Changes In The Concentration Skills and Interpersonal Characteristics of Athletes at the Australian Institute for Sport

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The sport psychology section at the Australian Institute for Sport (AIS) has been administering The Attentional and Interpersonal Style (TAIS) inventory to athletes using the Canberra training center since 1983. TAIS, is a 144 item paper and pencil inventory that measures eighteen different performance relevant concentration skills and interpersonal characteristics (Nideffer, 1976. Over the years, the sport psychology staff at the AIS has used feedback from TAIS to help athletes improve their concentration skills, for team building and to improve communication between athletes and their coaches (Bond, J. & Gross, 1990).

Since 1983, TAIS has been administered to over six thousand athletes. Several hundred of these athletes have responded to the inventory on two or more occasions. The typical interval between testings has been approximately one year. This pool of test data provided an opportunity to examine the changes taking place in athlete's test scores over time.

We were interested in examining the data to see what kind of changes, if any, were occurring, for three reasons: 1) We wanted to see how trait like, and/or stable the various characteristics were; 2) We wanted to see if the age of the athlete made a difference in terms of the amount of change that occurred, and; 3) We wanted to see if the type of training and/or consistency with which information from TAIS was used played a role in the amount of change that occurred.

Hypotheses

With respect to concentration, as athletes matured and developed, we would expect to see improvements, both in terms of the ability to develop and maintain an appropriate focus of concentration and in terms of the ability to avoid distractions. Thus we would predict:

- An increase in scores on TAIS scales measuring the ability to read and react quickly and instinctively to the environment (BET), the ability to analyze, plan, and strategize (BIT), and the ability to focus concentration, pay attention to details, and follow through (NAR).
- A decrease in scores on those scales measuring external distractibility (OET), internal distractibility (OIT), and the inability to make appropriate shifts from an internal to an external focus or vice versa (RED) would decrease.

With respect to interpersonal characteristics, the changes we might expect are at times less obvious. On certain scales, for example speed of decision making (OBS), the expression of anger and willingness to confront issues (NAE), introversion (INT), and extroversion (EXT) we wouldn't expect consistent change across athletes. For example, to grow and develop some athletes would have to learn to make quicker decisions and/or

express more anger while others would need to do the opposite. We would, however, predict consistent changes across athlete groups on the following scales:

- A decrease in the athlete's emotional impulsivity and/or non-conformity (BCON).
- An increase in the athlete's willingness to take responsibility, assuming more of a leadership role (CON), associated with an increase in self-confidence (SES).

Results and Discussion

The first analysis examined the test-retest reliability of TAIS scores as a function of the time interval between test administrations. Table 1 shows the test-retest reliability coefficients for four different groups of subjects (Total N = 502).

TABLE 1

TAIS Test-Retest Reliability Coefficients for the Australian Institute for Sport (AIS)

TAIS Scale	Six Month Test-Retest N = 121	One Year Test-Retest Age = 13-17 N=103	One Year Test-Retest Age = 18-24 N=146	Two Plus Years Test-Retest N=132	Mean Test-Retest Reliability Total Sample
BET	.68	.55	.59	.47	.57
OET	.61	.69	.62	.70	.66
BIT	.66	.65	.53	.68	.63
OIT	.54	.68	.54	.55	.58
NAR	.60	.70	.55	.46	.58
RED	.68	.64	.64	.43	.60
INFP	.71	.65	.69	.60	.66
BCON	.67	.60	.67	.61	.64
CON	.65	.68	.71	.63	.67
SES	.64	.68	.71	.61	.66
P/O	.52	.59	.67	.55	.58
OBS	.63	.52	.54	.40	.52
EXT	.71	.77	.82	.65	.74
INT	.72	.56	.64	.68	.65
IEX	.73	.69	.79	.66	.72
NAE	.81	.76	.82	.56	.74
PAE	.75	.73	.77	.60	.71
DEP	.56	.56	.59	.58	.57

The above correlation's are statistically significant and support the general reliability of The Attentional and Interpersonal Style (TAIS) Inventory. Median correlation's for the four different subject populations are .66 (six months) .65 and .64 for the groups where the interval was 1 year, and .60 when the interval between tests was two or more years.

Although the correlation's are reasonably high and statistically significant, the fact that they are not higher than they are indicates subject's scores are changing over time. Table 2 shows the average amount of change that occurs each year in subject's scores on selected TAIS scales.

The data presented in Table 2 is based on a reduced population of subjects. It is limited to individuals who have been tested on three or more occasions. The resident athlete group consists of 33 individuals primarily from the sports of swimming and tennis. The average

age for the group when first tested was 16. The 2.3 years shown in Table 2 indicates the time between the first and last testing. Thus the mean age for the group when last tested was 18.3. The 5.6% change on this groups score on the TAIS scale measuring BET reflects the average annual change. The total change on this scale over 2.3 years was 13%.

TABLE 2
Average Annual Change for AIS Athletes

TAIS Scale	Resident Athletes 2.3 Years	Team Sports 2.7 Years	Open Skill Sports 3.6 Years	Younger Athletes 4.5 Years	Older Athletes 5 Years
BET	5.6%	2.9%	1.5%	2.9%	-0.8%
BIT	4.8%	1.4%	0.6%	3.7%	0.0%
NAR	3.5%	1.4%	2.1%	3.5%	1.0%
OET	7.8%	2.2%	2.1%	3.1%	0.8%
OIT	4.8%	2.2%	3.6%	4.2%	1.8%
RED	7.0%	2.2%	2.4%	3.5%	0.6%
Attentional Average	5.7%	2.1%	2.1%	3.5%	0.8%
CON	4.0%	2.6%	0.9%	2.9%	1.2%
SES	4.8%	3.7%	5.1%	3.9%	-1.0%
DEP	3.5%	5.6%	4.5%	3.5%	-2.2%
Interpersonal Average	2.8%	1.8%	1.8%	2.0%	1.7%

There were 57 athletes in the Team Sport group. These athletes were involved in sports that were not housed at the AIS in Canberra (e.g., Rugby, Field Hockey, Baseball, Basketball). The mean age for the group when first tested was 19.7 and the mean age at the time of administration of the last test was 22.4. Thus, the changes in this groups scores have been averaged across 2.7 years.

There were 22 individuals in the open skill sports group. Mean age at the time TAIS was administered for the first time was 20.1 and the mean age the last time the inventory was administered was 23.6. Change scores have been averaged across 3.6 years.

The younger athlete group consists of 25 individuals who have been tested on four or more occasions. Many of these athletes were athletes in residence (hence there is considerable overlap between this group and the resident athlete group). The average age at the time of first TAIS administration was 17.2 with 4.5 years between the first test and the fourth.

The older group consists of 14 athletes from sports like shooting and equestrian. The average age at the time TAIS was first administered was 41 and the average age the last time the inventory was administered was 46.

Those TAIS scales not included in Table 2 were omitted because changes were both

small and inconsistent (in some instances increasing in others decreasing). The changes in bold print are statistically significant. It should be pointed out, that the other changes though not large enough to become statistically significant with the small number of subjects, were consistent with respect to both size and direction. Table 2 is a summary of total changes and doesn't show what happens between each test administration. For example, there were eleven opportunities to look at changes in each of the TAIS scales. When TAIS was administered to a group on four different occasions (as it was to the younger athlete group), there were three opportunities for BET to change. With the other four groups, TAIS was administered three times. Thus for each of those groups there were two opportunities for BET to change. Ten of the eleven possible changes were in a positive direction. That consistency holds for all of the scales shown in Table 2.

With the exception of scores on the TAIS scale measuring emotional impulsivity and non-conformity, the changes shown in Table 2 are consistent with our hypotheses. In addition, there were significant changes in the TAIS scale which measures self-critical thought processes and depression (DEP) indicating that most athletes become less self-critical and depressed as they get older.

Summary and Conclusions

An examination of changes occurring in the scores of AIS athletes on The Attentional and Interpersonal Style (TAIS) inventory both support the reliability of TAIS, and indicate that subject's are developing their concentration skills, self-confidence, and leadership ability with age. What seems apparent from this data is the fact that both age and the consistency with which training makes use of information from TAIS plays a role in the amount of change that takes place.

Table 2 shows that scores of younger athletes, and athletes who are in residence at the AIS change more than do the scores of older athletes. Indeed, the few changes in the data which are not consistent with our hypotheses are associated with older subjects (41-46 years of age). With this group, there appears to be a decrease in external awareness, and self-confidence, and an increase in depression over time.

In Table 2, we have separated changes occurring in the effective attentional scales (BET, BIT, and NAR) from those occurring in the ineffective scales (OET, OIT, and RED) for a reason. From a developmental standpoint, we would expect scores on BET, BIT, and NAR to be more trait like and thus subject to less change than the scales which measure distractibility. Typically, scores on the distractibility scales go up when ever subjects are thrust into a new situation and don't yet know what the discriminate, or performance relevant cues are. Without experience, athletes try to attend to too many things and become distracted and overloaded. There is some support for this notion in the data, but not as much as we would like to see.

We believe these finding support the notion that it is important to begin developing psychological skills early in an athletes career. The findings are also supportive of the notion that psychological skills training (development of concentration skills and

emotional control) should be integrated into the training program on a daily basis.

Because of the relatively small number of subjects these findings should be seen as "suggestive" rather than confirmatory. Future studies should attempt to partial out the influence that age has from the influence associated with the opportunity athletes in residence at the AIS have for ongoing contact with the sport psychologists.