

Investigating the predictive validity of the ELAT

An analysis using examination data from the University of Oxford for the 2007 ELAT cohort

Sara Scorey

September 2009



Executive Summary

This report looks at the performance of first year students on the University of Oxford courses for which the ELAT (English Literature Admissions Test) is a requirement, and compares this with their performance on the ELAT.

In particular this report explores the performance of the 204 candidates who took the ELAT in 2007 and subsequently took up a place at Oxford.

ELAT Scores and Bands were compared with first year module scores and outcomes (pass/distinction). Of the 15 first year modules considered, four were taken by sufficient numbers of students to be suitable for analysis: *ENGL0004 Paper 1*; *ENGL0005 Victorian*; *ENGL0006 Modern*; and *ENGL0007 Old English*.

The performance of male and female candidates was also compared.

It was found that:

- Both ELAT score and ELAT band correlate significantly with scores on each of the four modules analysed.
- Linear regression analyses reveal that scores on each of the four modules increase with increasing ELAT score. This relationship is statistically significant for *ENGL0005: Victorian* and *ENGL0006: Modern*.
- Linear regression analyses indicate that the predictions for male candidates are not significantly different from those for female candidates for any of the four modules. Thus there is no evidence of gender bias.
- Logistic regression analysis shows that the probability of achieving a distinction increases with increasing ELAT score, but that this relationship is not statistically significant.

Introduction

This report looks at the performance of first year students on the University of Oxford courses for which the ELAT (English Literature Admissions Test) is a requirement, and compares this with their performance on the ELAT.

The ELAT was introduced for the 2008 admissions cycle, so the first ELAT cohort took the test in November 2007. Those candidates from the first ELAT cohort who were subsequently offered a place at Oxford and started their course in Autumn 2008 took their first year exams in Summer 2009.

The following data is used in the analyses in this report:

- ELAT results:
 - ELAT score
 - ELAT band
- First year module scores:
 - ENGL0 004: Paper 1
 - ENGL0 005: Victorian
 - ENGL0 006: Modern
 - ENGL0 007: Old English
 - ENGL0 008: Middle English
 - ENGL0009: Paper 4c: Beowulf and its Cultural Background
 - ENGL0010: Paper 4d: Middle English Dream Poetry
 - ENGL0011: Paper 4e: Classical Literature
 - ENGL0012: Paper 4f: Introduction to the Study of Language and Linguistics
 - ENGL0013: Paper 4g: Introduction to Critical Theory
 - ENGL0014: Paper 4h: Special Author: Christina G. Rossetti
 - ENGL0015: Paper 4i: Special Author: Thomas Hardy
 - ENGL0016: Paper 4j: Special Author: Virginia Woolf
 - ENGL0017: Paper 4k: Special Author: Samuel Beckett
 - ENGL0018: Paper 4l: Special Author: Seamus Heaney
- First year outcome (Pass / Distinction)
- Extra candidate information:
 - Candidate Sex

There are 204 candidates with both an ELAT score from November 2007 and a first year outcome from Summer 2009; this cohort of candidates is referred to as the “Oxford cohort” throughout this report. The cohort of all 1247 candidates that took the ELAT in November 2007 is referred to as the “whole cohort” throughout this report.

An Explanation of the Analyses

Descriptive statistics

The descriptive statistics provided for each variable are: N (the number of candidates with a valid value for the variable being described); Minimum (the lowest observed score); Maximum (the highest observed score); Mean (the mean – a measure of the average score across all candidates) and Std. Dev. (the standard deviation – a measure of the spread of scores across all candidates).

Correlations

The correlation is a measure of the strength of the linear relationship between two variables. We have used Spearman's Rho as the measure of correlation in this report. Spearman's Rho uses the rank order of the values in the correlation calculation, instead of the actual values, and therefore – unlike some measures of correlation – does not make any assumptions about the distribution of the values.

Note that correlations presented in this report are uncorrected for range restriction, and therefore may be underestimates of the true predictive validity of the test.

Linear Regression

A linear regression is a model that predicts the values of one variable from the values of one or more other variables, using the method of least squares to find the (straight) line of best fit. In this report we use ELAT score to predict the first year module scores for those modules taken by at least 100 candidates. We also include the variable Male (0 = Female, 1 = Male) in the model so that we can ascertain whether candidate gender has an effect on the prediction.

The output from a linear regression includes a constant (B_0), a coefficient for each of the variables being used in the prediction (B_i), and a significance value for the constant and for each coefficient. The linear regression models in this report use two variables in the prediction – ELAT score and Male – resulting in the following model for predicting module scores:

$$\text{Module score} = B_0 + (B_1 \times \text{ELAT Score}) + B_2 \text{ if the candidate is male}$$

Logistic Regression

A logistic regression is a model that predicts the probability of an outcome from the values of one or more variables. In this report we use ELAT score to predict the probability of achieving a distinction.

The output from a logistic regression, as with a linear regression, includes a constant (B_0), a coefficient for each of the variables being used in the prediction (B_i), and a significance value for the constant and for each coefficient. The logistic regression models in this report use only one variable in the prediction – ELAT score – resulting in the following model for predicting the probability of achieving a distinction:

$$P(\text{distinction}) = \frac{1}{1 + \exp(-(B_0 + B_1 \times \text{ELAT Score}))}$$

Presentation of the Regression Output

In this report, the following output is presented for each regression model:

- A table of output including the constant, coefficients and significance values for the model.
- A chart illustrating the model described by the table.
- A table comparing predicted score (for linear regression) or predicted probability of outcome (for logistic regression) for candidates scoring one standard deviation below the mean on the ELAT with that for candidates scoring one standard deviation above the mean on the ELAT (note that the mean and standard deviation used are those for the Oxford cohort).

The x-axis of the chart shows the entire range of scores available on the ELAT. Note that the range of scores actually achieved by the cohort of candidates being considered will generally be much less than the range of scores available, and therefore the descriptive statistics for the ELAT should always be taken into consideration when interpreting the charts.

Statistical Significance

The significance can be thought of as the probability of observing a relationship of the size observed if there is no relationship between the variables – the lower the value, the more confidence we have that the observed relationship did not appear by chance. Note that the lower the significance value, the more significant the result. We use a significance level of 0.05 as the threshold in this report.

The significance level is related to both the size of the relationship observed and the size of the sample involved. If the results from two analyses show a similar relationship size, but one analysis uses a much larger sample, the result from the analysis using a larger sample will have a lower significance value (so will be a more significant result) than the other. If two analyses have a similar sample size, but the result from one analysis shows a much larger relationship, the result from the analysis showing a larger relationship will have a lower significance value (so will be a more significant result) than the other.

Note that the linear regression fits a straight line to the data, and therefore a high significance value indicates an absence of a linear relationship, not necessarily the absence of any relationship at all. Note also that the significance value for the logistic regression depends on the size of the smallest category of the outcome variable – in this case the category *candidates who achieved a distinction*. As there are relatively few candidates achieving a distinction, it only takes a few of these to perform particularly well (or particularly badly) on the ELAT to noticeably alter the value of the coefficient B_1 , and hence the estimated probability of achieving a distinction for a given ELAT score.

Descriptive Statistics and Frequencies

Frequencies – Candidate Sex

	Sex	Count	Column N %
Whole Cohort	Male	357	28.6
	Female	890	71.4
	Total	1247	100.0
Oxford Cohort	Male	73	35.8
	Female	131	64.2
	Total	204	100.0

Descriptive Statistics – ELAT Score (November 2007)

	N	Minimum	Maximum	Mean	Std. Dev.
Whole Cohort	1247	17	59	41.67	8.017
Oxford Cohort	204	28	59	46.48	6.495

Frequencies – ELAT Band (November 2007)

	Band	Count	Column N %
Whole Cohort	1	135	10.8
	2	436	35.0
	3	310	24.9
	4	366	29.4
	Total	1247	100.0
Oxford Cohort	1	48	23.5
	2	95	46.6
	3	45	22.1
	4	16	7.8
	Total	204	100.0

- There are just over twice as many Female candidates than Male candidates in the whole cohort, but just under twice as many Female candidates than Male candidates in the Oxford cohort.
- The Oxford cohort scored approximately 5 marks higher on the ELAT on average than the whole cohort.
- Nearly a quarter of the Oxford cohort achieved Band 1 on the ELAT compared to only 11% of the whole cohort.
- Nearly 30% of the whole cohort only achieved band 4, compared to only 8% of the Oxford cohort.

Descriptive Statistics – First Year Results (Summer 2009)¹

	N	Minimum	Maximum	Mean	Std. Dev.
ENGL0004	203	53	79	65.56	4.701
ENGL0005	197	42	74	64.74	5.059
ENGL0006	161	46	75	63.93	5.439
ENGL0007	190	37	79	62.93	7.050
ENGL0008	14	60	69	63.36	2.678
ENGL0009	3				
ENGL0010	1				
ENGL0011	16	48	71	61.63	6.908
ENGL0012	2				
ENGL0013	10	65	75	70.00	3.162
ENGL0014	1				
ENGL0015	8	57	70	64.88	5.027
ENGL0016	1				
ENGL0017	4				
ENGL0018	4				

Frequencies – First Year Outcome (Summer 2009)

	Count	Column N %
Pass	169	82.8
Distinction	35	17.2
Total	204	100.0

- Mean module scores range from 61.63 for *ENGL0011: Paper 4e: Classical Literature* to 71.33 for *ENGL0009: Paper 4c: Beowulf and its Cultural Background*.
- Only four modules were taken by sufficient numbers of candidates to be suitable for further analysis, these are:
 - ENGL0 004: Paper 1
 - ENGL0 005: Victorian
 - ENGL0 006: Modern
 - ENGL0 007: Old English

¹ Note that descriptive statistics for modules with fewer than 5 candidates have been greyed out for data protection purposes.

Correlations – ELAT and First Year Module Scores

Spearman's Rho		ELAT Score	ELAT Band
ENGL0004: Paper 1	Correlation Coefficient	0.130(*)	-0.141(*)
	Sig. (1-tailed)	0.032	0.022
	N	203	203
ENGL0005: Victorian	Correlation Coefficient	0.157(*)	-0.181(**)
	Sig. (1-tailed)	0.014	0.005
	N	197	197
ENGL0006: Modern	Correlation Coefficient	0.202(**)	-0.202(**)
	Sig. (1-tailed)	0.005	0.005
	N	161	161
ENGL0007: Old English	Correlation Coefficient	0.156(*)	-0.168(*)
	Sig. (1-tailed)	0.016	0.010
	N	190	190

** Correlation is significant at the 0.01 level (1-tailed).

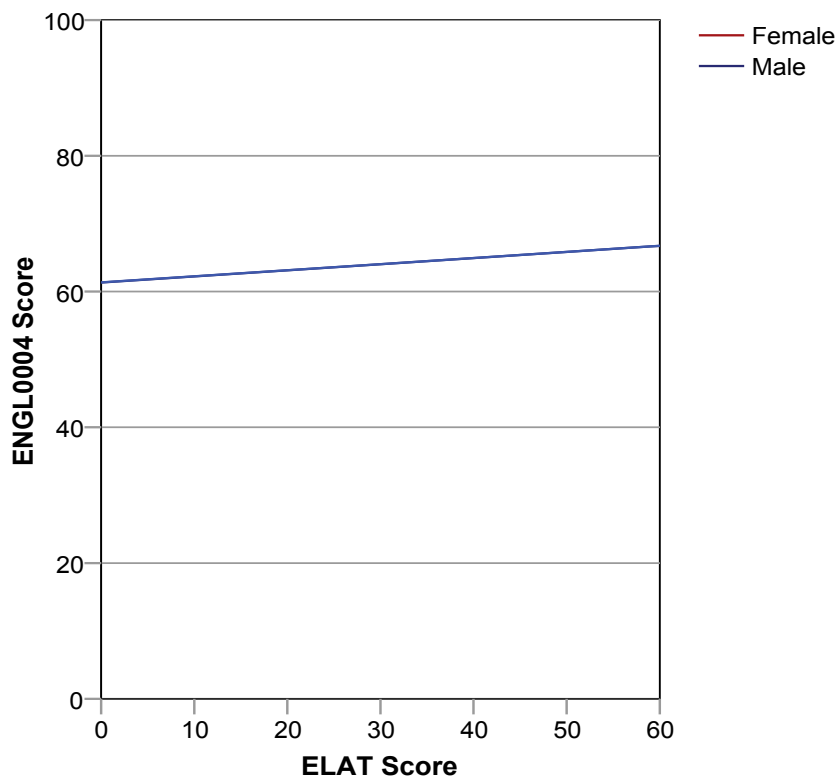
* Correlation is significant at the 0.05 level (1-tailed).

- Both ELAT score and ELAT band correlate significantly with scores on all four modules. Correlation is strongest with *ENGL0006: Modern*. Note that ELAT band has negative correlation with first year module scores because the top band is the lowest numbered band (1) and the bottom band is the highest numbered band (4).

Linear Regression Model 1 – Predicting Scores on ENGL0004: Paper 1 from Scores on the ELAT

Model 1	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	61.34	2.38	0.000	25.76	<0.001
ELAT Score	0.09	0.05	0.126	1.79	0.076
Male	-0.01	0.69	-0.001	-0.01	0.989

Linear Regression Model 1 predicts that a candidate with a score of x on the ELAT would achieve a score of y on ENGL0004, where $y = 61.34 + 0.09x - 0.01z$, $z = 1$ for male candidates and $z = 0$ for female candidates. The model shows that the effect of ELAT score on ENGL0004 score is positive but not significant (Sig. = 0.076), and that the effect of candidate gender on ENGL0004 score is not significant (Sig. = 0.989).



Oxford Cohort	Mean	Std. Dev.	Mean – 1SD		Mean + 1SD	
			ELAT	ENGL0004*	ELAT	ENGL0004*
ELAT Score	46.48	6.50	39.98	64.9	52.98	66.1

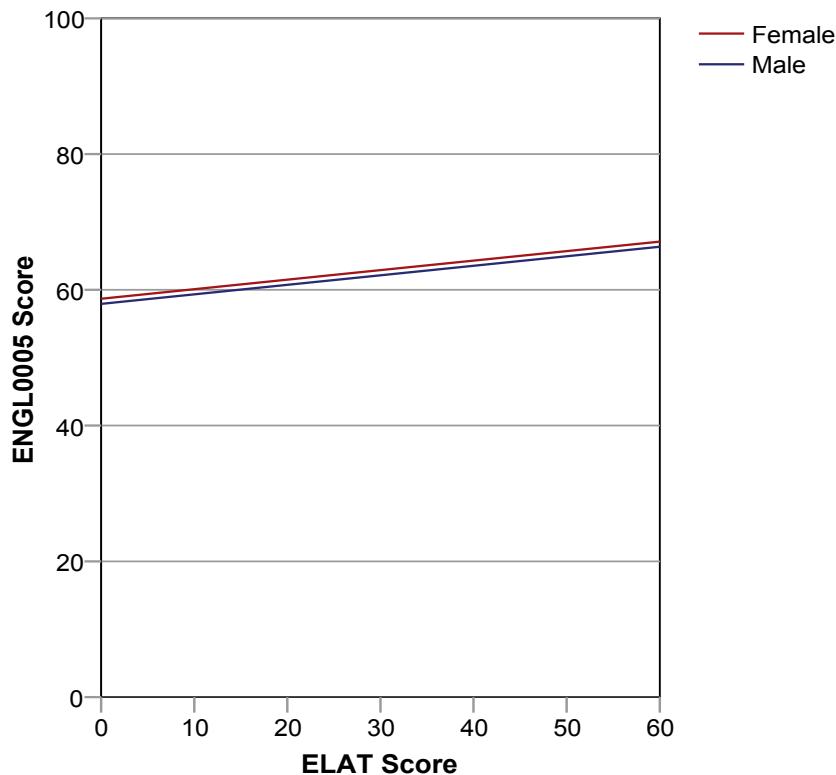
*Score on ENGL0004: Paper 1, as predicted by the model for female candidates.

- The model predicts that, for the Oxford cohort, candidates scoring 1SD above the mean on the ELAT will score 1.2 marks more on ENGL0004 than candidates scoring 1SD below the mean on the ELAT.

Linear Regression Model 2 – Predicting Scores on ENGL0005: Victorian from Scores on the ELAT

Model 2	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	58.70	2.62	0.000	22.42	<0.001
ELAT Score	0.14	0.06	0.172	2.43	0.016
Male	-0.76	0.74	-0.072	-1.02	0.308

Linear Regression Model 2 predicts that a candidate with a score of x on the ELAT would achieve a score of y on ENGL0005, where $y = 58.70 + 0.14x - 0.76z$, $z = 1$ for male candidates and $z = 0$ for female candidates. The model shows that the effect of ELAT score on ENGL0005 score is significant (Sig. = 0.016), but that the effect of candidate gender on ENGL0005 score is not significant (Sig. = 0.308).



Oxford Cohort	Mean	Std. Dev.	Mean – 1SD		Mean + 1SD	
			ELAT	ENGL0005*	ELAT	ENGL0005*
ELAT Score	46.48	6.50	39.98	64.3	52.98	66.1

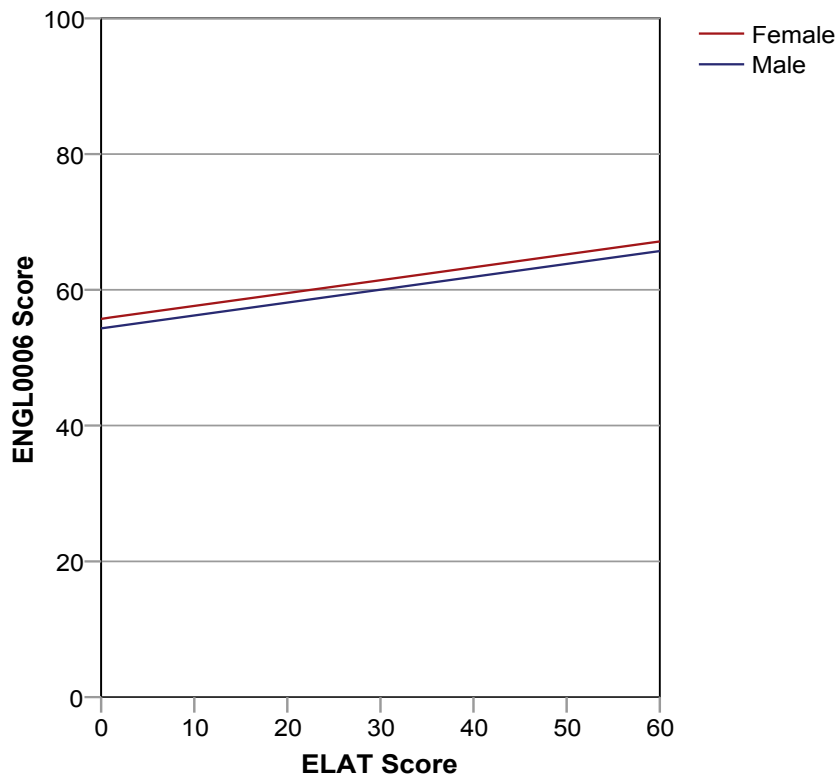
*Score on ENGL0005: Victorian, as predicted by the model for female candidates.

- The model predicts that, for the Oxford cohort, candidates scoring 1SD above the mean on the ELAT will score 1.8 marks more on ENGL0005 than candidates scoring 1SD below the mean on the ELAT.

Linear Regression Model 3 – Predicting Scores on ENGL0006: Modern from Scores on the ELAT

Model 3	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	55.72	2.92	0.000	19.06	<0.001
ELAT Score	0.19	0.06	0.232	2.99	0.003
Male	-1.40	0.87	-0.124	-1.60	0.111

Linear Regression Model 3 predicts that a candidate with a score of x on the ELAT would achieve a score of y on ENGL0006, where $y = 55.72 + 0.19x - 1.40z$, $z = 1$ for male candidates and $z = 0$ for female candidates. The model shows that the effect of ELAT score on ENGL0006 score is significant (Sig. = 0.003), but that the effect of candidate gender on ENGL0006 score is not significant (Sig. = 0.111).



Oxford Cohort	Mean	Std. Dev.	Mean – 1SD		Mean + 1SD	
			ELAT	ENGL0006*	ELAT	ENGL0006*
ELAT Score	46.48	6.50	39.98	63.3	52.98	65.8

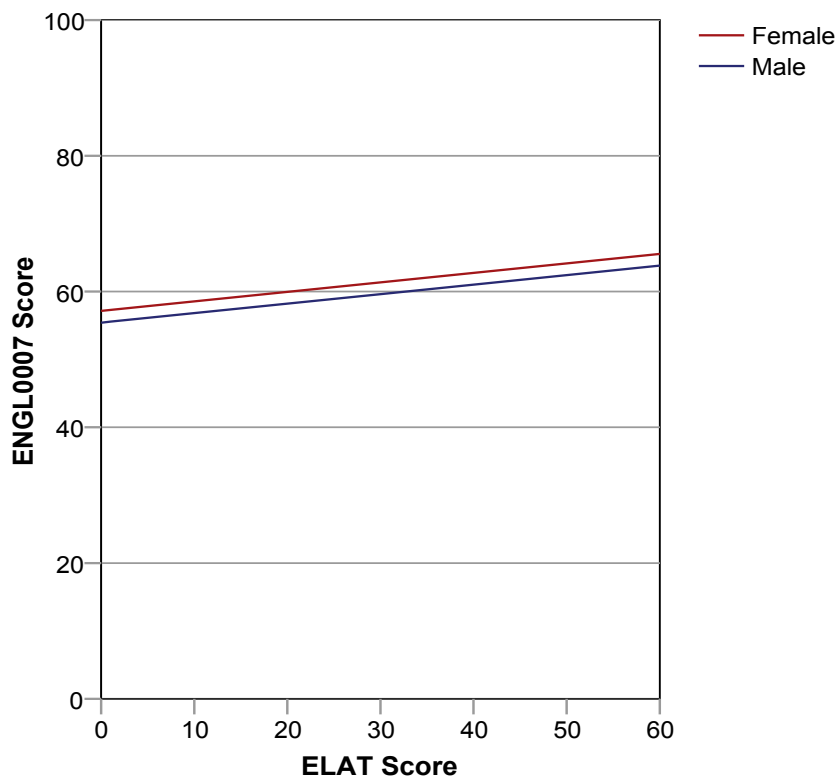
*Score on ENGL0006: Modern, as predicted by the model for female candidates.

- The model predicts that, for the Oxford cohort, candidates scoring 1SD above the mean on the ELAT will score 2.5 marks more on ENGL0006 than candidates scoring 1SD below the mean on the ELAT.

Linear Regression Model 4 – Predicting Scores on ENGL0007: Old English from Scores on the ELAT

Model 4	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	57.15	3.65	0.000	15.65	<0.001
ELAT Score	0.14	0.08	0.127	1.76	0.080
Male	-1.73	1.06	-0.118	-1.62	0.106

Linear Regression Model 4 predicts that a candidate with a score of x on the ELAT would achieve a score of y on ENGL0007, where $y = 57.15 + 0.14x - 1.73z$, $z = 1$ for male candidates and $z = 0$ for female candidates. The model shows that the effect of ELAT score on ENGL0007 score is positive but not significant (Sig. = 0.080), and that the effect of candidate gender on ENGL0007 score is not significant (Sig. = 0.106).



Oxford Cohort	Mean	Std. Dev.	Mean – 1SD		Mean + 1SD	
			ELAT	ENGL0007*	ELAT	ENGL0007*
ELAT Score	46.48	6.50	39.98	62.7	52.98	64.6

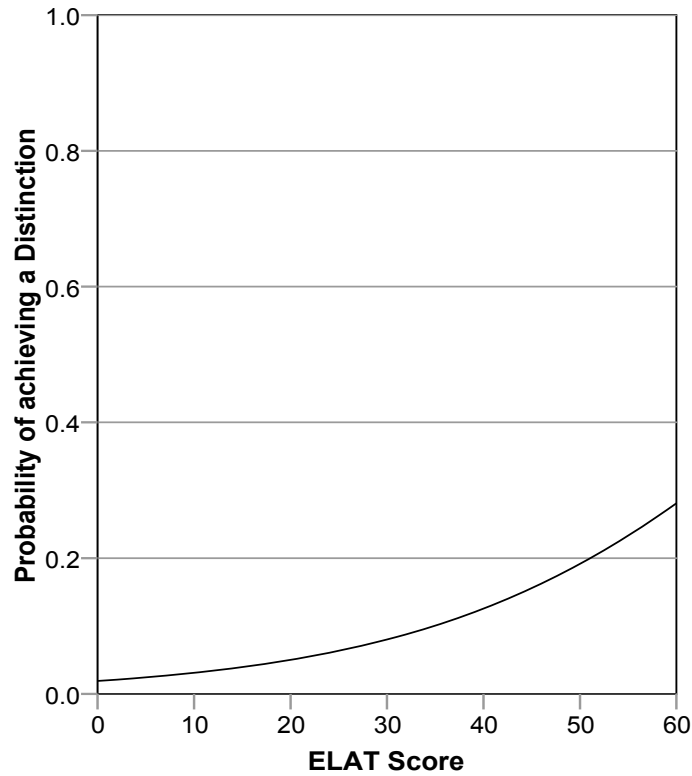
*Score on ENGL0007: Old English, as predicted by the model for female candidates.

- The model predicts that, for the Oxford cohort, candidates scoring 1SD above the mean on the ELAT will score 1.9 marks more on ENGL0007 than candidates scoring 1SD below the mean on the ELAT.

Logistic Regression Model 1 – Predicting Probability of Achieving a Distinction from Score on the ELAT

Model 1	B	S.E.	Wald	df	Sig.	Exp(B)
ELAT Score	0.05	0.03	2.66	1	0.103	1.05
Constant	-3.94	1.48	7.08	1	0.008	0.02

Logistic Regression Model 1 predicts that a candidate with a score of x on the ELAT would have a probability of achieving a distinction of y, where $y = 1 / (1 + \exp(3.94 - 0.05x))$. The model shows that the effect of ELAT score on the probability of achieving a distinction is positive but not significant (Sig. = 0.103).



Oxford Cohort	Mean	Std. Dev.	Mean – 1SD		Mean + 1SD	
			ELAT	Distinction*	ELAT	Distinction*
ELAT Score	46.48	6.50	39.98	0.126	52.98	0.216

*Probability of achieving a distinction.

- The model predicts that, for the Oxford cohort, candidates scoring 1SD above the mean on the ELAT are 1.71 times as likely to achieve a distinction as candidates scoring 1SD below the mean on the ELAT.

Comments

- ELAT score and ELAT band both correlate significantly with scores on each of the four modules analysed.
- The linear regressions show that the predicted score for each of the four modules increases with increasing ELAT score, but only scores on *ENGL0005: Victorian* and scores on *ENGL0006: Modern* were predicted significantly by ELAT score.
- The linear regressions show that the predictions for Male candidates are not significantly different to those for Female candidates for any of the four modules.
- The logistic regression shows that the probability of achieving a distinction increases with increasing ELAT score, but that this is not significant.
- Note that correlation coefficients in studies such as this are often low due to range restriction (the ELAT is an admissions tests, so, by definition, candidates with low scores are unlikely to get a place on the course) and the compensatory nature of selection (candidates with low scores who do get a place on the course are likely to be atypical of candidates with low scores in general).

The Cambridge Assessment Group is Europe's largest assessment agency. It plays a leading role in researching, developing and delivering assessment to eight million candidates in 150 countries.

Cambridge Assessment
1 Hills Road
Cambridge CB1 2EU
United Kingdom
tel +44 (0) 1223 553311
fax +44 (0) 1223 460278



Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate, a department of the University of Cambridge. Cambridge Assessment is a not-for-profit organisation.