Medical and Veterinary Admissions Test Validation Study

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The Medical and Veterinary Admissions Test

The development and use of the test
The Medical and Veterinary Admissions Test (MVAT) was produced and administered by the Research & Evaluation Division (RED) of the University of Cambridge Local Examinations Syndicate (UCLES) for the University of Cambridge (UoC), to assist with admissions. Following the administration of an initial small-scale pilot in 1999, the first version of the test was administered in November 2000, when all UoC applicants for medicine and veterinary courses starting in October 2001were asked to take the test. For medicine these included science graduates applying for a four year course specially designed them as well as conventional applicants, who were typically (but not entirely) aged 18-20 and mainly (but again not entirely) from the UK. Copies of the test were sent to applicants' schools etc, together with instructions for supervision etc. Arrangements were also made, wherever feasible, for applicants without a current link to an educational institution to take the test in a suitably proctored setting. Further versions of the MVAT were administered in Autumn 2001 and 2002, after which it will be replaced by the Biomedical Admissions Test (BMAT), a revised form which builds upon experience gained with the MVAT and elsewhere. The cohort taking the MVAT in 2000 should provide the best opportunity to evaluate the test's potential to contribute to selection, as in this first large-scale use many admissions tutors were not yet committed to its use. They will have based their decisions largely on other grounds, thus minimising selection effects due to the MVAT, enabling investigation of achievement by students who might not have been admitted had MVAT played a greater role in admissions.

Details of the MVAT test
The 2000 MVAT test consisted of three papers, two multiple-choice/short answer papers, plus an open ended paper. Paper 1 was titled Scientific Aptitude and tested problem solving and reasoning skills via questions in multiple choice (MC) and short answer (SA) formats. It contained 20 questions (with a maximum total mark of 21) to be completed in 30 minutes. Paper 2 was titled Scientific Knowledge and was made up of 30 MC and SA questions (with a maximum total of 38 marks) to be completed in 30 minutes. Papers 1 and 2 were designed to be suitable for clerical marking, which was provided by UCLES. Paper 3 (Scientific Understanding) lasted 60 minutes. It had four sections (Chemistry; Biology; Physics; Mathematics) each containing three open-ended questions, largely asking for responses in essay form. Applicants were required to complete only two questions, each chosen from a different section. All questions were designed to allow applicants to show their capacity to reason through a complex issue or problem. Paper 3 questions were marked by the University.

Other information used in admissions
Admissions to UoC are highly competitive, with many more very highly qualified applicants than there are places available. Most UK applicants obtain the best possible grades in their end of school GCE Advanced Level examinations, rendering these relatively ineffective as a selection tool. It should however be acknowledged that examination results do provide a screening tool, as applicants unlikely to obtain excellent results are either dissuaded from applying to Cambridge or are likely to be discounted unless their circumstances are exceptional. Application forms (submitted via UCAS) detail educational background and examination results (prior and forecast) and other activities and interests. These forms also include applicants' personal statements outlining their reasons for applying etc., together with confidential references (from schools etc.) concerning academic ability, other characteristics and suitability for the courses concerned.

In addition, UoC colleges interviewed almost all applicants for medical and veterinary courses (i.e. all those able to travel to Cambridge, or to a small number of interview centres abroad - e.g. in Singapore), so college admissions tutors' impressions of the applicants will have contributed substantially to selection. It is worth noting that interviewing is not universal practice in undergraduate selection in UK universities.

Indeed many higher education institutions now make offers (conditional upon satisfactory GCE AL examination results) without any interviewing. Interviews are highly demanding of staff time and the practice of interviewing all applicants may not be sustainable in the long term, although interviewing seems always likely to have a place at Cambridge and will be especially important in those disciplines, like these, where personal attributes are a significant factor in determining suitability. Where interviewing persists, one possible role for admissions tests, in conjunction with the other information available, may be to help screen or short-list applicants who will be interviewed. To assist in admissions in autumn 2000, Cambridge colleges awarded each applicant interviewed a numerical score; combining ratings where more than one interviewer was involved.

Performance at university

For those who were admitted and begun their courses in October 2001, follow up data were supplied by the university concerning performance in examinations set for the Medical and Veterinary Sciences Tripos, Parts 1A (in summer 2002) and 1B (in summer 2003), some of which served also as Second M.B. and Second Veterinary M.B. examinations for students not taking the Tripos. These included:

Summer 2002

Functional Architecture of the Body (FAB)
Section I (1 hour): Written - all questions compulsory; SA, MC and true false (TF) formats. 17%
Section II (2 hours): Practical - circuit of stations with questions requiring recognition & interpretation of photographic, diagrammatic, radiological, skeletal and prosected material. 33%
Section III (2 hours): Written - two essay questions, chosen from selections provided in sub-sections A (examining ability to integrate structure with function and construct logical arguments) and B (applying anatomical knowledge to a clinical situation or problem and to deduce basic clinical implications from first anatomical principles). 50%

or

Veterinary Anatomy and Physiology (VAP)
Section I (1 hour): Written - all questions compulsory; SA and MC formats. 17%
Section II (2 hours): Practical - circuit of stations involving specimens or problems, with MCQ or SA questions assessing core knowledge and understanding of anatomy and its application, including identification of structures, deduction, functional interpretation, appropriate use of language and knowledge of anatomical techniques. 33%
Section III (2 hours): Written - two essay questions, chosen from selections provided in sub-sections A (examining ability to integrate structure with function and construct logical arguments) and B (applying anatomical knowledge to a clinical situation or problem and to deduce basic clinical implications from first principles). 50%

and

Homeostatis (Hom)
Section I (1 hour): Written - all questions compulsory; SA and MC formats. 30%
Section II (2 hours): Practical - covers experimental physiology and histology, including analysis and interpretation of data from physiological experiments. 20%
Section III (2 hours): Written - two essay questions chosen from five sub-sections. 50%

Molecules in Medical Science (MIMS)
Section I (1 hour): Written - all questions compulsory; SA and MC formats. 33%
Section II (2 hours): Practical - questions on practical aspects of the course, including interpretation and handling of data, applying knowledge in the light of experience in laboratory and computer-based exercises. 17%
Section III (2 hours): Written - three essay questions, one chosen from selections (of 3-4) offered in each of three sub-sections. Questions aim to test integrated understanding rather than detailed knowledge. 50%

Summer 2003

Human Reproduction (HR)
Section I (1 hour): Written - all questions compulsory; SA and MC formats. 30%
Section II (2 hours): Practical - may include histological material, experimental data, ethical issues and demographic data. 20%
Section III (1 1/2 hours): Written - two essay questions from a choice of four. 50%

Neurobiology with Human Behaviour (NHB)
Section I (1 hour): Written - all questions compulsory; SA and MC formats. 25%
Section II (2 hours): Practical - examines understanding of functional neuroanatomy and human behaviour and understanding and ability to apply neurophysiological data. 25%
Section III (2 hours): Written - four essay questions from a choice of eight. 50%

or

Veterinary Reproductive Biology (VRB)
Section I (1 hour): Written - all questions compulsory; SA and MC formats. 30%
Section II (2 hours): Practical - questions will relate to anatomy and physiology practical classes and employ SA or MCQ formats. 20%
Section III (1 1/2 hours): Written - two essay questions from a choice of five. 50%

Neurobiology with Animal Behaviour (NAB)
Section I (1 hour): Written - all questions compulsory; SA and MC formats. 25%
Section II (2 hours): Practical - examines understanding of functional neuroanatomy and animal behaviour and understanding and ability to apply neurophysiological data. 25%
Section III (2 hours): Written - four essay questions from a choice of eight. 50%

and

Biology of Disease (BOD)
Section I (1 hour): Written - all questions compulsory; SA and MC formats. 25%
Section II (2 hours): Practical - including recognition and interpretation of biological, photographic, diagrammatic and sectioned material, as well as interpretation and handling of data and knowledge and application of laboratory techniques. 25%
Section III (2 hours): Written - three essay questions, one chosen from a selection offered. 50%

Mechanisms of Drug Action (MODA)
Section I (1 hour): Written - all questions compulsory; SA and MC formats. 30%
Section II (2 hours): Practical - two questions assessing data handling, numerical manipulation and logical reasoning, including quantification of receptor-ligand interactions and pharmacokinetics. 20%
Section III (2 hours): Written - three essay questions from a choice of six. 50%

The data

Selection variables

The means and standard deviations of scores on MVAT Paper 1, Paper 2 and Paper 3 and of interview scores for all applicants for whom data were available are shown in table 1, which also includes similar information for the successful applicants beginning their courses in Autumn 2001.

The score distributions suggest that the MVAT test was appropriately targeted - in terms of test difficulty - for this extremely able set of applicants. Mean scores are close to the 50% mark and almost the whole of the mark scale is in use.

It is apparent from table 1, and from the graphical contrasts the distributions of scores on these variables by unsuccessful applicants and those admitted in 2001 shown in figures 1 to 4 below, that - as might be expected - on average those admitted tended to score more highly on the MVAT and at interview than those who were rejected. But it is also clear that scores on the MVAT test did not play an over-riding role in selection decisions for this, the initial cohort taking the test, as the distributions of scores in each Paper for those admitted and unsuccessful applicants overlap very substantially.

Table 1 Means & standard deviations of selection variables for all applicants and those admitted in 2001

	All			Admitted		
	mean	sd	n	mean	sd	n
MVAT Paper 1	10.57	3.58	1506	12.41	3.67	319
MVAT Paper 2	25.09	6.42	1506	29.40	4.45	318
MVAT Paper 3	10.15	2.07	1506	11.09	2.03	320
Interview	6.56	1.67	1405	8.19	1.02	321

Those admitted in 2001 included applicants with the entire range of scores on MVAT Paper 1 (Scientific Aptitude), which thus appears to have had least influence on admissions. The distributions for Papers 2 (Scientific Knowledge) and (to a somewhat lesser extent) 3 (Scientific Understanding - as assessed by essays) show more association between high scores and admission, with successful applicants largely scoring in the top half of their mark ranges. But many others with equally high MVAT Paper 2 and 3 scores were not amongst those admitted. As one would expect, given the MVAT tests status for this cohort, interview scores appear more closely associated with admissions, although even here many who were highly rated were not amongst those entering in 2001. Again this is unsurprising as many other factors, not least subsequent achievements in public examinations, will have affected their success. As the test has gained acceptance within the admissions process in subsequent years it is possible that the degree of selectivity with respect to MVAT scores may rise in future cohorts.

Figure 1 MVAT P1 scores

applicants v admitted

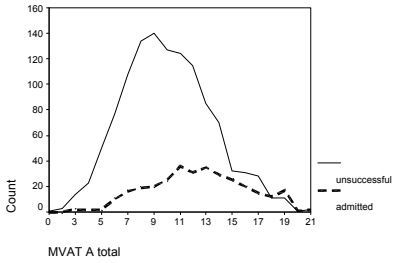


Figure 1 MVAT P2 scores

applicants v admitted

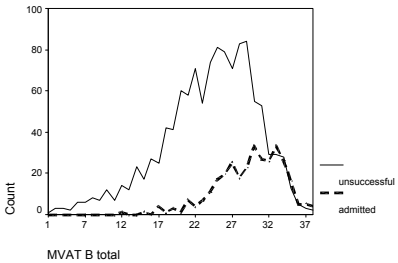


Figure 1 MVAT P3 scores

applicants v admitted

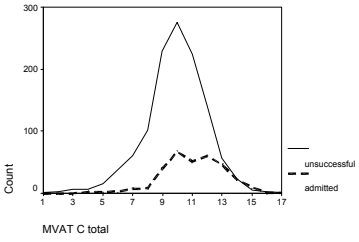
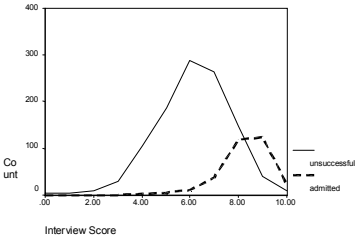


Figure 1 Interview Scores

applicants v admitted



Analyses of applicants by gender and by course (medicine; graduate medicine; veterinary) suggest that similar patterns were in evidence in all cases. Means and standard deviations of scores on these selection variables by gender and course are provided in table 2, again for all applicants and those admitted in 2001.

On average males, the minority group, scored higher than females in all three MVAT components; this being true for both all applicants and the sub-set of those admitted in 2001. The same held for interview scores, although here the difference between the males and females who were admitted was trivial. Average scores on all three MVAT components by applicants for A100 medicine were higher than those of veterinary (D100) applicants. Applicants for the graduate entry course in medicine fared less well on MVAT papers 1 and 2, but performed rather better on Paper 3, although, curiously, the (small) group admitted had a relatively low average score on this element. Variations in interview scores between courses may be of less interest.

Table 2 Means & standard deviations of selection variables for all applicants and those admitted in 2001 by gender & course

	All			Admitted		
	mean	sd	n	mean	sd	n
Males						
MVAT Paper 1	11.56	3.60	556	13.04	3.77	122
MVAT Paper 2	26.78	6.01	556	30.67	4.30	122
MVAT Paper 3	10.24	2.12	556	11.21	2.16	123
Interview	6.71	1.61	518	8.20	0.98	126
Females						
MVAT Paper 1	9.98	3.44	940	12.02	3.56	197
MVAT Paper 2	24.09	6.46	940	28.61	4.37	196
MVAT Paper 3	10.09	2.05	940	11.02	1.95	197
Interview	6.47	1.70	878	8.18	1.05	195
A100 Medicine						
MVAT Paper 1	10.99	3.61	929	12.65	3.48	238
MVAT Paper 2	25.99	6.05	930	29.88	4.05	238
MVAT Paper 3	10.31	2.07	930	11.26	2.03	239
Interview	6.63	1.71	911	8.14	0.98	241
A101 Medicine (Grad)						
MVAT Paper 1	9.90	3.86	96	10.20	5.24	15
MVAT Paper 2	20.83	6.57	96	23.47	6.70	15
MVAT Paper 3	10.18	2.21	96	9.20	2.37	15
Interview	7.64	1.67	52	8.76	1.43	15
D100 Veterinary						
MVAT Paper 1	9.93	3.32	467	12.05	3.78	66
MVAT Paper 2	24.38	6.50	466	29.02	4.26	65
MVAT Paper 3	9.85	2.01	466	10.89	1.75	66
Interview	6.27	1.51	435	8.24	1.01	65

Achievement variables and their relationships with selection instruments

Table 3 provides the means and standard deviations of marks[1] on first and second year examinations (showing the three elements - MC/SA; Practical & Essay - and total for each option), together with their correlation with the three components of the MVAT and, also, interview scores. These statistics are provided for males and females separately as well as overall.

The correlations observed between selection and achievement variables vary considerably; spanning the range historically encountered (see Sainsbury (1970) for instance) in studies of this type. The strongest correlation observed was 0.493 (between MVAT P1 - Scientific Aptitude - and the practical assessment in

[1] These may be weighted when aggregated.

Molecules in Medical Science(MIMS), for females). At the other extreme some negative correlations are reported.[2]

Whilst these correlations are not high, given the very highly selected nature of these students, this suggests that the test may provide a useful contribution to selection. Especially where, as here, applicants GCE AL results[3] are so universally excellent as to have no real predictive value.

Table 3: Means & standard deviations of achievement variables & correlation with MVAT & Interview, by gender and overall

		n	Mean	Std. Deviation		r x MVAT1	r x MVAT2	r x MVAT3	r x IV
homeostasis 1	Males	126	18.77	3.25	***	0.156	0.310	0.074	-0.020
	Females	200	17.36	3.60		0.245	0.404	0.237	0.216
	Total	326	17.90	3.53		0.233	0.400	0.179	0.137
homeostasis 2	Males	126	13.58	2.26	*	0.176	0.206	0.006	-0.030
	Females	200	12.98	2.34		0.307	0.345	0.219	0.189
	Total	326	13.21	2.33		0.269	0.314	0.138	0.112
homeostasis 3	Males	121	27.44	4.69	***	-0.011	0.132	0.100	0.016
	Females	188	26.29	4.71		0.035	0.164	0.073	0.173
	Total	309	26.74	4.73		0.035	0.176	0.084	0.115
homeostasis T1A total	Males	121	59.79	8.54	**	0.091	0.240	0.085	-0.007
	Females	188	56.84	9.06		0.185	0.318	0.155	0.228
	Total	309	58.00	8.96		0.169	0.314	0.124	0.143
molecules in medical sc 1	Males	126	24.25	4.05	ns	-0.011	0.255	0.072	-0.078
	Females	200	23.42	3.94		0.256	0.310	0.195	0.182
	Total	326	23.74	3.99		0.161	0.305	0.148	0.085
molecules in medical sc 2	Males	126	10.85	2.30	***	0.396	0.217	0.138	0.121
	Females	200	9.99	2.25		0.493	0.382	0.296	0.099
	Total	326	10.32	2.30		0.467	0.347	0.235	0.111
molecules in medical sc 3	Males	121	30.44	3.89	ns	0.047	0.209	0.137	0.011
	Females	188	29.60	4.09		0.177	0.171	0.250	0.057
	Total	309	29.93	4.03		0.138	0.203	0.200	0.041
molecules in medical sc T1A total	Males	121	65.49	8.23	*	0.122	0.309	0.138	-0.013
	Females	188	63.23	8.34		0.346	0.319	0.248	0.141
	Total	309	64.11	8.36		0.271	0.335	0.198	0.084
functional architecture of the body 1	Males	109	9.55	1.98	ns	0.053	0.183	0.127	-0.045
	Females	150	9.21	2.08		0.340	0.332	0.278	0.124
	Total	259	9.36	2.04		0.235	0.288	0.213	0.084
functional architecture of the body 2	Males	109	24.18	2.43	ns	-0.060	0.210	0.053	-0.115
	Females	149	23.83	2.97		0.209	0.235	0.276	0.096
	Total	258	23.98	2.75		0.118	0.236	0.185	0.019
functional architecture of the body 3	Males	104	30.62	2.80	ns	0.035	0.331	0.151	-0.001
	Females	137	30.12	2.75		0.053	0.133	0.164	0.173
	Total	241	30.34	2.78		0.061	0.234	0.152	0.097
functional arch of body T1A total	Males	104	64.31	5.83	ns	0.014	0.317	0.134	-0.076
	Females	137	63.46	6.34		0.196	0.213	0.234	0.158
	Total	241	63.83	6.13		0.134	0.266	0.182	0.062
veterinary anatomy & physiology 1	Males	17	10.82	1.38	ns	-0.332	0.232	-0.089	-0.580
	Females	50	10.16	1.63		0.090	0.328	-0.080	0.144
	Total	67	10.33	1.59		-0.025	0.311	-0.059	0.059
veterinary anatomy & physiology 2	Males	17	23.94	2.82	ns	0.029	0.370	-0.103	-0.296
	Females	50	23.22	3.09		0.155	0.336	-0.033	0.266
	Total	67	23.40	3.02		0.114	0.349	-0.036	0.176
veterinary anatomy & physiology 3	Males	17	29.71	3.31	ns	0.033	-0.229	0.452	0.062
	Females	50	29.28	3.08		0.312	0.209	0.078	-0.048
	Total	67	29.39	3.12		0.224	0.080	0.177	-0.011
vet anatomy & phys T1A total	Males	17	64.47	4.93	ns	-0.054	0.123	0.220	-0.290
	Females	50	62.66	6.45		0.245	0.344	0.001	0.137
	Total	67	63.12	6.11		0.164	0.295	0.057	0.094
Biology of Disease - Section 1	Males	124	17.93	2.46	*	-0.015	0.195	0.092	-0.063
	Females	194	17.21	3.00		0.235	0.387	0.232	0.113
	Total	318	17.49	2.82		0.163	0.344	0.181	0.057

[2] It is worth noting that many negative correlations relate to the relatively small (n17) group of males taking Veterinary options and, hence, should probably not be over-interpreted.

[3] Note that even in less highly selected university courses, correlations between GCE AL results and achievement are typically similar to or lower than those observed for aptitude tests (Entwistle (1974)).

Biology of Disease - Section 2	Males	124	13.73	2.35	ns	-0.005	0.100	0.127	0.124
	Females	194	13.96	2.39		0.112	0.297	0.179	0.074
	Total	318	13.87	2.38		0.059	0.207	0.156	0.092
Biology of Disease - Section 3	Males	119	30.84	3.87	ns	-0.003	0.079	0.173	-0.014
	Females	182	30.52	4.60		0.050	0.189	0.229	0.214
	Total	301	30.64	4.32		0.035	0.153	0.203	0.135
Biology of Disease T1B total	Males	119	62.47	7.20	ns	-0.022	0.152	0.169	0.007
	Females	182	61.87	8.58		0.134	0.290	0.219	0.178
	Total	301	62.11	8.05		0.082	0.242	0.196	0.119
Human Reproduction - Section 1	Males	108	18.95	2.85	ns	-0.012	0.094	0.255	-0.044
	Females	148	19.09	3.13		0.186	0.302	0.253	0.083
	Total	256	19.04	3.01		0.103	0.213	0.252	0.034
Human Reproduction - Section 2	Males	108	12.86	1.38	ns	0.063	0.139	0.082	0.106
	Females	148	12.74	1.22		-0.060	0.121	0.047	0.078
	Total	256	12.79	1.29		0.004	0.135	0.065	0.089
Human Reproduction - Section 3	Males	102	31.06	3.85	ns	-0.052	0.232	0.228	-0.021
	Females	136	31.14	3.87		0.092	-0.035	0.190	0.089
	Total	238	31.11	3.85		0.031	0.076	0.207	0.043
Human Reproduction T1B total	Males	102	62.81	6.22	ns	-0.004	0.223	0.273	-0.026
	Females	136	63.10	6.03		0.126	0.153	0.247	0.103
	Total	238	62.97	6.10		0.067	0.175	0.259	0.048
Veterinary Reproduction - Section 1	Males	17	19.59	3.52	ns	-0.048	-0.039	-0.219	-0.052
	Females	47	18.64	3.66		0.288	0.294	-0.124	0.179
	Total	64	18.89	3.62		0.180	0.204	-0.127	0.152
Veterinary Reproduction - Section 2	Males	17	14.35	1.62	ns	-0.006	0.017	-0.189	-0.052
	Females	47	13.79	1.53		0.174	0.112	0.013	0.070
	Total	64	13.94	1.56		0.107	0.096	-0.015	0.075
Veterinary Reproduction - Section 3	Males	17	30.55	1.46	*	0.174	-0.101	0.373	0.395
	Females	47	28.84	2.78		0.148	0.152	0.093	-0.017
	Total	64	29.30	2.60		0.123	0.122	0.171	0.088
Veterinary Reproduction T1B total	Males	17	64.49	5.58	ns	0.014	-0.046	-0.095	0.056
	Females	47	61.27	6.65		0.260	0.251	-0.026	0.107
	Total	64	62.13	6.50		0.175	0.186	-0.006	0.137
Neurobiology and Human Behav - S1	Males	108	15.17	2.58	ns	-0.076	0.091	0.130	-0.080
	Females	148	14.95	2.38		0.197	0.210	0.182	0.118
	Total	256	15.04	2.46		0.087	0.170	0.158	0.032
Neurobiology and Human Behav - S2	Males	108	15.29	2.26	**	-0.018	0.200	0.072	0.070
	Females	148	14.41	2.58		0.334	0.344	0.271	0.099
	Total	256	14.78	2.48		0.221	0.323	0.185	0.084
Neurobiology and Human Behav - S3	Males	102	31.31	3.40	*	-0.048	0.143	0.288	-0.007
	Females	136	32.27	3.74		0.165	0.115	0.309	0.105
	Total	238	31.86	3.62		0.057	0.092	0.298	0.063
Neurobiology & Human Behav T1B total	Males	102	61.70	7.03	ns	-0.064	0.176	0.217	-0.012
	Females	136	61.86	7.16		0.267	0.244	0.270	0.118
	Total	238	61.79	7.09		0.127	0.209	0.242	0.064
Neurobiology and Animal Behav - S1	Males	17	15.29	1.96	*	-0.231	0.193	-0.465	-0.358
	Females	47	13.61	2.89		0.076	0.158	-0.113	0.083
	Total	64	14.06	2.76		-0.008	0.179	-0.128	0.069
Neurobiology and Animal Behav - S2	Males	17	17.27	1.70	**	-0.038	0.064	0.116	-0.163
	Females	47	15.28	2.90		0.236	0.381	-0.126	-0.082
	Total	64	15.81	2.76		0.146	0.316	-0.028	-0.022
Neurobiology and Animal Behav - S3	Males	17	30.79	3.07	ns	0.004	-0.396	-0.304	0.136
	Females	47	30.53	2.61		0.175	0.199	0.038	0.185
	Total	64	30.60	2.72		0.115	0.004	-0.054	0.174
Neurobiology & Animal Behav T1B total	Males	17	63.35	5.19	*	-0.098	-0.140	-0.317	-0.109
	Females	47	59.42	7.36		0.185	0.282	-0.080	0.065
	Total	64	60.47	7.03		0.099	0.196	-0.082	0.086
Mechanisms of Drug Action - Section 1	Males	125	19.12	3.29	ns	-0.019	0.119	0.178	-0.051
	Females	193	18.63	3.30		0.181	0.254	0.221	0.187
	Total	318	18.82	3.30		0.109	0.214	0.205	0.098
Mechanisms of Drug Action - Section 2	Males	125	13.55	4.26	**	0.233	0.129	0.138	0.081
	Females	192	12.16	4.39		0.395	0.337	0.185	0.110
	Total	317	12.71	4.38		0.346	0.285	0.169	0.102
Mechanisms of Drug Action - Section 3	Males	119	30.64	3.83	ns	-0.192	0.069	0.104	-0.060
	Females	180	30.75	3.87		0.070	0.096	0.101	0.177
	Total	299	30.71	3.85		-0.037	0.081	0.102	0.084
Mechanisms of Drug Action T1B total	Males	119	63.33	9.10	ns	0.017	0.134	0.173	-0.003
	Females	180	61.83	8.87		0.309	0.288	0.189	0.209
	Total	299	62.42	8.98		0.198	0.237	0.180	0.126

Statistical significance of gender differences indicated by * <.05, ** <.01, & *** <.001.

Unsurprisingly, it would seem that the MVAT test's components relate more closely to some examinations than to others.

Scientific Aptitude (MVAT P1) for instance correlated highly with the practical assessments in MIMS (0.467 overall) and Mechanisms of Drug Action (MODA) (0.346 overall), but associations with other assessments were markedly weaker.

In general Scientific Knowledge (MVAT P2) tended to show the highest levels of association with achievement of all the selection variables. Overall correlations greater than 0.3 were observed with Homeostasis (Hom) MC/SA and Practical assessments; MIMS Practical; Veterinary Anatomy & Physiology (VAP) MC/SA and Practical; Biology of Disease (BOD) MC/SA; Neurobiology and Human Behaviour (NHB) Practical; and Neurobiology and Animal Behaviour (NAB) Practical.

Scientific Understanding (MVAT P3 - assessed by essay) tended to show lower levels of association with achievement variables than the other MVAT components, including many of the essay components where higher correlations might perhaps have been anticipated. However (overall) correlations of 0.298 (with NHB Essays), 0.252 (with Human Reproduction (HR) MC/SA) and 0.235 (with MIMS Practical).were observed.

The level of association observed between Interview Scores and achievement was disappointing. The highest (overall) correlation noted was 0.174 (with NAB Essays) and many of the negative correlations observed involved this variable.

As a means of demonstrating some of the overall trends in association more clearly, aggregated scores for the different types of test were calculated - for Medics and Vets separately. Table 4 reports the correlations between these aggregate variables and selection variables - again overall and by gender. This drives home a point very evident in the more detailed correlation matrix: that the correlations between all selection variables and achievement are in general notably higher for females than for males.

Table 4 Correlation of aggregate achievement variables with MVAT and Interviews, by gender and overall

		n	r x MVAT1	r x MVAT2	r x MVAT3	r x Interview
Medicine MC & SA	male	103	0.022	0.226	0.183	-0.059
	female	145	0.280	0.410	0.311	0.158
	all	248	0.187	0.351	0.253	0.067
Medicine Practicals	male	103	0.091	0.219	0.208	-0.028
	female	145	0.339	0.428	0.340	0.144
	all	248	0.250	0.361	0.280	0.073
Medicine Essays	male	98	-0.043	0.262	0.260	-0.021
	female	133	0.141	0.168	0.274	0.192
	all	231	0.064	0.206	0.265	0.100
Medicine total	male	98	0.010	0.253	0.229	-0.042
	female	133	0.247	0.307	0.269	0.172
	all	231	0.152	0.287	0.245	0.078
Veterinary MC & SA	male	17	-0.200	0.136	-0.206	-0.209
	female	46	0.243	0.311	-0.081	0.153
	all	63	0.107	0.273	-0.072	0.127
Veterinary Practicals	male	17	0.274	0.269	-0.241	-0.166
	female	45	0.446	0.467	0.007	0.215
	all	62	0.363	0.416	-0.003	0.194
Veterinary Essays	male	17	-0.062	-0.283	-0.043	0.089
	female	45	0.217	0.335	0.030	0.259
	all	62	0.124	0.181	0.049	0.263
Veterinary total	male	17	-0.027	0.040	-0.177	-0.110
	female	45	0.346	0.403	-0.018	0.248
	all	62	0.220	0.312	-0.013	0.224

It should not be assumed that this gender difference suggests that selection instruments are in some way biased or otherwise at fault. It is quite possible that this may simply reflect a greater likelihood that various unknown factors might intervene in the case of males, making their academic achievements less easily forecast. Their are many possible intervening variables. Some may have systematic effects. For instance Entwistle & Brennan (1971) suggested that different types of students - in terms of personality and values - were typically more or less likely to succeed in different disciplines; and Entwistle et al (1971) pointed to the obviously important role of study habits and attitudes and motivation in determining success at university. But the behaviour of individual undergraduates in the course of a major transition in their lives is unlikely to ever prove highly predictable.

The gender difference in associations with achievement does however point up the difficulties selectors face in treating candidates fairly.

It is also clear that MVAT P2 is relatively well correlated with achievement by comparison with the other MVAT components, as described above.

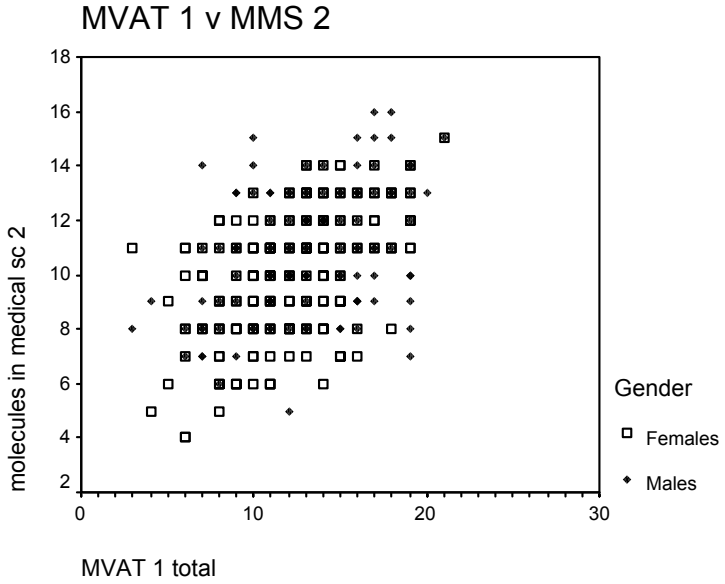
For medical students however, MVAT P3 (assessed via essays) does correlate more consistently with these aggregate (and hence more reliable) achievement variables than it appeared to do with the component examinations. Unfortunately this is not the case for Veterinary students, for whom correlations are low or even negative

The low association between Interview Scores and achievement is also very evident here, especially for males, for whom negative correlations are the norm rather than the exception.

What is particularly notable here are the relatively high levels of association observed between the MVAT and the aggregate of Practical assessment scores. This may be of particular interest to selectors who prize the capacity to apply knowledge and deductive skills etc especially highly.

Another perspective

Figure 2 Scatterplot of MVATPI (Scientific Aptitude) v MMS Practical



Correlation is probably not the most useful perspective on these data. It may be easier to see how admissions might be assisted by aptitude testing by looking at the data graphically. This makes it possible

to ask what if questions concerning the relatively extreme cases - the ablest students (who one would always wish to select) and the poorest (who one might prefer had gone elsewhere). Let us take the example of MMS Practical, where the relationship between MVAT scores and achievement was particularly strong - especially for females. Figure 2 displays the data in the form of a bivariate scatterplot, distinguishing between males and females. The vertical axis indicates marks in MMS 2 and the horizontal axis scores on MVAT P1.

In the distribution of MVAT P1 scores for all applicants the median was 10. This point has come to be used in the University of Cambridge as a key reference point when considering applicants and corresponds to a BMAT scale score of 5.0. Had this been taken as a required threshold when selecting this cohort, seven of the eleven students with MMS 2 marks of 6 or below would have been rejected. Of course so too would many others with moderate MMS 2 marks. But only one or two students achieving fairly high marks would not have been admitted and had those rejected been replaced by other applicants with better MVAT 1 scores (and there were many such amongst those who failed to gain a place in this cohort) we might (on the assumption that they would have performed as well as those with similar MVAT scores - in the range of, say, 10/15 - who were admitted) have hoped for a notable improvement in results on this university examination.

Of course one might (and indeed must) argue that many other factors do need to be taken into account. But the weak association between Interview Scores (which presumably reflect efforts to assess many of the other factors thought important) and achievement observed in these data suggest that current practices might benefit from the inclusion of supplementary information. These data suggest that there may well be a case for taking judicious notice of aptitude test scores in admissions.

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