Delineating Entrepreneur Styles: Application of Adaption-Innovation Subscales[1]

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ABSTRACT

The paper discusses Adaption-Innovation (A-I) Theory and its measure, the KAI, as one means to study individual roles in the creative process. For a fuller understanding of the theory, subscale data is divided into "zones" within each subscale. Earlier work in A-I theory focused on Kirton's KAI instrument and its total score, often overlooking or downplaying the significance of the three subscales. Results here show entrepreneuers to have unique mix of scores on the three subscales, with Rule Conformity being a moderating variable for Originality. Arguments are made for conducting more research on the subscales, based on the evidence in this study. Much of what was found in the analysis would not have been as relevant with total KAI and no subscale data.

INTRODUCTION

Creativity has received much attention in recent years, with a focus on what it is and how to achieve it. Adaption-Innovation (A-I) Theory is one means to understand creativity as a type of cognitive style. The purpose of this paper is to develop further understanding of A-I theory through the introduction of "zones," which identify intervals of scores within each subscale and may be used to characterize the fit between certain zones and various professional profiles. This approach is examined through statistical analysis of two populations--managers and entrepreneuers.

COGNITIVE STYLES

Cognitive styles are defined as the consistent and stable "characteristic mode of functioning" shown through the way a person thinks and perceives (Witkin, 1976). Using them as a means of delineating intellectual differences has received much attention from academicians in recent years. (Kagan and Kogan, 1970; Shouksmith, 1970; Vernon, 1973; Messick, 1976).

A distinction is made between styles and abilities, for valuation-assessments are made with abilities, but not with cognitive styles (McKenna, 1984). With abilities, virtue alone comes from having them, because of their unipolar dimension. For example, the ability to paint a work of art is either there or not there. Cognitive styles, on the other hand, tend to be bi-polar with either side having "goodness" (Witkin, 1976; Goodenough, 1976), making this intellectual approach less threatening (Messick, 1976; McKenna, 1984). For example, one person may be an extravert, another an introvert, with neither having an inherent sense of "betterness" over the other. Abilities are the content of thinking, the "what" --e.g, the ability to think critically--while style is the "how" (Messick, 1976)--thinking inductively vs. deductively, for example.

A-I THEORY

Some recent work in creativity has looked at creative styles similar to cognitive styles, in this case noting differences between level (abilities) and style (Kirton, 1976; Payne, 1987; Isaksen,

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1987). With this approach, types of creativity would be seen as equally valuable, rather than only looking at one type of creativity and how much a particular person has.

Isaksen (1987) argues the need for more theories looking at style of creativity, such as Adaption-Innovation (A-I) Theory, which does not look merely at level, as most creativity theories do. The importance of differentiating style from level was described by Kirton (1984), who stated that present measures of level are unrealiable because they may be contaminated by such factors as intelligence and individual scope for action. Kirton (1976) developed an instrument called the Kirton Adaption-Innovation Inventory (KAI) which measures dimensions of A-I theory, looking at two styles of creativity--innovative and adaptive.

An advantage of A-I theory is that it broadens the definition of creativity to include adaptive, i.e., the person who manifests creativity through developing more efficient systems or bringing improvement and stability while staying within the current paradigm. Previous work defined creativity similar to A-I theory's innovative, i.e., the person who is ingenious and original, the one who challenges the existing paradigm. With A-I theory, the questions changes from "How creative are you?" to "How are you creative?" (Isaksen, 1987). A major contribution to the field was the recognition that working within a system with reliability, precision and efficency, e.g., adaptive, was another type of creativity (Kirton, 1976).

In the early work on A-I theory, Kirton (1976 and 1977) identified the three subscales of orginality (the extent one prefers to proliferate new and/or novel ideas), rule conformity (the extent to which one accommodates with a group's norms or rules and is prudent), and efficiency (creating a reliable system external or internal to oneself). These subscales were labeled after the sources from which most of the items originated (Mulligan and Martin, 1980). Originality or "O," was based on Rogers' (1959) work on creativity, efficiency or "E" came from Weberian (1947) thoroughness, while rule conformity or "R" derived is conception from Mertonian (1957) conformity.

Rosenfeld and Winger-Bearskin (1991) describe the subscale of originality as the arena of communication and the subscales of rule conformity and effiency as the arena of implementation. This means the similarity of scores on O has a great deal to do with how people understand and relate to one another when solving problems, while similarities on the other two have more to do with how easily people work together to accomplish a goal.

Kirton (1990) maintains the three subscales are interdependent with some correlations, but he says their correlations are not high enough to refrain from using them independently. Further, Payne (1987) feels that even though there are moderate correlations of .36, this still allows for all possible combinations of scores on the three subscales, which deserve more attention. A correlation of .36 may indicate a level of interdependence, but it is not strong enough to prove that most individuals fall within a "norm" of the same level of score on all three subscales. Therefore, it is quite possible and very likely to see numerous people who are innovatively original, for example, but have rule conformity and efficiency scores as adaptors. In other words, too many people fall out of normal ranges or alignments to ignore or discount further study of the subscales.

THE SUBSCALES AND ZONES

Further refinement of the subscales has been done recently by Rosenfeld and Winger-Bearskin(1990), where each subscale was divided into four zones of adaptive, mid-range adaptive, mid-range innovative and innovative. Using zones as a nomenclature for expressing relative position on the subscales seems conceptually easier than using rawu scores for each of the three subscales. This is especially true with using the KAI, where each subscale has a different maximum and mean, so that a "29," for example on originality is in the adaptive

range, while it is in the innovative range for efficiency. Therefore using zone terminology offers an intelligible means of discussing ranges of scores on the subscales and can assist when discussing certain types of people.

Many people find their scores fall within the same zone (or the one adjacent) on each of the four zones. However, because there are correlations of only .36 to .47 between the subscales (Kirton, 1977), it means quite a number of people will have scores in different zones--in other words, subscale scores which are not aligned. Just as Kirton (1990) indicates there are behavioral differences with as little as a 10-point difference on the scales, so it seems reasonable to assume that there will be behavioral differences between scores in different zones.

Cutoffs for the four zones were developed by taking Kirton's (1977) factor trait norms, where he calculated standard deviations from observed means on each subscale. These scores were rounded off into theoretical boundaries, as he does with the total KAI score to develop a theoretical mean for KAI (Kirton, 1977) With the subscales, one standard deviation on either side from the theoretical mean gives two of the zones, mid-adaptive and mid-innovative. Scores further out constitute the other two zones., adaptive and innovative.

Our supposition is that certain professional groups will exhibit distinct mixes of scores with respect to the zones on the subscales. In order to begin to validate this proposition, we will compare two professional groups--entrepreneurs and managers--to see how they compare on zones.

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RESEARCH AND SUBSCALES

A number of studies, as described below, have been conducted which seemed to have inconclusive or incomplete conclusions resulting from lack of focus on the A-I subscales. Some of them may have benefited from further examination of subscale data.

Keller and Holland (1978) found a positive correlation between self-esteem and KAI, but an even stronger one with the originality scale (Goldsmith, 1985). Goldsmith and Matherly (1986) found no correlation between KAI and the Eysenck Personality Inventory Lie Scale, but did find a correlation with the originality scale at the .01 level of confidence. While comparing KAI to three other scales of innovativeness, Goldsmith (1986) found the highest correlations were with the subscales and not total KAI. Goldmsith and Matherly (1987) tried to demonstrate correlations between KAI and Kaufmann's (1979) two styles--assimilators and explorers, which sound very similar to A and I. However, no relationship was found. It did not seem that the researchers looked at the subscales, and there may have been clearer results if that had been done. Lowe and Taylor (1986) further argue the need for subscales research with their results showing scientists having adaptive score on efficiency but a total innovative score, proving lack of alignment on the subscales with that professional group.

Kirton (1985) found A-I scores to have modest relationships with scales of dogmatism, inflexibility, conservatism and intolerance of ambiguity. Justification for lack of more positive results was given as problems with the battery of tests, rather than not looking at subscales. Previously Kirton (1977) had shown the subscales do exhibit varying degrees of correlation with those same characteristics.
Carne and Kirton (1982) did find a relationship of .42 between KAI and intuition on the MBTI, but the correlation increased to .49 when looking at inutition and originality and to 0.62 when comparing originality with the combination of intuition and perception. Kirton (1978) claims

innovators are similar to Rogers (1959) "creative loner," and therefore should tend towards extraversion. He did find correlations between total KAI and extraversion of about .42 (Kirton, 1976), and .45 (Kirton, 1977), but other studies failed to replicate those results (Kirton and de Ciantis, 1976; Kirton, 1978). The research of Carne and Kirton (1982) found no correlation between KAI and extraversion, but there was a relatively strong relationship of .31 between extraversion and originality, indicating further need to study the subscales more closely.

ENTREPRENEURS

Recent literature on entrepreneuers indicates the difficulty and frustration in being unable to identify consisent characteristics or traits of successful entrepreneurs (Winslow and Solomon, 1989; Kilby 1971). A number of studies have been done using McClelland's (1969) need for achievement theory. Martin (1984) further described the requirement for entrepreneurs to have a high achievement drive, in addition to being a risk-taker, having a high internal locus of control, and desiring regular feedback. Pinchot (1985) discusses the need for vision, risk taking and a drive to get things done no matter what.

Timmons (1985) conducted a review of the literature (both normative and empirical), finding the following traits important: risk-taking, mental drive, innovative, ambitious, need for control, responsibility and achievement, and high tolerance for ambiguity and failure. Solomon (1989), too, examined several empirical studies, finding one distinguishing characteristic. Entrepreneurs had difficulty functioning in a traditional organization and sought another outlet for their creativity. Ginsberg and Buchholtz (1989) further examined 10 studies on entrepreneurs and found a great deal of contradiction. Forty attributes were used in the studies and only risk and achievement were consistently high. However, other writers who have asserted entreprenuers need certain traits tend not to have any instruments readily available (Welsh and White, 1983; Solomon, 1989). Most of the instruments seem to only measure one or two of the supposed list of characteristics. Some writers even contend that attitudes are a better indicator of entrepreneurial ability than personality characteristics (Robinson, et al (1991) In other words, there is disagreement about important categories of attributes as well as which attribute in each category is important.

DATA DESCRIPTION

In this study, 44 entrepreneuers were administered the Kirton Adaption-Innovation Inventory to determine total KAI as well as scores/zones for the three subscales. Selected from data of groups of managers, the entrepreneurs were identified as the principle in starting a business (as opposed to taking over) which had positive cash flow after two years and they were not primarily supported by any other income. Businesses which they started were varied and included construction, engineering, sales, advertising, consulting, hair salon computer software development, and manufacturing. These entreprenuers were compared with 189 managers from one division (which tends to have an entrepreneurial culture) of a large company. The third data set was the means, standard deviations, etc. of Kirton's (1977) sample which was used to develop population norms. Also tested was an additional group of eight entrepreneurs who did not meet the above criteria, because of not being the primary source of income.

HYPOTHESES

Our hypotheses were that 1) the entrepreneurs would have KAI scores statistically signficant from norms which Kirton (1977) found and from the norms of the 189 managers; and 2) entreprenuer's would score in different zones on the subscales from either Kirton's (1977)

norms or the 189 managers, and 3) originality for entreprenuers can be expressed fully (or is moderated by rule conformity) only if the entreprenuers were not too rule conforming.

METHODOLOGY AND RESULTS

Population means were calculated for all three populations: Kirton's, managers and entreprenuers. F-tests rejected the null hypothesis of equality of variances between the manager and the entrepreneur population samples. Differences were statistically significant at the 0.01 level, except for efficiency. Kirton's original sample and the entrepreneuers were significantly different at the 0.01 level. Z-tests rejected the null hypothesis of equality of all means (KAI, O, E, and R) between manager and entrepreneur samples, as well as between Kirton's sample and entrepreneurs. Differences were significant at the .01 level. Significant differences in both mean and variance suggest that these are different population distributions.

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Correlations of the three subscales were compared for entreprenuers and managers. A clear pattern of differences emerges when these correlations are examined. The correlation between rule conformity and efficiency is weak (0.333) in the entreprenuer data, while it is larger (0.490) in the manager data. Correlations between rule conformity and orginality were also different in the two populations: 0.303 in the entrepreneur data vs. 0.604 in the manager data. The correlation between O and R is .303 and not significant for the entreprenuers, while for the managers it is .604 and significant at the .001 level. This means for the managers, those who tend to be innovative in originality will also tend to be innovative in rule conformity. With entrepreneurs, though, this is not the case. Those with innovative originality will have relatively more adaptive rule conformity, though it will still be in the innovative range.

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Given the apparent differences in correlation of the subscale scores for entrepreneurs, we examined the data in an additional manner. We utilized a moderator variable approach(Morris, Mansfield, and Stern, 1986; Sharma, Durand and Gur-Ari, 1981; La Rocco and Jones, 1978), calculating and interaction term (rule conformity * originality) for each individual, in order to test if one variable moderated the effect of the other. We wanted to see, for example, if different levels of R would have differing effects on O. This moderating variable accounted for very different portions of variance for total KAI scores. Using an ordinary least squares regression approach, several models were examined.

The first model examined was:

(1) $KAI_i = Beta_0 + Beta_1$ (rule conformity) + $Epsilon_i$

or $KAI_i = \beta_0 + \beta_1$ (rule conformity) + ε_i

In the manager data, over 40% (R^2 = .431) of the variation in the total KAI score can be accounted for by the rule conformity subscale alone. In the entreprenuer data, however, 47% (R^2 = .471) of the variation can be accounted for by the rule conformity subscale alone. This suggests that managers vary less in their R scores than do entrepreneurs.

When another model:

(2) $KAI_i = Beta_0 + Beta_1$ (rule conformity * originality) + $Epsilon_i$

or $KAI_i = \beta_0 + \beta_1(\text{rule conformity} * \text{originality}) + \varepsilon_i$

is examined, we find that the interaction term explains
94% (R^2 = .940) of the variance alone in the manager data and 89% (R^2 = .887) in the entrepreneur data.

Another model was used, as shown below.

(3) $KAI_i = Beta_0 + Beta_1 R_i$ (Rule Conformity) + $Beta_1 O_i$ (Originality) + $Epsilon_i$

Managers KAI scores are better explained with model (3), estimating the model using R and O separately rather than as a moderator variable. Managers have an R^2 of 0.951, while entrepreneurs have R^2 of 0.888. R alone can explain 87% of the variance in total KAI scores for managers and only 75% of variance in total KAI scores for entrepreneurs. Originality is lower and has a wider range for managers than for entrepreneurs.

For entrepreneurs, though, model (2) explains 89% of the variance, as does model (3). Therefore, model (2) and model (3) provide similar fits (i.e., explain about the same percentage of variance).

The final model examined was:

(4) $KAI_i = Beta_0 + Beta_1$ (Mod--R*O) + B_2E + $Epsilon_i$

This model (4) explains 99% of the variance for both managers and entrepreneurs and is therefore the best for explaining the variance in manager and entrepreneur KAI scores. Parameter estimates for coefficients on the interaction term and the efficiency subscale were not significantly different. The constant terms were significantly different, indicating regression lines with different intercepts and different slopes. The parameter estimates for the efficiency subscale, though, were not significantly different.

From these results we can conclude that for entrepreneuers the importance of how efficiency and this term interact with rule conformity as the moderating variable is extremely important.

Cronbach's alpha was computed for reliability estimates in order to give the lower bound to reliability in unweighted scale of items(Carmine and Zeller, 1979). Results showed a much higher reliability for managers (0.7165) than for entrepreneurs (0.4744), indicating the managerial sample to be more predictable than the entrepreneurs. When comparing the group of secondary entrepreneurs to the general entrepreneurs, t-tests rejected the null hypothesis of equality of means (KAI, O, R) with differences signficant at the .005 level (KAI, R) and the .03 level (0).

Further analysis was done to look at the KAI scores of entrepreneurs and managers to see how prevalent those types would be. Using the means of both groups and comparing them to Kirton's sample, Z-tests showed that about 7.5% of the population (Z=1.424) can expect to be managers and about 5% of the population (Z=1.653) could be entrepreneurs. However, since our sample was small and not balanced in in terms of sex, gender or socio-economic factors, it is difficult to generalize to other populations. More work is needed here to see if these prelimiary findings would bear fruit with other groups.

In order to see if demographic variables may have had an effect on KAI scores, regression analysis showed only 15% of the variance in KAI scores could be explained by the total of age, sex, and education. Further, correlations of age, sex, education with KAI, O, R, and E are all less than .15.

DISCUSSION

Results clearly show that the subscales (and correlations between them) behave differently in the three populations, which gives more impetus to the assertion by a number of writers (as described earlier) that KAI subscales be researched more. Not only do the subscales not align, but the entrepreneurs data was also less internally reliable, therefore less predictable (and out of the norms) than the other data sets. What this means is that total KAI does not necessarily predict what any of the subscales will be, particularly for entrepreneurs.

Some of the more pertinent differences found was that the entrepreneurs O and R scores had half the correlation of the managers' O and R scores. Therefore, managers with innovative O would tend to have relatively more adaptive R, unlike what would be expected if the subscales were in alignment relative to the general population. Another difference was the distribution of O (which had a significantly higher mean for entrepreneurs), which was much narrower with the entrepreneurs, showing that the range of "acceptable" O scores is much smaller for successful entrepreneurs.

The other major finding is the existence of a moderating variable--rule conformity--in the entrepreneur data. Originality operates through R in this population. R then acts as a kind of on/off switch for O. If a person's R is too adaptive, even an innovative O will have difficulty expressing that O. The combination of O through R is much more important than if looked at separately. If the E is known, or just the interaction term (R * O), predictions are much easier in the manager data than with the entreprenuers. This means the subscales for the entrepreneurs do not fit the norms the way the subscales do for the managers, who are more similar to Kirton's population norms.

For entrepreneuers both the E score as well as the interaction term are needed to predict total KAI. However, in the management population, the interaction term (O * R) alone can explain 88% of the total score, while E alone predicts 43% of total KAI.

Entrepreneurs who were not the principal source of income had significantly different scores than the successful entrepreneurs, whose KAI and R scores were much more innovative, and the difference was somewhat greater than with the O. This further proves the argument of R being the moderating variable for entrepreneurs, meaning that though an innovative O is important,a more adaptive R will cancel out any effect of that innovative O. Therefore, the R score is extremely important in looking at successful entrepreneurs. It may be that R is proportional to risk. Those with secondary incomes took less risk and their R scores are more adaptive.

The above indicates that R gets more adaptive as a person is less entrepreneurial. Not only were there no adaptive R scores with the successful entrepreneurs, but there were no adaptive O scores, either. This poses a questions as to whether there is a cutoff point on O and R below which a person could not be expected to be a successful entrepreneur.

When we looked at total KAI, we found that only 5 % of the population could expect to be entrepreneurs. Even this figure, though, does not take into account competence, for the KAI does not measure that. Considering the competence factor, we could probably expect a much smaller percentage than 5% of the population to be successful entrepreneurs.

In conclusion, entrepreneurs are different from both a management sample (even though from an entrepreneurial division of a firm) and from a general population. Basically, entrepreneurs in this sample were shown to have innovative originality and rule conformity, with efficiency just about at the midpoint between adaptive and innovative.

More research is needed to look at more conservative firms, rather than the entrepreneurial type studied here, to compare the entrepreneurs with a different set of managers.

Further research is needed, too, in the area of zones. We have done some preliminary work examining scores within the subscales. We have observed that that various occupational groups or types of persons may score differently within subscales. For example, entrepreneurs seem to score I (innovative) on O, I on R and anywhere on E (which is borne out above by the relatively high standard deviation of E with the entrepreneurs). When looking at combination of scores, there are different types of people that can be examined by looking at different zones. Using this method, there would be 64 types of people to be studied. For example, one could look at the type I-Ma-A (which means innovative on originality, midd-range adaptive on rule conformity and adaptive on efficiency)as the creative optimizer, or one who generates lots of ideas and fits them into the organization well. The intrapreneur might be: I-Mi-anywhere on E, for this is someone who needs to be more adaptive on R than an entrepreneur, because the intrapreneur must be acceptable within the organization. The continuous improvement person could be: A-Ma-A, and therefore someone who is able to optimize the given paradigm through being adaptively creative.

Another area which needs further work is the follow-up person after the entrepreneur. We have seen the second person into the company will usually be more adaptive, which will backup the entrepreneuer's weaknesses. It would be interesting to see whether entrepreneurs who did bring in a more adaptive person were more successful than those who didn't. Which leads to another question, as well. What is the difference between successful entrepreneurs (as we have studied) and those who did not succeed after two years? Would there KAI scores be any different?

And lastly, are there any differences between male and female entrepreneurs? Earlier research has indicated demographic and personality differences between male and female managers, but would those differences extend to entrepreneurs as well?

This article has looked at the need to research A-I theory subscales more and has shown the usefulness of zone theory.

SUMMARY

The purpose of this paper has been to further develop the concept of the subscales in A-I theory, as well as delineating zones within each subscale and showing how various professional types can score out of norms on the zones.

A-I theory offers one approach for seeing creativity as having two styles--adaptive and innovative. Adaptive persons are those who express creativity through developing more efficient systems, bringing improvement and stability within the current paradigm. Innovative persons show creativity by looking at things in original or unconventional ways, often breaking or challenging the existing paradigm.

A-I theory also includes the three subscales of originality (proliferation of new and/or novel ideas), rule conformity (the extent to which one goes along with a groups norms and is prudent), and efficiency (being reliable, predictable and precise). There are modest to mildly

strong correlations between the subscales of .36 to .47, so this does not preclude studying each subscale independent of one another. In fact, many people would fall outside the norms on some of the subscales, showing lack of alignment on the subscales.

Little research has focused clearly on the subscales, though some has showed that subscale data give more rich results than KAI score alone does. One study showed scientists to have subscale scores which were not aligned with one another. Research on entrepreneurs tends to be conflicting with little agreement, except that entrepreneurs have high needs for achievement and risk-taking. However, there seems to be a need for an instrument which could clearly identify characteristics of an entrepreneur.

Each subscale can be divided into zones--adaptive, mid-range adaptive, mid-range innovative, and innovative--based on Kirton's factor trait norms. Twohypotheses of this study were that entrepreneurs would have subscale scores which would fall outside the norms of a groups of managers as well as those established by Kirton

This study looked at 44 entrepreneurs--their KAI and subscale scores, comparing them to a group of 189 managers as well as Kirton's standard norms. Results showed the entrepreneurs to have have scores (total KAI as well as subscales) which fall in different zones from the managers or from Kirton's sample. In fact, ther were no successful entreprenerus who had adaptive Originality or Rule Conformity Scores. Further analysis showed that Rule Conformity acts as a moderating variable--or a type of governor/regulator--for Originality. These conclusions merit the assertion that subscales need further research.

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TABLE 1--MEANS OF THE THREE POPULATIONS

	Kirton sample	Managers	Entrepreneurs
n	562	189	44
KAI mean	94.99	102.33	125.16
s.d.	17.9	16.39	12.2
O mean	40.78	44.33	55.14
s.d.	8.89	8.06	6.04
R mean	35.39	38.62	47.68
s.d.	8.56	7.03	5.18
E mean	18.82	19.43	22.36
s.d.	5.59	5.07	5.7

TABLE 2--POPULATION DIFFERENCES IN MEANS
Managers v. Entreprenuers

Variable	Z value	F value
KAI	10.6**	1.8*
O	9.9**	1.78*
R	9.7**	1.84*
E	3.15**	0.79

TABLE 3--POPULATION DIFFERENCES IN MEANS
Kirton Sample v. Entrepreneurs

Variable	Z value	F value
KAI	7.6**	2.15*
O	14.6**	2.17*
R	14.3**	2.73*
E	3.97**	0.96

*significant at 0.01 level of confidence; ** significant at .001 level

TABLE 4
PEARSON CORRELATION COEFFICIENTS
ENTREPENEUR SAMPLE

	KAI	O	R	E
KAI	1.0**	.674**	.756**	.663**
O	.674**	1.0**	.303	.058
R	.756**	.303	1.0**	.333
E	.663**	.058	.333	1.0**

n=44 1-tailed signif: * .01 ** .001

TABLE 5
PEARSON CORRELATION COEFFICIENTS
MANAGER SAMPLE

	KAI	O	R	E
KAI	1.0**	.834**	.869**	.669**
O	.834**	1.0**	.604**	.278**
R	.869**	.604**	1.0**	.490**
E	.669**	.278**	. 490**	1.0**

n=189 1-tailed signif.: * .01 **.001