Sex Differences, Test Experience and the Self-Estimation of Multiple Intelligences

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This study examined sex differences in, and the influence of IQ test experience on, the self and partner estimation of Gardner's ten multiple intelligences. Over 600 students from New Zealand completed a brief questionnaire based on those used in previous research (Furnham, 2001). Three of the ten self-estimates yielded significant sex differences. Males believed they were more intelligent than females on mathematical (logical), spatial and existential intelligence. Those who had previously completed an IQ test gave higher self-estimates on eight of the ten estimates. Self-estimates were compared to university samples from America and Britain, and results tended to show New Zealand students gave lower self-estimates particularly on mathematical, body-kinetic, existential, spiritual and naturalistic intelligence. Factor analysis showed the ten multiple intelligences fell into three interpretable factors which were predicted by both gender and test experience.

A study, published by Beloff (1992) ten years ago on sex differences in self-estimated intelligence in Scottish students, has provoked a good deal of research. Similar studies have been carried out in America, Germany, Hong Kong, Iran, Japan, Singapore, South Africa, and Uganda (Bennett, 1996, 1997, 2000; Byrd & Stacey, 1993; Furnham, 1999, 2000; Furnham & Baguma, 1999; Furnham, Clark & Bailey, 1999; Furnham & Fong, 2000; Furnham, Fong & Martin, 1999; Furnham, Hosoe & Tang, 2001; Furnham & Mhkize, 2002; Furnham, Rakow & Mak, 2002; Furnham & Rawles, 1995; Furnham, Shahidi & Baluch, 2002; Rammstedt & Rammsayer, 2000).

The study of self-estimated intelligence and implicit theories of intelligence is of considerable research importance but also practical significance. Dweck and Bempechat (1983) note that personal beliefs about intelligence are unrelated to actual ability but have a behavioural and cognitive impact in academic situations. Mueller and Dweck (1998) showed that, paradoxically, being praised for being intelligent can actually undermine children's motivation and performance because they believe academic success and failure are a function of "native intelligence" rather than effort and hard work. Beyer (1990, 1998, 1999) has demonstrated sex differences in intelligence in terms of expectations, self-evaluations and performance on ability tests. She notes that self-evaluations affect expectancies of success and failure as well as actual performance on these tests. Her particular interest is in gender differences in the accuracy of self-evaluation but notes its practical implication, particularly in suggesting ways of eliminating women's under-estimation of their own ability. In this sense studies on self-estimated intelligence are linked to the literature on implicit theories , self-perception and expectancy theory as well as attitude-behaviour research on the behavioural consequences of holding particular beliefs.

The results of the studies on self-estimated intelligence are remarkably consistent. When asked to estimate overall IQ (g), nearly every study has demonstrated a consistent sex difference of usually between 3 to 6 points, with males giving higher estimates than females. This is true of both student and non-student populations (see Table 1). Only two studies had adult non-student populations (Furnham & Gasson, 1998; Furnham, Reeves & Budhani, 2001). However there has been one exception, which was the study by Byrd and Stacey (1993) in New Zealand, which found no sex differences in self-estimates but very large differences in estimates of parents' and siblings' intelligences, with females rating their parents (mother and father) and sister (but not brother) as more intelligent than did males. Participants in that study were second year students at the University of Canterbury in Christchurch.

The current study replicates and extends this literature in a number of ways. First, it seeks to determine whether

the "unique" result of Byrd and Stacey (1993) could be replicated. This would suggest that in New Zealand alone there are no sex differences in the self-estimation of intelligence. As there was no specific reason for this finding, which could be considered an anomaly, it was predicted that there would be an overall sex difference with males giving higher self-estimates, particularly for mathematical intelligence. It is possible that the subjects/ disciplines the students were studying may have contributed to their estimates. Thus, because they may be under-represented, female science students may give higher self-estimates than males. Equally, final year students may give higher estimates than first years. However, nearly all the studies have used first year psychology students, where females outnumber males.

The second feature of this study was to consider the sex differences within specific types of intelligence. Gardner (1983) defined intelligence as "the ability to solve problems or to create products that are valued within one or more cultural setting" (p. 11) and specified seven intelligences. He argued that linguistic/verbal and logical mathematical intelligences are those typically valued in educational settings. Linguistic intelligence involves sensitivity to the spoken and written language and the ability to learn languages. Logical-mathematical intelligence involves the capacity to analyse problems logically, solve maths problems and investigate issues scientifically. These two types of intelligence dominate intelligence tests. Three other multiple intelligences are arts based: musical intelligence which refers to skill in the performance, composition and appreciation of musical patterns; bodily-kinesthetic intelligence which is based on the use of the whole or parts of the body to solve problems or to fashion products; and spatial intelligence which is the ability to recognize and manipulate patterns in space. There are also two personal intelligences: interpersonal intelligence which is the capacity to understand the intentions, motivations and desires of other people and to work effectively with them; and intrapersonal intelligence which is the capacity to understand oneself and to use this information effectively in regulating one's life.

However, in his later book Gardner (1999a) defines intelligence as a *"biopsychological potential to process information that can be activated in a cultural setting to solve problems or create products that are of value in a culture" (p. 33-34).* In it he introduces three possible new intelligences although he notes: *"The strength of the evidence for these varies, and whether or not to declare a certain human capacity another type of intelligence is certainly a judgement call" (p.47).* However he only adds one new intelligence, namely naturalistic intelligence which is *"expertise in the recognition and classification of the numerous species - the flora and fauna - of his or her environment" (p.43).* It is the capacity of taxonomization: to recognize members of a group, to distinguish among members of a species and to chart out the relations, formally or informally, among several species. The other two were spiritual and existential intelligence. Spiritual intelligence is the ability to master a set of diffuse and abstract concepts about being, but also mastering the craft of altering one's

Table 1. Results of studies where participants made an overall IQ (g) rating on themselves and others.

Study	Women	Men	Difference
Beloff (1992) Scotland	(N=502)	(N=265)	
Self	120.5	126.9	**6.4**
Mother	119.9	118.7	-1.2
Father	127.7	125.2	-2.5
Byrd & Stacey (1993) New Zealand	(N=105)	(N=112)	
Self	121.9	121.5	**-0.4**
Mother	114.5	106.5	-9.0
Father	127.9	122.3	-5.6
Sister	118.2	110.5	-7.7
Brother	114.1	116.0	1.9
Bennett (1996) Scotland	(N=96)	(N=48)	
Self	109.4	117.1	**7.7**
Reilly & Mulhern (1995) Ireland	(N=80)	(N=45)	
Self	105.3	113.9	**8.6**
Measured	106.9	106.1	-0.8
Furnham & Rawles (1995) England	(N=161)	(N=84)	
Self	118.48	123.31	**6.17**
Mother	108.7	109.42	0.72
Father	114.18	116.09	1.91
Furnham & Rawles (1999) England	(N=140)	(N=53)	
Self	116.64	120.50	**3.9**
Furnham & Gasson (1998) England	(N=112)	(N=72)	
Self	103.84	107.99	**4.15**
Male child (1st child)	107.69	109.70	2.01
Female child (1st child)	102.57	102.36	-0.21
Furnham, Reeves & Budhani (2001) England	(N=84)	(N=72)	
Self	104.84	110.15	**5.31**
Male child (1st son)	116.09	114.32	-1.77
Female child (1st daughter)	110.66	104.32	-6.34
Rammstedt & Rammsayer (2000) Germany	(N=51)	(N=54)	
Self	111.9	114.1	**2.2**
Furnham, Dixon, Harrison, Rasmussen & O'Connor (2000) Scotland	(N=100)	(N=53)	
Self	107.0	113.6	**6.6**
Furnham & Fong (2000) Singapore	(N=51)	(N=37)	
Self	105.86	107.81	**1.95**
Furnham, Hosoe, & Tang (2001) USA	(N=111)	(N=112)	
Self	110.24	112.00	**1.76**
Furnham, Hosoe, & Tang (2001)Japan	(N=102)	(N=62)	
Self	98.58	102.09	**3.51**
Furnham, Crawshaw, Rawles & Spencer (2002) England	(N=66)	(N=51)	
Self	114.18	119.18	**5.0**
Father	115.35	117.65	2.3
Mother	110.69	111.72	1.0

consciousness in attaining a certain state of being. This has recently become an issue of considerable debate (Emmons, 2000; Mayer, 2000). Existential intelligence is yet more difficult to define: *"the capacity to locate oneself with respect to the furthest reaches of the cosmos - the infinite and infinitesimal - and the related capacity to locate oneself with respect to such existential features of the human condition as the significance of life, the meaning of death, the ultimate fate of the physical and the psychological worlds and such profound experiences as love of another person or total immersion in a work of art"* (p.61).

Furnham et al. (2002) examined self- and partner-estimates on all ten intelligences in the United States and Great Britain. They found that a two-way (sex and country) ANOVA on the *"overall intelligence"* score showed a sex effect where males gave higher scores (M =115.82, SD = 12.80) to themselves than did females (M =110.84, SD=9.14). On the multiple intelligence males gave themselves higher ratings in the logical (Male 112.46 vs Female 102.98), spatial (Male 114.25 vs Female 107.28), spiritual (Male 107.59 vs Female 104.19), and naturalistic (Male 108.01 vs Female 102.50) domains. There were also four significant country effects. Compared to the ratings that the British students gave themselves, Americans rated themselves as having lower verbal intelligence (107.32 vs 111.42), but higher spatial intelligence (111.18 vs 108.80). The American students also rated themselves as having lower musical intelligence (98.91 vs 104.52), but higher body-kinetic intelligence (112.90 vs 107.71) than did the British. On the rating of the overall intelligence that one gave his or her partner, the British gave significantly higher scores to their partners than did the Americans (115.83 vs 111.87).

There were also significant sex and country effects, but no significant interactions, in partner ratings over the ten multiple intelligences. There were six significant sex differences: verbal intelligence where males rated their partner higher than did females (111.83 vs 107.68); spatial intelligence where females rated their partners higher than did the males (111.33 vs 106.24); musical intelligence where males rated their partners higher than did females (107.58 vs 103.38); body kinetic intelligence where males rated their partners higher than did females (110.58 vs 105.33); interpersonal intelligence where males rated partners higher than did females (112.68 vs 106.70); and spiritual intelligence where males rated their partners higher than females rated theirs. Two country effects were additionally found: The British rated their partners' verbal and spiritual intelligence higher than Americans did.

Furnham et al. (2002) also found that the ten multiple intelligences loaded on two clear factors. Moreover, when the ten intelligences were regressed onto an overall (g) estimate, five (those that loaded all on the second factor) were productive in the following order: verbal, logical (mathematical), spatial, existential and naturalistic.

The present study attempted to replicate the sex differences found by Furnham et al. (2002) in self- and partner-estimates of the ten multiple intelligences. It also set out to replicate the factor structure. Further, the results were compared with those from Furnham et al. (2002) to examine cross-national differences between the American and British data in their study and the New Zealand data in this. The existence of the 'tall poppy' attitude to high achievers found in Australia and New Zealand suggests that there may be various cultural differences (Feather, 1998).

The third feature of this study examined how IQ test experience and beliefs are related to self-estimates of intelligence. In a number of studies in the area, Furnham and colleagues asked various questions about intelligence and intelligence testing. Such aspects as sex and race differences in IQs, and the usefulness of tests, etc. were considered. Two questions concerned whether participants had actually completed a formal intelligence test and whether they believed it to be valid.

This study examined the relationship between test experience and belief in test validity and self-estimation of intelligences.

H_1 It was predicted that there would be a significant sex difference on self-estimated logical and mathematical intelligence with males giving higher estimates than females.

H_2 It was predicted that there would be a sex difference in partner-estimated intrapersonal and interpersonal intelligence with males giving partners higher scores than females.

H_3 It was predicted that, in comparison with British and American student populations, New Zealand students' self-estimates would be lower.

H_4 It was predicted that those students who had completed an intelligence test would give higher self-estimates than those who had never taken a test.

H_5 It was predicted that those students who believed in intelligence test validity would give higher self-estimates than those who did not believe in test validity.

Method

Participants

In all, 622 students from Victoria University, Wellington, New Zealand, took part in the study. They were all psychology students at the beginning of their first year. Asked to specify their nationality, 435 said New Zealander, 22 Maori, 138 dual-national allegiances and 49 said other nationality. There were 214 males and 407 females. Their ages ranged from 16 to 38 with the mean being 23.05 years (SD = 5.37 years). Over three quarters (480) were single, but 46 were "living together," 25 married and the rest divorced, separated or other. In all 26.8% (167) claimed to have taken an IQ test before.

Questionnaire

Participants completed the one-page questionnaire included in all previous studies in this area (Furnham, 2000). An illustration of a normal distribution was shown with a mean of 100 and three positive and three negative standard

deviations. Under each standard deviation a typical IQ score and an accompanying description (e.g., "+1, 115 high average") were given. Participants were then shown a grid with ten rows and two columns. The ten were taken from Gardner (1999). There was a short description of each intelligence (see Table 2). This included the eight "definite multiple intelligences plus the two currently rejected, but considered, candidates." The rows were labelled "You" and "Your Partner". Partner referred to opposite sex. Thus each participant was requested to make 20 IQ estimates of themselves against population norms. Apart from standard demographic data they were also asked if they had ever taken an intelligence test and if they thought intelligence tests measured intelligence fairly well. On reflection this question could have been better worded even though it had been used in many previous studies. It is possible an answer "No" to the question could mean either that they measure IQ very well, or not well at all. However when 20 students were later asked their understanding of the "No" response all said it meant IQ tests do not measure IQ well at all.

Results

Initial analyses showed no significant differences in analyses across the national groups: 457 New Zealanders; 138 Dual-Nationals; 49 other nationals. However because of missing data the N in each analysis is different.

Table 2 shows the results of a 2 (sex) x 2 (target: self/ partner) x 10 (factors) MANOVA (then ANOVAs) with repeated measures on the second factor. Because the N dropped as a result of many participants not giving partner estimates further 2 (sex) x 10 (intelligence factors) ANOVAs were run separately for self and partner.

1. Self Estimates: As can be seen in Table 2, there were three significant sex differences: Males gave higher

Table 2. Mean responses and ANOVA results for self- and partner-estimates, as well as cross-national comparisons

	Self			Partner			Self			
	M N=212	F N=407	ANOVA	M N=110	F N=217	ANOVA	GB N=241	NZ N=555	USA N=305	ANCOVA FRatio
1. **Verbal** or linguistic intelligence (the ability to use words)	108.4	108.0	0.21	108.8	107.8	1.21	111.5^a	108.2^b	107.5^b	8.31***
2. **Logical** or mathematical intelligence(the ability to reason logically, solve number problems)	106.3	100.1	33.16***	105.8	106.8	0.27	107.7^a	102.3^b	106.4^a	15.62***
3. **Spatial** intelligence (the ability to find your way around the environment, and form mental images)	109.9	105.9	13.26**	108.5	109.4	0.31	109.1^a	107.4^a	111.1^b	7.74***
4. **Musical** intelligence (the ability to perceive and create pitch and rhythm)	99.9	100.3	0.09	105.1	102.4	1.84	104.8^a	100.3^b	98.6^b	9.88***
5 **Body-kinetic** intelligence (the ability to carry out motor movement; e.g. being a surgeon or a dancer)	103.2	102.6	0.22	106.0	106.1	0.02	107.7^a	102.8^b	113.0^a	60.91***
6. **Intrapersonal** intelligence (the ability to understand other people)	112.3	112.8	0.23	110.5	106.1	8.11**	114.6	112.6	113.4	2.08
7 **Intrapersonal** intelligence (the ability to understand yourself and develop a sense of your own identity)	112.6	111.4	1.14	110.4	109.1	0.63	113.2	111.8	112.7	1.12
8. **Existential** intelligence (the ability to understand the significance of life, the meaning of death and the experience of love)	110.7	108.4	3.85*	108.6	107.8	0.64	111.5^a	109.3^b	112.6^a	6.52**
9. **Spiritual** intelligence (the ability to engage in thinking about cosmic issues,the achievement of a state of; e.g.achieving trance states and the ability to have spiritual effects on others)	102.4	100.4	2.60	102.1	99.9	1.54	104.6^a	101.2^b	106.4^a	13.51***
10. **Naturalistic** intelligence (the ability to identify and empty many distinctionsin the natural world; e.g. categorizing species membership	103.4	104.1	1.13	102.9	102.9	0.00	106.1^a	101.0^b	104.2^a	16.31**

***p<.001 **p<,.01 *p<.05 Superscripts refer to post hoc scheffe test results. Means with similar super scripts do not significantly differ from each other.

self-estimates for mathematical, spatial and existential intelligence. This supports H_1.

2. Partner Estimates: There was only one significant difference. Males estimated their partners higher on intrapersonal intelligence than females estimated their (usually male) partner. This provides partial support for H_2.
3. Country Comparisons: Using the data from Furnham et al. (2001), these results were compared to estimates from similar populations in the United States and Great Britain. An ANCOVA was performed (co-varying out sex) followed by Scheffe post-hoc comparisons. This was because the ratio of males to females differed in the three countries and this analysis allowed for "pure" country comparison. Eight of the ten self-estimates showed a significant effect and most were in the same direction. New Zealanders gave themselves lower self-estimates than both Americans and the British on mathematical, body-kinetic, existential, spiritual and naturalistic intelligence. New Zealanders gave themselves significantly lower scores on verbal intelligence than the British (but not Americans) and significantly lower than the Americans (but not the British) on spatial intelligence. The two 'emotional' intelligences (intra- and inter-personal) showed no significant differences. Overall there is partial support for H_3.

   Asked "Do you believe intelligence tests measure intelligence fairly well?," 40.5% (252) said yes, the remainder (59.5%) no.
4. Table 3 shows the results from the two-way ANOVA looking at how test experience and attitude influence self-estimates. Eight of the ten main effects showed a test experience effect and all in the same direction: Those who had taken a test gave themselves higher self-estimates, particularly on verbal, mathematical, interpersonal, spiritual and naturalistic intelligence. This provides support for H_4 but not H_5. By contrast, the test validity variable revealed only one significant effect: Those who believed in IQ test validity tended

Table 3. Self-estimated intelligence scores as a function of test experience x test validity and ANOVAS across the ten measures

Test Experience	Yes		No		F	F	F
Test validity	Yes N=74	No N=89	Yes N=178	No N=214	Exp	Val	ExV
1. Verbal or linguistic intelligence (the ability to use words)	114.58	110.98	106.62	106.02	41.38***	4.38	2.24
2. Logical or mathematical intelligence (the ability to reason logically, solve number problems)	107.26	103.81	101.99	100.96	10.92**	3.36	0.98
3. Spatial intelligence (the ability to find your way around the environment, and form mental images)	109.80	108.53	105.03	107.71	5.27	0.38	2.64
4. Musical intelligence (the ability to perceive and create pitch and rhythm)	102.84	99.75	98.60	100.14	1.77	0.28	2.57
5. Body-kinetic intelligence (the ability to carry out motor movement; e.g. being a surgeon or a dancer)	104.39	102.30	102.56	102.51	0.40	0.71	0.64
6. Intrapersonal intelligence (the ability to understand other people)	114.26	115.72	111.18	111.41	10.17**	0.53	0.28
7. Intrapersonal intelligence (the ability to understand yourself and develop a sense of your own identity)	113.74	113.48	109.95	111.55	5.55*	0.31	0.59
8. Existential intelligence (the ability to understand the significance of life, the meaning of death and the experience of love)	114.19	112.13	107.19	108.33	18.61**	0.13	1.64
9. Spiritual intelligence (the ability to engage in thinking about cosmic issues, the achievement of a state of; e.g. achieving trance states and the ability to have spiritual effects on others)	105.81	102.28	99.12	100.90	8.55**	0.41	3.75
10. Naturalistic intelligence (the ability to identify and empty many distinctions in the natural world; e.g. categorizing species membership	106.19	101.90	99.79	100.53	13.99***	2.92	5.87**

*** p<.001 ** p<.01

to give themselves higher self-estimates for verbal IQ. There was one significant interaction: Those who had taken an IQ test and believed in test validity gave themselves a higher self-estimate for naturalistic intelligence compared to those who had not taken a test but believed in test validity.

5. Factor Structure -
The ten self-estimates were then subject to a VARIMAX rotated factor analysis to see the underlying structure of the perception of IQ. Table 4 indicates this led to a three factor structure. To some extent the factors follow Gardner's classification of personal, traditional and arts based intelligences. It is interesting to notice that two of the "new" intelligences loaded on the personal intelligences, (i.e., existential and spiritual) while naturalistic loaded on the traditional intelligence.

A one-way ANOVA looking at sex differences on these factors revealed a significant difference only on the second factor, with males giving higher self-estimates than females.

Table 4. Factor Analysis of the ten self-estimates

	Factors		
IQ	1	2	3
Existential	.79	.14	.00
Intrapersonal	.77	.01	.03
Interpersonal	.70	.02	.26
Spiritual	.62	.16	.10
Verbal	.46	.43	.02
Logical	.01	.84	.03
Naturalistic	.31	.65	.18
Musical	.02	.03	.76
Body kinetic	.01	.17	.71
Spatial	.34	.28	.45
Eigenvalue	2.53	1.48	1.40
Variance	25.29%	14.75%	13.95%
F level for sex difference	0.12	41.12***	0.37

***p<.001

Sex and test attitudes/experience were then regressed onto the three factor scores. It was a simple multiple regression with the predictor variables dummy coded. As a result of the findings shown in Table 3, the interaction term was not included. As can be seen in Table 5, two of the regression equations were significant. Test experience was the only significant predictor of self-estimated personal intelligence: those that had completed a standard IQ test were more likely to give higher self-estimates than those who had not.

However, all three independent variables were significant in the second regression. Males, subjects who had done an IQ test and subjects who believed in IQ test validity gave higher self-estimates than females, subjects without test experience and subjects who believed that IQ tests were invalid.

Table 5. Multiple regression of sex and test attitudes onto the three factor scores

Factor 1. Personal intelligence
F (3,546) = 5.96, p<.001: Adj R square = .03

	Beta	t
Text Exp.	-.17	4.12***
Test Validity	.03	0.78
Sex	-.02	0.43

Factor 2: Traditional Intelligence
F (3,546) = 19.53, p<.001; Adj R square = .09

	Beta	t
Text Exp.	-.17	4.18***
Test Validity	-.11	2.65**
Sex	-.25	5.97***

Factor 3: Arts Based Intelligence
F (3,546) = 0.23 ns; Adj R Square = .00

	Beta	t
Text Exp.	-03	0.64
Test Validity	01	0.30
Sex	02	0.51

***p<.001 **p<.01 *p<.05

Discussion

This paper set out to examine three specific things. The first was the anomalous finding from Byrd and Stacey (1993) which showed that only in New Zealand were there no sex differences in self-estimates of intelligence. This current study replicated the results from many other multiple-intelligence self-estimate studies and found that two of the original seven intelligences and one of the additional three intelligences showed a significant sex difference in favour of males. Furthermore, the effect size for mathematical intelligence was reasonably large. Note also the results from the analysis of variance of the factor scores: Only the second factor showed a large significant sex difference, with males giving higher self-estimates than females.

Furnham (1999) suggested from his regression analyses that mathematical and spatial intelligence lies at the heart of most lay people's conception of intelligence. In other words, the average concept of intelligence is male normative, in that the mathematical/spatial abilities at which men are considered best are considered to be its essence. This accords with other studies in the area (Furnham, 1999; Furnham & Baguma, 1999; Furnham, Clark & Bailey, 1999; Furnham, Hosoe & Tang, 2002). Indeed, a review of nine studies of the sex differences in the estimation of multiple intelligence found significant differences between male and female self-estimates of logical/mathematical and spatial intelligence in African (Ugandan), American, Belgian, British, German, Japanese and Singaporean students. Thus,

the findings reported by Byrd and Stacey (1993) were not replicated, suggesting, as suspected, that they are anomalous. The results of this study therefore attest to the universality of male and female differences in self-estimates of intelligence.

The results of the cross-cultural comparison show much greater evidence of New Zealander humility rather than hubris. The self-estimates reported by Byrd and Stacey (1993) were among the highest in this literature, certainly for females, but the results from Table 2 show a different story. When evaluated against comparable student groups from the United States and Britain, the New Zealanders gave themselves low scores particularly on logical/mathematical intelligence, as well as the three "new" intelligences. This could reflect New Zealand cultural differences in attitudes to people with high IQ, but suggests even more strongly that the findings of Byrd and Stacey (1993) were anomalous. Any cultural effect on self-estimates would seem to have a particularly strong effect on New Zealand females even though there are a number of successful women in public life. On the other hand the relatively low scores of both male and female students may simply reflect norms of not boasting rather than bias.

Another aim of this study was to explore self- or partner-estimates. Once again, as in all previous studies which examined estimates of other's intelligence - relatives, partners, famous people - it immediately became apparent that the number of sex differences drops. Indeed, other studies have shown that it tends to be the interpersonal (or emotional) intelligences that show self-other differences. That is, there is often no sex difference in the self-estimates of interpersonal intelligence, but people are happy to attribute more varying scores to others. Notably males recognize that female relatives and partners tend to have higher intra- and inter-personal intelligence compared to themselves and vice versa.

Perhaps the most original results from this study were the consistent findings on test experience and belief in test validity on self-estimates. Those who had actually completed an IQ test tended to rate themselves higher on the personal and traditional multiple intelligence factors. There was also some evidence that those who believed in IQ test validity gave themselves higher estimates on the traditional, academic factors (see the regression in Table 5).

The data do not allow us to test any explanation for these findings. It may be that more intellectually self-confident people, who are more likely to provide higher self-estimates, volunteer or seek out IQ test feedback. It may also be possible that there is a schooling effect such that those who went to certain schools were both selected on the basis of their IQ and given feedback on it. Alternatively, it could be that this result is simply a function of getting actual IQ test results. That is, getting scores tends to make participants both more confident in themselves and test validity.

However, it would be desirable to know which IQ tests participants undertook, under what conditions and what feedback they received. Whilst it is possible that they completed validated tests of the three traditional academic intelligences (verbal, logical, spatial), it is much less probable that they were exposed to tests of the other intelligences, especially the three "new" ones which showed such a difference.

This study has suggested that whilst sex differences in self-estimates of intelligence tend to be fairly consistent across cultures, estimates are influenced by test experience and beliefs. Certainly, the theoretical and social significance of the results of the study are worth contemplating. Many researchers have pointed out that there may be important academic and work-related consequences of the sex difference in self-rated abilities. Whilst some researchers seem concerned to study and help females who are seen to be biased in favour of modesty and lower-than-actual estimations (Beloff, 1992; Beyer, 1999), others believe it is more important to examine male biases and the potentially negative consequences of hubris in self-estimated intelligence (Mueller & Dweck, 1998). Certainly this area of research provides an excellent theoretical and practical area for the study of such things as self-fulfilling prophesies and the effect of self-estimations of intelligence on academic performance all around the world.

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