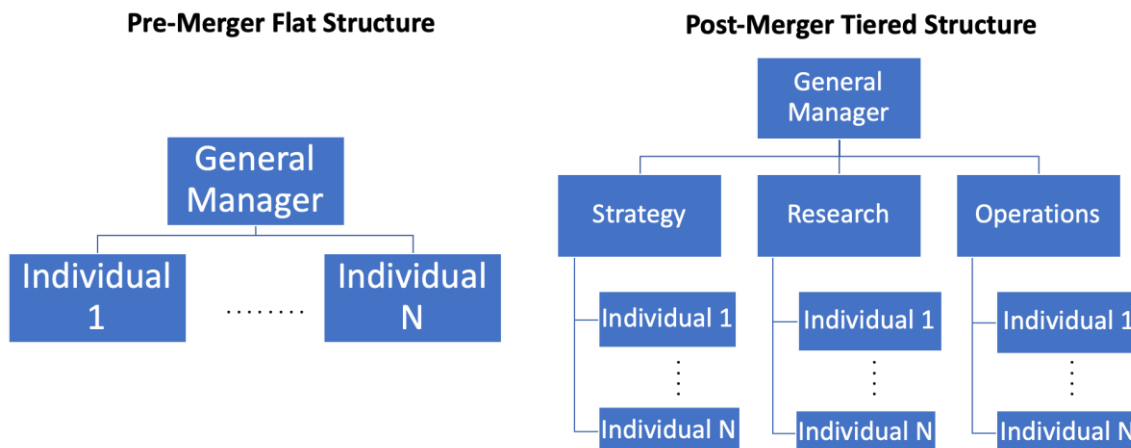
Kirton's Adaption-Innovation Theory proposes the premise that every individual is unique and thus a minority of one (Kirton, 2006). This means acknowledging that although no person or group should be unfairly exploited, no person can be expected to perform uniformly well at all times in all circumstances. Each person needs to consider the balance between the value their diversity brings to the group and the simultaneous cost this diversity represents to the group. Kirton (p. 357) defines this as the *economy of diversity management*, and like any other type of economy, it needs balance to remain robust. With the economy of diversity management, "individuals gain from acceptance of others' diversity should be greater than its cost. So, as a member of the team, [they] offer obligations (towards resolution of Problem A) and accept reward (from the resolution of Problem A); [within] teams, all diversity should be accepted that is useful (or potentially useful that costs little to carry); [teams] should ensure members' obligations." In this context, Problem A is defined as the reason, with respect to the problem-solving domain, the team has formed. Brodeur (2007, p. 33) further investigated diversity management and the cost and value effect on teams by stating when "awareness of cognitive style, as a fundamental form of diversity could have important implications on predicting improved teamwork success."

With the management of diversity, Jablorkow (2007, p. 31) outlines that "leaders need to manage diversity well – both diversity of problems and diversity of problem solvers", and therefore it is critical to recognize individual and group dynamics including agents of change, coping behavior, and bridging along with the continuum of evolutionary and revolutionary problem diversity. Agents of change play a significant role during the team restructuring. The "fit" between individual cognitive style and team structure impacts employee retention as a cost. These agents affect the cognitive climate or cognitive consensus in the sense that replacement post-merger team members bring a cognitive style aligned with the designed sub-team purpose as a value. Additionally, the cognitive climate alignment of the assigned post-merger manager enables value in the sub-team, however, introduces a cost with the additional manager to manager collaboration and associated gaps. With change comes uncertainty, and team members

demonstrate coping behavior associated with the flat reporting structure and the tiered hierarchical reporting structure. The cost of individual coping behavior is balanced with the team’s value of problem-solving breadth in both pre-merger and post-merger teams (Jablokow, 2007). Finally, bridging, which is the ability and willingness for an individual to mitigate the residual issues (or Problem B) of group dynamics while maximizing the focus on Problem A, is observed in both pre-merger and post-merger team organizational design. However, the cost of individual bridgers adds value to close the diversity gaps and results in effective communication and trust building between the diverse set of individuals (Kirton, 2006).

**Methods/Data Analysis**

This case study is based on the organizational design change from a pre-merger flat structure to a post-merger tiered structure for the R&D team as depicted in Figure 1. It should be noted that the post-merger individual assignment and hiring generally aligned their cognitive style to the purpose/problem domain of the sub-teams when compared to the overall team mean; Strategy sub-team was generally more innovative (KAI mean of 109.5), Research sub-team was generally slightly more adaptive (KAI mean of 90.6), and the Operations team was generally more adaptive (KAI mean of 85.2); General Manager was highly innovative (KAI Score of 130); Manager sub-team was more innovative (KAI mean of 109.7).



*Figure 1 - Pre and Post-Merger Team Structures*

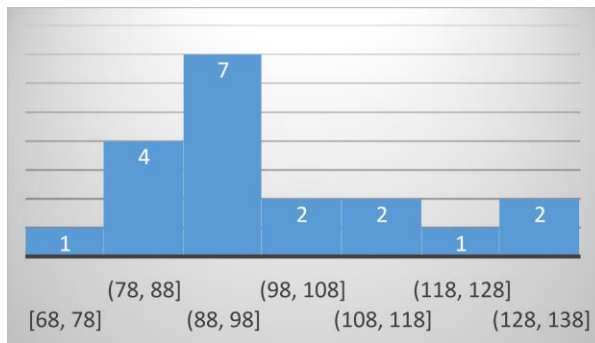
A quantitative approach was taken to conduct a comparative analysis of the differences in KAI measures between the pre-merger team and the post-merger team. Longitudinal data was collected over a 18 month period that spanned the M&A closing. The statistical analysis was performed using basic Microsoft Excel functions. Table 1 highlights the individual quantity and overall team KAI scores and sub-scores (SO, E, and R/G).

Between the Pre-Merger and Post-Merger data collections, 6 individuals departed from the original team and were replaced with 8 individuals through a standard corporate interviewing process by the post-merger managers. Of the departing individuals, 4 of the 6 were more innovative than the pre-merger team mean. For the replacement individuals, 5 of the 8 were more adaptive than the post-merger team mean. However, when the sub-team means for strategy and research teams are taken into consideration, 7 of the 8 replacement individuals were within

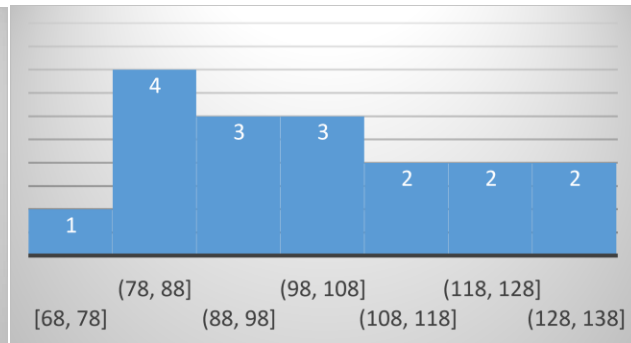
the standard deviation of the sub-team means. Figure 2 highlights the pre-merger team total KAI score histogram while Figure 3 highlights the post-merger total KAI score histogram.

**Table 1 - KAI Team Scores and Sub-scores**

<b>KAI Inventory Scores</b>	<b>Pre-Merger Flat Structure</b>	<b>Post-Merger Tiered Structure</b>
Number of Overall Team Individuals	17	19
Number of Managers	1	4
Team KAI Total Score Mean/Standard Deviation	101.2 / 19.5	97.2 / 17.6
Team KAI SO Sub-Score Mean/Standard Deviation	45.5 / 8.2	46.2 / 7.6
Team KAI E Sub-Score Mean/Standard Deviation	19.0 / 5.7	17.2 / 6.1
Team KAI R/G Sub-Score Mean/Standard Deviation	36.8 / 9.3	34.1 / 9.0



*Figure 2 – Pre- Merger Team Total KAI Score.*



*Figure 3 - Post-Merger Team Total KAI Score*

### Findings and Conclusions

The economy of diversity management in this study is most apparent when observing the manager collaboration. The added cost of the change to the post-merger tiered structure is noticed with the managers’ coping behaviors. Two of the three managers are outside the standard deviation to the consensus mean of their respective team. This gap requires a greater coping effort by each manager. However, the added value is apparent as all three managers are of the more innovative on their respective team, which allows them to act as bridgers to the general manager, who is more innovative to the majority of the team individuals. The cost of coping is countered by the added value of bridging.

A value add is also seen in the coping effort required of team members in the post-merger tiered structure. The decrease in standard deviation of overall score among each team lowers the amount of coping behavior needed for the members of that specific team. Another value add of the new structure can be seen with collaboration and trust within the sub-teams. This can be seen with the lower standard deviation of E and R/G between the sub-team individuals. The economy of diversity management in this sense is seen with the balance between the cost of managing structural change with the added value of increased collaboration and trust, as well as less coping.

Another significant finding can be seen in the way team individuals perceived and experience the organizational change with respect to the M&A event. The cost is apparent in those individuals where their preferred style was a gap with respect to the post-merger team organization. These individuals, who were typically the more innovative on the pre-merger team, were the first to leave during M&A transition. The departure of these individuals and ensuing replacement individuals resulted the shift to an overall more adaptive climate to align with the change in corporate culture and problem domains.

In conclusion, this case study highlighted the economy of diversity management that requires a balance of cost and value to maintain a robust team record of success as the organizational structures change to meet M&A. This was observed through the perceived connection between Kirton's Adaption-Innovation Theory concepts of agents of change, coping, and bridging.

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## **From Red to Black: Achieving Financial Stability by Improving Culture**

*By Anne E. Collier*

*Arudia*

### **Introduction**

We've spent the last 4.5 years using KAI as part of enterprise-wide culture change. The organization is a state-funded behavioral health organization located in southeast Georgia. By 2015, the organization was in dire financial straits. In late 2015, the State hired a new CEO, who worked to bring financial stability by ensuring that front-line managers had the communication, management, and conflict resolution skills necessary to be effective managers.

In June of 2016, we delivered our first training to the Executive Team (12) and managers (70). The training consisted of the KAI, followed by the *Arudia Win-Win Conversation Model* and the *Arudia Coaching Model*. The CEO is a former coaching client and was (and still is) committed to creating a coaching culture.

In August of 2016, we delivered our first webinar for managers and continue to do so each month we are not there in person to provide training. In July of 2017, we began working with direct-care staff. We offered our "Core Program," which is KAI and the *Win-Win Conversation Model*. As of October 2018, we've trained a little over half the staff.

In October of 2018, we were challenged to provide training to staff and managers who, because of patient needs, couldn't leave the service location because it would require closing the location for a day or paying overtime, which was infeasible for a number of reasons, including lack of budget. To overcome this obstacle, we developed "Small Bites" training, which last 45 to 60 minutes. And, because a persistent theme has been helping staff and managers to operate better under stress, which means not internalizing the stress, we used the short-form free version of the Actualized Leader Profile. In addition to being free, participants could take the assessment on site in about three minutes, which mitigated the challenges we face in communicating with participants about programs and taking assessments. We now use both the KAI and short-form version in our Learning Collaborative Management Academy. The combination is brilliant.

### **Methods/Data Analysis.**

Below are both qualitative feedback and quantitative data regarding [the organization's] culture improvement. We note that in addition to being a "nicer place to work," both experienced and inexperienced managers have learned tangible managerial skills grounded in their understanding different problem-solving styles. The KAI has been essential to creating a more collaborative and professional environment.

We used Survey Monkey. Most question were answered using a Likert Scale.

## Findings and Conclusions

### *Manager Feedback*

Some of the highlights that were particularly exciting for [the organization’s] leadership to see:

- Managers and supervisors:
  - Coaching each other;
  - Reaching across program boundaries to support each other; and
  - Actively using their knowledge of KAI, Coaching, and Win-Win to improve their focus, communication, and success on the job.
- One of the greatest benefits was “the freedom to not be perfect” – but to reach out and obtain help from one another, “understanding our different strengths and barriers.”
- The transparency of 50-60 managers sharing together what they’d learned, practiced, and discovered was clear evidence of the progress being made to build a results-oriented team.
- “We process things differently”; “I’m not a stick in the mud – I just need more information before I start moving, and then I move right past other people”
- Creative solutions that have emerged as team members reach out to each other to seek complementary strengths in imagining, planning, and implementing in programs and cost centers.

From the start the response was different. [The organization’s] leadership overheard managers say:

- “Wow, this is not just another training. I’m really able to make use of these skills.”
- There’s a way to get “both in the box creativity and out of the box creativity, it’s the people I ask for help, and I need both to get the best results.”
- “It takes time to learn these things, you have to stop and practice them, but it saves so much more time when you have conversations with employees that are direct and meaningful; when you use [the Arudia tools] you get all that time back.”

### *Survey Results*

We have made it a practice to survey [the organization’s] managers to assess the impact of our training, particularly early in the process. We were also striving to improve and measure the trust and faith in senior leadership. Below are some of the survey results.

#### **Six-Month Survey Results: December 2016**

<b>Middle Management Academy Survey</b>	<b>Strongly Agree/Agree</b>
Handle daily problems better	88%
Feel more in control of my life	64%
Better able to deal with crisis	77%
More confident of good results from difficult conversations	78%
Use Coaching Skills to support others	88%
More likely to address a challenge	82%
Getting along better with others	73%
More appreciative/tolerant of others	92%
Believe offering KAI and Win-Win to all employees beneficial	80%
Used Coaching at least three times	96%

Communication Improvement	Strongly Agree/Agree		
	Baseline	+ 6 months	+12 months
Compared to April 2016, the flow of information has improved	N/A	58%	91%
The Executive Team cares about what we think	19%	62%	91%
The Executive Team members do what they say they are going to do	N/A	75%	81%
There is sufficient communication from the Executive Team	37%	64%	91%

In summary, the KAI has been the foundation of our efforts with [the organization's] and other clients to improve culture, collaboration, and communication. Without a solid conceptual framework for understanding that problem-solving styles and therefore approaches to work differ, many of our manager-clients would still be experiencing frustration and failure as they attempt to manage those with different styles.

## **KAI Theory as a Möbius Strip: A Twist in Thinking about Problem Solving**

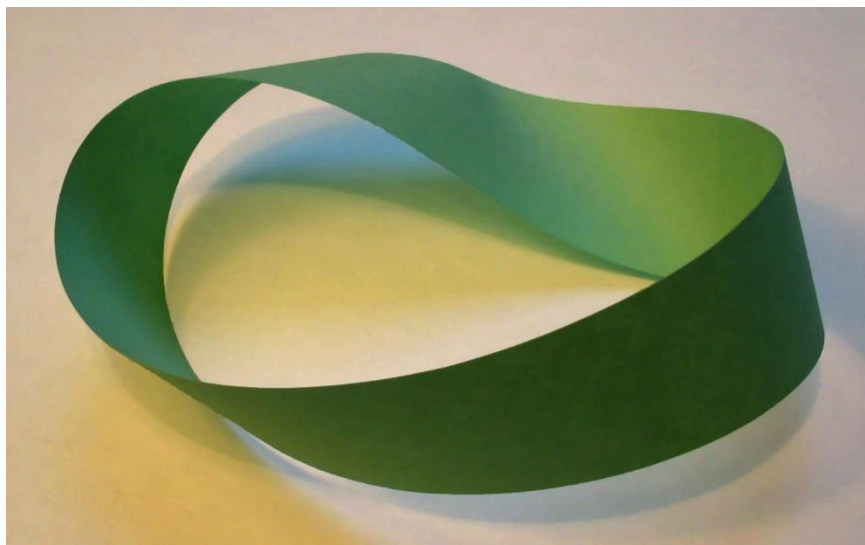
*By Eric Kaufman  
Virginia Tech*

### **Introduction**

Discovered in 1858, the Möbius strip is one of the most curious shapes in mathematics; it is unorientable (Buckley, 2007). As can be seen in Figure 1, “Möbius strips are unique because of their one sidedness. Rather than having two sides and two edges, with a simple twist, a piece of paper has one side and one edge. Inner and outer become one” (Byrnes, 2012, p. 23).

### **Figure 1**

A Möbius strip



*Note.* Photo by David Benbennick. Reprinted from Wikimedia Commons ([https://commons.wikimedia.org/wiki/File:M%C3%B6bius\\_strip.jpg](https://commons.wikimedia.org/wiki/File:M%C3%B6bius_strip.jpg)). CC BY-SA 3.0.

Somewhat recently, those outside mathematics have found value in the Möbius strip as a metaphor for relationships that flow into one another. Reflecting upon the curious shape, Parker Palmer (2004) mused:

I have to keep repeating, “what seems to be” because there is no “inside” or “outside” on the Möbius strip—the two apparent sides keep co-creating each other. The mechanics of the Möbius strip are mysterious, but its message is clear; whatever is inside us continually flows outward to help form, or deform, the world—and whatever is outside us continually flows inward to help form, or deform, our lives. (p. 47)

### **How it works**

Considering Kirton’s Adaption-Innovation (KAI) Theory, can we embrace an unorientable relationship between adaption and innovation? In 1976, Kirton purported “that everyone can be located on a continuum ranging from an ability to ‘do things better’ to an ability to ‘do things differently,’ and the ends of this continuum are labeled adaptive and innovative, respectively” (p. 622). However, what insights might we gain from thinking of the KAI continuum more like a

Möbius strip? In what ways do adaption and innovation flow into and co-create one another throughout the problem-solving process? When an individual takes adaption to the extreme, might they have more in common with the innovative end of the scale than we tend to assume or expect? We already know that one's degree of adaption or innovation is relative to others, yet our understanding of the relationship may be too simplistic. The Möbius strip holds the potential to facilitate sensemaking when exploring the complex relationship between adaption and innovation.

As noted by Lamb (2016), “You can make a Möbius band in the comfort of your own home by taking a strip of paper or pasta dough, putting a half twist in it, and taping (paper) or squishing (pasta) the ends together.” Accordingly, the Möbius strip makes for an inexpensive visual aid that can be incorporated into workshops or presentations.

### Results/implications to Date

Although the Möbius strip has not previously been applied to KAI theory, it has been used for other applications that may be useful to consider:

- Development of a new mathematical field known as topology (Gunderman & Gunderman, 2018).
- Representations of recycling (Jones & Powell, 1999).
- Improved durability with conveyor belts (Doménech, 2018).
- “The blended coaching dance” between instructional and facilitative coaching (Bloom et al., 2005).
- Understanding notions of integrity and wholeness in spiritual life (Dana & Jaeger, 2010).
- How values and beliefs influence objectives and behaviors (Chabon, 2016).
- The complementary relationship between leadership and followership (Hurwitz & Hurwitz, 2015).

### Future Plans/Advice to Others

For practitioners, the session will explore options for illustrating the nuanced relationship between “being” and “doing” that we must navigate in the coaching process (see Bloom et al., 2005). For researchers, the session will surface ideas for mixed methods studies that might enhance our understanding of the nuanced relationship between adaption and innovation in problem solving. As Sinclair and Maimone (2020) noted in the *Handbook of Research Methods on Creativity*, it is an “open agenda.”

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## **Cognitive Style Characteristics and Team Interactions: Selected Research Findings**

*By Daniel Henderson, Nil Ergin, Neeraj Sonalkar, & Kathryn Jablokow,  
Pennsylvania State University*

### **Introduction**

Understanding team performance has been the subject of scholars in many fields, and it remains a key area of interest among practitioners, including managers, coaches, and consultants as they build teams across a wide range of contexts. While there is consensus among scholars and practitioners that a team is more than the sum of its individual performers, team construction in many settings is still dominated by seeking outstanding individual performers. This is partially due to our limited understanding of the relationships between individual cognitive characteristics and team interactions. This abstract highlights findings related to the relationships between cognitive style characteristics and team interaction behaviors, revealed through a research project funded by the National Science Foundation (NSF) into high performance design teams. In particular, we use the KAI Inventory along with the Interaction Dynamics Notation (IDN), a visual representation system that captures actions between members of a team, to investigate these relationships. Our findings shed light on the ways in which cognitive style does and does not impact team interaction behavior; we present findings of both types in this abstract.

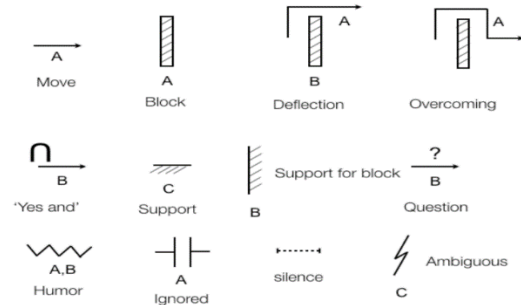
### **Connection to Adaption-Innovation Theory**

Design is a type of problem solving and involves creative behavior of many kinds. Adaption-Innovation Theory was originally developed for problem-solving contexts and states that all individuals solve problems and are creative at *different levels*, with *different styles*, and responding to *different motives* and *opportunities* (Kirton, 1976; 2011). This all applies to designers too, making Kirton's Adaption-Innovation Theory a useful lens for studying design teams and their members' interactions. In a design team setting, the diverse cognitive characteristics of individual team members can influence the team collaborations and collective behavior in both positive and negative ways. While there are many frameworks proposed for understanding cognitive diversity (Kirton, 2011; Allinson & Hayes, 1996; Sternberg & Grigorenko, 1997; 2001), A-I Theory is the clearest and most comprehensive, which makes its application to the study of design teams both straightforward and effective.

### **Methods/Data Analysis**

To study the relationship between cognitive style and team interactions, we use the *input-mediator-outcome-input* framework of Ilgen et al. (2005). In this framework, cognitive characteristics from A-I Theory serve as *inputs*. Team interactions, as measured by the Interaction Dynamics Notation (IDN), serves as a *mediator* of the inputs. The *outcomes* of interest are design products (as well as individual perceptions) created during a team experience. Feedback from the outcomes then has the potential to influence cognitive behavior and team interactions. As the *mediator* element of the framework, team interaction is defined by IDN as reciprocal action between the members of a team. In design teams, interactions are the sequences of verbal and nonverbal actions and responses between individuals as they go about understanding design problems, generating solutions, and developing prototypes. The development of IDN is described in detail in Refs. (Sonalkar, 2012; Sonalkar et al., 2013). IDN utilizes symbols based on principles of improvisational behavior (Gerber, 2007, 2009), as shown in Fig. 1. Each IDN symbol is assigned to an action, either verbal or nonverbal, conducted by a participant and responded to by their team members. This assignment is not based on what the

action is, but rather on the response the action receives. Thus, IDN captures the reciprocity of interaction and models team interaction rather than a sequence of individual contributions. To conduct IDN and cognitive style analysis, we held team effectiveness workshops to collect data on design teams. See Table 1 for a summary of the data from two of our workshops. Both sets of teams were composed of a variety of participant types, including undergraduate students, graduate students, design instructors, and industry practitioners with backgrounds from engineering design and product design. During the workshops, teams worked on a given design challenge and produced prototype solutions.



**Table 1: Summary of Data Collection**

Workshop 1	Workshop 2
5 teams, 3-4 members each	14 teams, 3 members each
<b>Data Collected:</b>	
Cognitive Style (via KAI Inventory)	
Team Interactions (via IDN)	
Team Outcomes (solutions to design challenge)	
Individual Outcomes (perceptions via a post-workshop survey)	

Figure 4: A selection of IDN Symbols/Interaction Categories

### Findings and Conclusions

The KAI-related findings reported here are described in detail in (Jablokow et al., 2018, 2019); practical applications of these findings for KAI practitioners are noted in Table 2. In our initial analysis of the Workshop 1 teams, we investigated the relationship between the KAI scores of team members and the IDN categories of their interactions. We evaluated each member of a design team in terms of their percentage contribution to the interaction categories (i.e. question, support, “yes-and”, block, overcoming, and deflection behaviors). We found that team members interacted in ways that generally aligned with A-I Theory (Jablokow et al, 2018). Particularly, we saw that question-asking was a common response across the A-I spectrum, but certain interactions (e.g., “yes and” and “support”) were more frequently exhibited by adaptive individuals. According to A-I theory, adaptive individuals are more likely to seek consensus with their peers (Kirton, 2011). Interestingly, conducting the same analysis with a larger data set in Workshop 2 showed no statistically significant differences in the IDN categories that adaptive and innovative individuals exhibit. So, while differences certainly exist within teams with respect to the members’ contributions to IDN categories, we did not observe an overarching pattern of interaction based on cognitive style across all teams (Jablokow et al., 2019).

In the same vein, we found that there was no statistically significant difference in the occurrence of *ideas* or *unique ideas* during team idea generation (Jablokow et al., 2019). This finding contradicts the popular myth that more innovative individuals will generate more ideas than their more adaptive counterparts under any condition. The finding also validates A-I Theory, which states that individuals with similar cognitive levels, regardless of their cognitive styles, are likely to generate similar number of ideas when ideating in their preferred manner (Kirton, 2011). Cognitive gap, a term used in A-I Theory to describe the differences in cognitive level and/or cognitive style between individuals was another relevant variable in our analysis. We found that the maximum cognitive style gap across members of a team had a statistically significant positive correlation to the number of topics initiated and revisited during team discussion



(Jablokow et al., 2019). A-I Theory notes the need for teams of greater cognitive diversity to spend more time and energy coming to consensus in solving problems (Kirton, 2011). We also observed that teams with more adaptive cognitive climates tended to exhibit more focused sequences of IDN interactions and responses in generating ideas/unique ideas than more innovative teams (Jablokow et al., 2019). A-I theory suggests that adaptive individuals are less likely to explore pathways of discussion that they perceive to be extraneous or falling outside the purview of the current problem-solving task (Kirton, 2011).

Finally, when we examined the cognitive profiles of the most successful teams of Workshop 1, we noted the presence of at least one team member whose cognitive style placed them in the “middle” of the team’s cognitive gap (Jablokow et al., 2018). A-I Theory tells us that *bridging*—i.e., “reaching out to people in the team and helping them to be part of it so that they may contribute” (Kirton, 2011, p. 247)—is a social role that can be assumed by any member of any team as a means of managing and leveraging the cognitive diversity of that team. Being in the “middle position” within the cognitive style distribution of the team lessens the coping required to reach out to “both sides.” We cannot be certain that these individuals fulfilled a bridging role; however, their presence—in conjunction with the success of their teams—suggests that they may have helped leverage cognitive diversity to the benefit of their teams.

**Table 2: Reported findings and their relevance to KAI practitioners**

Findings	Relevance of the findings for KAI practitioners
There were no statistically significant differences in the IDN interaction patterns that adaptive and innovative individuals exhibited in a team setting.	Adaptive and innovative individuals are equally likely to exhibit the various IDN interaction patterns. In particular, adaptive and innovative individuals are equally likely to block others’ ideas; this contradicts the common myth that adaptors “resist change” more than innovators.
There was no statistically significant difference in the occurrence of ideas or unique ideas during team idea generation of adaptive or innovative teams.	Cognitive style is only one factor in idea generation. Both adaptive and innovative teams generate the same number of ideas in a setting where members are allowed to generate ideas in their preferred style. Idea generation is an emergent behavior that arises from the cognitive styles of the team members as well as the interactions between team members.
Cognitive gap across members of a team had a statistically significant relationship with the number of topics that were discussed and revisited during team discussion.	Cognitive style-diverse teams discuss a wider variety of topics and search for design solutions in a wider solution space. This results in these teams revisiting topics more in a discussion, leading to more energy and time required to reach a solution.
Teams with more adaptive cognitive climates tended to exhibit more focused IDN sequences in generating ideas/unique ideas.	Teams with more adaptive cognitive climates more often stick to particular sequences of interactions and responses. Their discussion structure is more consistent than more innovative teams.
The most successful teams had at least one team member whose cognitive style placed them in the “middle” of the gap formed by the team’s most adaptive and most innovative members.	Bridgers play an important role in helping improve team harmony and success by helping to harness cognitive diversity within design teams.

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## **The Evolution of the Cognitive Socio-Behavioral Perspective: Insights from the Integration of Kirton's Cognitive Function Schema and The Organismic Socio-Behavioral Perspective**

*By Chantel Simpson, North Carolina A&T State University, and  
James Anderson, University of Georgia*

### **Introduction**

The exploration of experience from the view of the subject is one that can provide a dearth of information salient to furthering research, regardless of the field of expertise. This conceptual study introduces the cognitive socio-behavioral perspective (CSBP), a conceptual framework utilized to explore the psycho-social variables associated with the minority experience. The cognitive socio-behavioral perspective (CSBP) evolved from the organismic socio-behavioral perspective (OSBP) and incorporates Kirton's Cognitive Function Schema. The OSBP conceptual framework explored the processes of motivation and retention among agricultural students by exploring inputs such as environment, behavior and identity and the reciprocal nature of their relationships (Anderson, et al; 2018). Kirton's Cognitive Function Schema explores the cognitive factors associated with problem solving, including similar concepts as were found in the OSBP model including behavior and environment (Kirton, 2011). By overlaying these two frameworks upon one another, the cognitive socio-behavioral perspective (CSBP) was conceived. This model incorporates the psycho-social aspects associated with motivation and problem-solving within the minority experience.

### **HOW IT WORKS**

The CSBP conceptual model pairs aspects of each model, Kirton's Cognitive Function Schema and the OSBP conceptual model and explores them through a critical race lens. This critical race lens is imperative to increasing an understanding of the minority experience because race and the impacts of race are inherent within our society. Therefore, persons within minority groups often experience the world differently as they navigate unconscious biases and/or stigmas associated with their ethnic group or ethnicity (Delgado & Stefancic, 2017). Collectively, this framework is grounded in self-determination theory and was used to better understand the processes impacting motivation, assimilation and retention of African American males within STEM and agriculturally-related undergraduate degree programs from the perspective of the student. Figure 1 depicts the model and Table 1 depicts the relationship between the variables of each model.

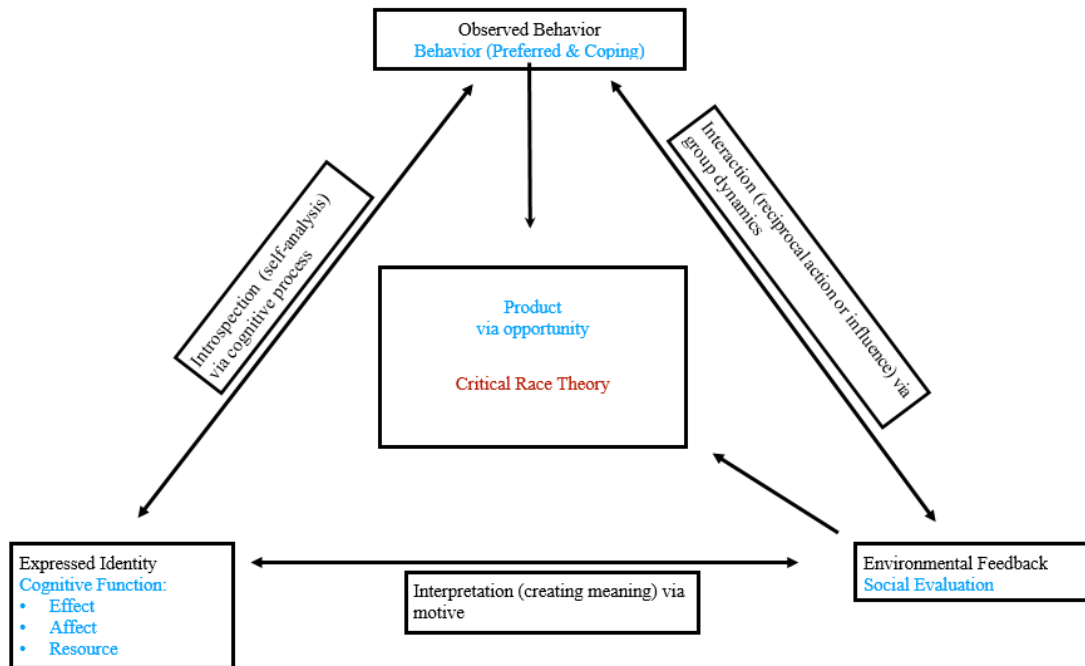


Figure 1: Cognitive Socio-behavioral Perspective (Simpson, 2019)

Connecting the Models	
Organismic Socio-Behavioral Perspective	Kirton’s Cognitive Function Schema
Observed Behavior	Behavior (Preferred & Coping)
Environmental Feedback	Social Evaluation
Expressed Identity	Cognitive Function (Effect/Affect/Resource)
Interpretation	Creating Meaning (via motive)
Introspection (self-analysis)	Via Cognitive Process
Interaction	Via Group Dynamics

Table 1: Variables in Each Model

### Results/Implications to Date

To date, the CSBP model has been used with a population ( $N = 10$ ) of African American male students pursuing degrees in STEM and agriculture. Their participation in this study unpacked a number of issues that are salient to understanding issues surrounding STEM retention including issues navigating multiple identities, mentorship as evidence of coping, experiences impacting a sense of belonging and motivational factors or challenges to attrition (Simpson, 2019).

### Future Plans/Recommendations

The CSBP conceptual framework provides a psycho-social lens for understanding not only the diversity in problem-solving preferences, but also more broadly describes the impacts and influences of other factors such as identity and environment. These factors provide a better understanding of group or team dynamics. They also provide insight about the power of one’s motivation to succeed despite differences and coping that may occur in multiple areas including

socially and culturally. In the future, this model should be broadened to a larger group to determine replicability and applied to other ethnic groups to determine if there are similar findings.

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## **KAI and Graduate Education: An Exploration of International Graduate Students' Mentoring Needs Based on Cognitive Style**

*By Shreya Mitra, Virginia Tech, and James C. Anderson II, University of Georgia*

### **Introduction**

Approximately 1.65 million international students come to the United States to gain expertise in their respective fields in order to return home to address some of the most perplexing problems of the 21<sup>st</sup> Century (Brown & Stephan, 2013; Lee & Rice, 2007). A significant influence on a student's knowledge acquisition is academic motivation, which is impacted by both personal and environmental factors (Anderson et al., 2018). Pertaining to international graduate students, the major professor has a significant environmental impact on the students' ability to gain the knowledge and skills needed to solve the aforementioned problems in their respective countries. Hence, the success of this mentoring relationship, a form of experiential learning, becomes crucial in establishing competent global leaders.

### **Connection to Adaption-Innovation Theory**

Numerous studies report that international students face a plethora of challenges that hinder their ability to acclimate socially and academically, thus limiting professional growth (Brown and Holloway, 2008; Curtin et al., 2013; Rienties et al., 2012). Often these interpersonal issues, particularly between the major professors and their international students, are portrayed as cultural mismatches (Rienties et al., 2012). Although culture plays an important role in this mentoring relationship, it is only one component that impacts motivation and thus fails to fully explain the cause of interpersonal rifts from a holistic perspective (Rienties et al., 2012). Since the main purpose of the advisor and the advisee coming together is to identify and solve research problems (i.e., Problem A), differences in their preferred way of problem solving (i.e., Problem B) might be an unidentified factor impacting this relationship. Accordingly, we hypothesize that cognitive differences related to how individuals process information during problem solving may impact motivation, productivity and satisfaction (i.e., group dynamics) within this dyadic relationship.

The purpose of this study was to determine the factors that encourage or thwart the relationship between advisors and their international graduate students. More specifically, are cultural or cognitive differences toward problem solving present, which differences are more salient in defining the advising relationship, and are coping behaviors being employed and by whom? To this end, we sought to:

1. Identify factors consistent with positive versus challenged advisor-student relationships as perceived by international students; and
2. Identify expectations for mentoring support by cognitive preference as measured by the KAI inventory.

### Methods/Data Analysis

A convenience sample of international students at Virginia Tech were invited to participate in the study. After obtaining consent from 19 participants, they were given the online version of the KAI, followed by a semi structured interview to glean insights on perceived factors that impact the mentoring relationship. KAI scores of the participants were compared to their interview responses to see if at all there is any connection between their problem solving style and the nature of problem they are facing in the mentoring relationship.

Whole text data analysis method for this study. Sentence was considered the unit of analysis in this study. It is based on the analytic procedures developed by Glaser and Strauss (1967) and Corbin and Strauss (2008). The process involved interpreting free flowing text. While transcribing, special attention was paid towards the tone of the expression, emphasis on words and phrases, and pauses taken by the participant while responding to the data collecting questions. We noted an overview of participants lived experience towards the phenomenon during the first reading of the transcript (Corbin & Strauss, 2008). Next, transcripts were coded and themes were identified. Although this was part of a larger study, the following findings only report data related to the two aforementioned objectives.

### Findings

Research objective one sought to identify factors consistent with positive versus challenged advisor-student relationships as perceived by international students. The factors were very consistent with processes within the cognitive function schema (Kirton, 2011) related to learning, motive, cognitive process, and group [partner] dynamics. A summary of responses is provided in Table 1.

**Table 1**

***Factors consistent with positive versus challenged advising relationship from the viewpoint of international student participants***

Positive Factors	Negative Factors
Feedback/ Constructive criticism	Mismatched work interest
Trust, Faith, confidence	Lack of proper communication
Flexibility	Language barrier
All-encompassing development	No constructive criticisms received
Interest in same domain of work	Lack of feedback
Respect—thought, culture, work judgment	Lack of independence in work
Proper communication	Ideas were not heard
Understanding each other’s perspective	Lack of detailed guidance
Accommodative and coping nature	Cognitive misalignment

Research objective two sought to identify expectations for mentoring support by cognitive preference as measured by the KAI inventory. Expectations were consistent with preferences for brainstorming, work style, and group conformity as describe by KAI theory (Kirton, 2011). Table 2 provides a summary of common responses by cognitive preference.

**Table 2**

***Categorizing Participants Responses According to their Respective KAI Scores***

More Innovative (107, 124, 127)	Mid-Range (80, 83, 85, 86, 87, 89, 90, 95, 97, 103, 104)	More Adaptive (64, 65, 68, 75, 76)
Wants a certain amount of freedom to work independently	Wants ideas to be acknowledged	Prefers a set structure and step-by-step guidance
Wants to be encouraged to come up with new ideas	Appreciates constructive criticism	Likes to ask lot of questions
Does not take constructive criticism personally	Prefers proper communication specially when there is an issue	Prefers the advisor taking the lead on new ideas
Enjoys facilitations vs. detailed guidance.	Prefers structured and detailed guidance.	Expects the advisor to know them well, both personally and professionally.

**Conclusions and Recommendations**

Based upon the findings of this research, international students seemed to face complex problems in U.S. academic and non-academic settings. These students expect a lot of mental support from their advisors, which is consistent with the needs of domestic students, but exacerbated by the real and perceived complexities of culture (i.e., social effect). They tend to be dependent upon their advisor in terms of personal and professional guidance. As such, it becomes the responsibility of the higher education institution to support the needs of the international students in a manner that will increase effort with Problem A (i.e., academic and scholarly success) and decrease effort with Problem B (i.e., mentoring dynamics). In order to mitigate Problem B’s for international students in the U.S and to provide a good academic environment for them to focus on Problem A’s, the following recommendations have been developed. They are as follows:

- Faculty advisors should be offered training to understand the key elements of KAI as a way to improve mentoring relationships, including strategies for sharing the responsibility of coping when cognitive gaps exist.
- Faculty advisors should be trained on best practices for mentoring, specifically on strategies to support the unique needs of diverse students in order to improve social evaluation and create positive training environments.
- Further research on KAI and graduate education should be conducted, especially related to understanding strategies for improving group dynamics when ethnic diversity is a factor.



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## **Italian Adaptors and Innovators and Entrepreneurship: A First Study**

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### **Background and Basic Hypotheses**

Entrepreneurship is a research subject of great interest. Many studies have been published about entrepreneurs and entrepreneurship (Casson, 1982; Chaganti & Chaganti, 1983; Cohen, 1989; Cunningham & Lischeron, 1991), focusing on different facets either of the concept itself or of the personal characteristics (Drucker, 1985; Leavitt, 1986; Schumpeter, 1934; 1939). The outcome of these studies has also been varied and uncertain, and there still exists a certain amount of disagreement and confusion about the role of the entrepreneur and his/ her psychology and behaviour (Cheah Hock Beng, 1994; Johansson & Senneseth, 1990). If we try to identify a common statement around the concept of entrepreneurship and the traits of the entrepreneur, we can say that most of the studies have stressed the concept of *innovation* as one of the fundamental and underlying qualities related both to the person and to the business process.

This is not the only way of defining the entrepreneur, but since the work of Schumpeter (1934; 1939; 1950) the entrepreneur has been said to be a person who promotes "new combinations", and is therefore involved with the innovation process. Many critiques have been made of Schumpeter's ideas (Hayek, 1945, 1949; Kirzner, 1973, 1979); in these references the entrepreneur is described as adjusting to rather than just disturbing the equilibrium with the environment. But all the studies do agree, more or less, attributing to the entrepreneur a unique ability to solve problems related with the management of change, take consequent initiative within uncertainty, and, in the end, the art of "being innovative", as popularly defined.

In the Italian context, the findings are the same (Coda, 1989; Corno, 1989a; 1989b). Moreover, in Italy the concept of the entrepreneur is also related to what is called the "family business" (in Corno, 1989a; 1989c). That is we often meet entrepreneurs start up their own business, achieve success, involve relatives, and then, when they are going to retire, leave their business to them. This development then has typically the initiator and the "followers", and some scholars would say that the real entrepreneur, the "innovative" person, is often (only) the founder. Certainly the subject of entrepreneurship is one of the most complicated in the field of business, and there are many aspects which need more understanding from many points of view. In this paper we have tried to tackle some of these.

First is the testing of the hypothesis that the entrepreneur is an above average innovative person. We are now using the concept of innovation in a general way, but we will be applying the Adaption- Innovation dimension (Kirton, 1976, 1987) as a specific theoretical framework and the KAI (Kirton Adaption-Innovation Inventory) as the psychometric measure of personality and cognitive style applied to a sample of Italian entrepreneurs. Second, is to test if there is any difference between the initiators and the followers in terms of their innovativeness. The same sample, although numerically small ( $N = 60$ ) and geographically limited (an industrial area of the North of Italy), is wholly made up of people who clearly are entrepreneurs; some (about 50%) have started their business, while the others have just "received their business through the family".

Because studies use different definitions and approaches to the entrepreneur as the innovative person, we have carried out a study making use of a good theory related to the measurement of creativity. Kirton's Adaption-Innovation (A-I) theory at present is the most useful theory available in the field of cognitive styles; clearly keeping separate style from level and offers a good explanation to both the individual preference towards change and the organizational climate (Kirton & McCarthy, 1988). One of the main points of the theory is that Kirton sharply distinguishes (Kirton, 1976; 1978a; 1978b; 1987; 1989) between level and style of problem solving and creativity, and in the field of style labeled as "innovative" and "adaptive"; the two poles of a unique personality dimension (Adaption and Innovation). The theory is of great interest not only for the analysis of individual cognitive styles, but also for its relationship to social and organizational groups and cultures (Kirton, 1978c; Prato Previde, 1991), by removing capability from style and locating problem-solving style on a continuum of preferences.

Both the theory and the measure have been applied to a great variety of people in different countries (Kirton, 1989; Kubes & Spillerova, 1992) and have demonstrated a good validity and a strong reliability estimates (Kirton, 1989; Clapp, 1993; Prato Previde, 1984; Taylor, 1994). The Italian validation of the KAI has been carried out some years ago (Prato Previde, 1984) on a large general population sample. In that sample there was a very small group of entrepreneurs, while the managerial group was well represented.

Later, Italian studies have not followed up on the subject of entrepreneurs, but this has been done in other countries. A recent study (Buttner and N. Gryskiewicz, 1993) following the work by Tandon (1987), who had tested some challenging hypotheses. First, it has been shown that entrepreneurs are more innovative than general managers. Second, it is clear that more adaptive entrepreneurs are more "likely to continue operating their business over the long term than are innovative entrepreneurs". (Buttner & Gryskiewicz, 1993; Tandon, 1987). Then, more innovative entrepreneurs start more businesses than the adaptive entrepreneurs, and prefer to manage (and migrate to manage) more fitting with their cognitive style. It seems, then, that the more innovative start more businesses and more frequently some of the earlier ones fail, than do adapters. Entrepreneurs tend to manage in ways that accord their style or move out, if they do not fail.

Therefore, the aims of this study are to shed more light on these questions:

- 1) Is the concept of the entrepreneur as an "innovative" person valid when using the Kirton's theory and measure of cognitive style?
- 2) Does the innovation dimension with Kirton's precise definitions apply to a sample of Italian entrepreneurs?
- 3) Independently from the location of the whole sample on the Adaption-Innovation continuum, is there any cognitive difference and, if so, in what direction is it, between the sub-set of those entrepreneurs who started up their business from zero, and those of the next generation of leaders who acquired/inherited the business, years later?

### **Population and Sample**

The people included in this study, are entrepreneurs living and operating in a homogeneous geographical area. All of them live and operate in the area surrounding the city of Lecco, said to be one of the most active and brilliant initiating centres in the region of Lombardia and one of

the wealthiest in the whole of Italy (Corno, 1989c). Most of the sample has in fact been selected from the membership of the Association of the Local Entrepreneurs of Lecco (Corti, 1993, unpublished). These people are fairly well known and successful entrepreneurs of an area where the town of Lecco is the center. They are typical of a particular kind of entrepreneurial culture and market where managing small companies is quite diffused and often represents a "family business". In fact, most of the companies they are directing are middle or small to middle well established industries with a familiar pattern prevailing in which there is a progression of power from generation to generation of the property and of the business to the children (or other relatives) taking over from the founder (Corno, 1989b). All of the present owners are actively managing their firm and their business has, on average, survived longer than the 2 years (see: "survival phase" in Tandon, 1987). In fact they are all managing well-established business that have been existing for an average of more than 10 years.

Of the original 80, forty were the initiators of the enterprise, while the remaining 40 people represent the next generation of the previous sub-group, or the second generation of similar industries. It was not possible to include only persons (initiators and followers) who were part of the same family. But all the people included, who were randomly picked, are part of a same cultural, geographical and entrepreneurial domain. Among the original number of 80 people who were selected, about 75% of them accepted ( $N = 60$ ), and this is good, if compared to similar studies which address the entrepreneurial domain. The 92.5% of the followers accepted, while the founders gave a return of the 57.5%. The final sample is of 60 people. Men dominate the sample. The number of the women in the sample totals nine, and all of them are in the sub-set of followers. But this is completely expected within this cultural environment, and reflects the membership of the Association, which has 7% women.

### **Methods**

The assessment was carried out applying to the sixty entrepreneurs of the research sample a test battery made up of the Kirton Adaption- Innovation Inventory and a ad-hoc Questionnaire (Corti, 1993, unpublished). All the people in the sample were met personally by a researcher for about 40 minutes; during that time they were made generally aware of the concept of the research and then they immediately filled in the KAI. After that a second measure was applied during a structured interview. The interview which followed the KAI administration was aimed at collecting some biographical data and some information about the history of the entrepreneur. The second measure was a questionnaire created for this occasion; it elicits opinions and descriptions about the company, the business the entrepreneur and his/her work experience related to the management of change. This second tool was composed of 14 questions for the initiators, and 13 questions for the followers.

### **Results and Comments**

The data derived from the analysis of the cognitive styles of the sample of the 60 entrepreneurs are shown on Table 1 and Table 2. For the entire sample of these entrepreneurs (both initiators and followers) = the KAI mean (95.80) is exactly that of the theoretical mean of the measure as it has been described by Kirton (Kirton, 1977; 1987). Therefore, the mean of this group is also exactly located at the mid-way point of the Italian general population mean (94.1) and the mean of Italian managers (99.27) of an earlier study (Prato Previde, 1984).

**Table 1**  
**Results from the Whole Group of Entrepreneurs (N = 60)**

<b>KAI MEAN = 95.80</b>	<b>RANGE = 55 - 132</b>	<b>STANDARD DEV. = 15.77</b>
MEAN S.O. = 43.98	" = 24 - 61	" = 8.94
MEAN E = 17.08	" = 7 - 34	" = 5.81
MEAN R = 34.73	" = 16 - 50	" = 6.89

The range of the scores of the total group, is, as Kirton assumes for sufficiently large groups (more than 15 to 20 people) wide (55 to 132), but not different from what is usually found in similar researches. The standard deviation of this group (15.7) is similar to what is expected from more general groups (see Italian population, English and American studies), and sub-groups (see the sub-sets of the Italian study). In this case the standard deviation suggests that the group of entrepreneurs is far away from being a self-selected group for this research and there is a wide heterogeneity within the scores which are, globally considered, exactly that of the general population. Although these data were not gathered from the whole Italian entrepreneurial population, we have collected a wide selection of people, and the fact is that these Italian entrepreneurs are right in the middle of the Adaption- Innovation continuum is both surprising and challenging. It is surprising because the entrepreneurs are, generally speaking, thought of as agents for change who make the things happen "innovatively"; moreover, and this is even more relevant, many studies on entrepreneurship and on entrepreneurs, have strongly focused on the "innovative" (Schumpeter) side of the entrepreneur. Now, these results seem to suggest that the concept of "innovation" applied *tout court* to the entrepreneurs and generalized might be incorrect, if we make use of the study and measure of Kirton. The so-called innovation of the entrepreneur seems not to be something that we can accept as a background statement if we are making use of this measure of cognitive style, especially for businesses that have survived successfully for as long as ten years and which are deeply settled within the cultural environment.

This means that we cannot assume that being an entrepreneur and being innovative are the same, because the entrepreneurs have different styles with different preferences for change. Some of them (this particular sample) are even more adaptive than a general sample of managers taken from different companies (Prato Previde, 1984; Prato Previde, 1994, unpublished). Of course, these results have to be tested on other different samples, in order to understand if this first conclusion can be extended safely to the entrepreneurial sector of Italy. Some further analysis is, however, here possible. Are the "founders" and the "followers" alike in cognitive style? Tables 2 and 3 below show the results of this division.

**Table 2**  
**Results from the Group of "Founders" (N = 23)**

<b>KAI MEAN = 95.26</b>	<b>RANGE = 55- 132</b>	<b>STANDARD DEV. = 17.45</b>
MEAN S.O. = 45.43	" = 30 - 61	" = 8.71
MEAN E = 16.08	" = 7 - 30	" = 6.36
MEAN R = 33.73	" = 16 - 50	" = 8.64

**Table 3**  
**Results from the Group of “Followers” (N = 37)**

<b>KAI MEAN = 96.13</b>	<b>RANGE = 64 - 127</b>	<b>STANDARD DEV. = 14.88</b>
MEAN S.O. = 43.08	" = 24 - 58	" = 9.08
MEAN E = 17.70	" = 8 - 34	" = 5.44
MEAN R = 35.35	" = 24 - 45	" = 5.59

Now, from a statistical point of view, we find the same thing as we described for the entire group. The data that refer to the mean, the range and the standard deviation of the total scale and of the sub-scales are largely similar if you compare the sub-set of the initiators with the second-generation results. Just small differences, and none significant! And here is the second point of surprise, because, as it is also suggested by Kirton and other scholars, we would expect to find the initiators to be more innovative than the followers. Kirton argues all are creative, all like novelty, all are potentially initiators, but either within paradigms or, conversely, outside. Even so this is still a surprise, because we also expect that those "pioneering" are more innovative, and this is not true; belonging to our results the "fathers" who have started their business in a completely lonely way, setting up a firm and "adventuring", have scored in the middle.

We have not a ready explanation for this result; we can assume again that we have to consider the kind of market and the cultural (Corno,1989c) environment where a certain initiative (in these case we are speaking of product-oriented manufacturing firms) has been developed. Of course, further studies are needed to check this issue, with different and larger samples. As we have already said, the study included the completion by the same sample of the questionnaire entitled "Are You a Creative Entrepreneur?" (Corti, unpublished, 1993). The first interesting result from it is that the sample perceive themselves quite "innovative". On a Likert scale continuum from 1 (the least) to 5 (the most), the initiators score 4.04, while the followers 3.36.

When requested (another item) to say and to describe on a continuum (1 to 5) if they prefer a gradual and incremental change (1), or a sudden and radical change (5), the interviewees globally score 2.5 (2.52: initiators; 2.45: followers). That clearly means that these people like changes, move towards "innovation" (better "novelty") but gradually, and with a logic which is close to the "continuous improvement" more than to a revolutionary turnaround. This is totally coherent with the kind of creativity which is expressed through their KAI scores and with literature concerning dual modes of entrepreneurship (Cheah Hock Beng, 1993; Mazzola & Visconti, 1991 ). Moreover, when requested to point out their personal definition of innovation, only a very small number of them has referred to innovation in the same sense that Kirton assumes (that is the innovative pole of the A-I continuum). Conversely, those (only few of the sample) who answered that the term is related to "revolutionary events" were not the innovators of the sample. More specifically, in a question (number 6) they were requested to say which kind of innovations they concretely introduced in their company from the time they were in their position of top responsibility all said that the kind of "innovations" that they introduced were most similar to "improvement" (that is Kirton's adaption). This is not far away from the typologies of "innovation" illustrated as basic in the entrepreneurial field (Manimala,1993). The problem is the terminology, equating "new", "novel" with innovation only (see also Foxall, 1994).

## Conclusions

The main conclusions of this study can be summarized in a few points. First, the use of A-I dimension and of KAI is really useful for measuring cognitive style and preference for change, keeping these personal preferences well separated from level, complexity, success, competence, and other issues related to organizational behaviour. Kirton's approach is also useful to deepen the current understanding of the concept of innovation. A lot of confusion has probably been made by saying that the entrepreneurs are "just innovative", without explaining and probing completely what this statement means. Entrepreneurs are probably more innovative than managers, but this must always be checked and referred to the kind of business, the duration of the initiative, the environmental conditions, and so on. In accordance with the results of this research, we can say that entrepreneurs who are directing small and middle-size businesses in the sector of manufacturing and in a geographical area where entrepreneurship is traditionally high-rooted, and who have survived successfully over a period of years are exactly in the middle of the A-I continuum and exhibit the same range of a general population.

But, on the other hand, it seems to be true that different climates (cultures) influence entrepreneurial process and the orientation of initiatives. Recent surveys in this domain (CIS, 1993), demonstrate Italian entrepreneurs have quality improvement and product development objectives at the top of their strategies. Moreover, from the same research, a clear orientation to maintain same strategies resulted to be a major constraint for small businesses. They all perceive themselves as innovative (a cultural inference?), but they describe themselves as preferring gradual change initiatives, and refer to their "innovations" illustrating ideas and initiatives which are inspired by "improvement philosophy and practice".

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