

The Politics of Numeracy: Unequal Distribution of a Scarce Skill.

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"Numeracy" is a term which has taken its place, if not in the public consciousness, then at least in the language of circles where education is discussed. This follows the publication of the Cockcroft Report, Mathematics Counts (1982). What are we to make of this term? [...]

What about the politics of numeracy? This may sound an inappropriate way to talk about numbers - of all things - which are so apparently abstract and impartial/pure, and ... objective/scientific? Politics is about the social processes whereby certain groups get what they want; this we may ask in connection with numeracy: cui bono? which social classes, gender groups, races etc. benefit in terms of "getting more than their share" of numeracy? What advantages flow from being numerate, and what disadvantages from lacking numeracy? And what are the ideological as well as material, consequences of whatever inequalities there may be in the distribution of numeracy?

The importance of the politics of numeracy, then, lies to begin with, in the effect of inequalities in the distribution of numeracy, or the lack of it, 'non-numeracy'. Three examples may illustrate this importance, one to do with each of the noteworthy features of the definition of numeracy given earlier: confidence, practicality, and its critical potential.

First, a quote from a series of reflections on schooldays, by Margaret Drabble, a well-known British writer:

"I dropped mathematics at 12, through some freak in the syllabus I cannot deny that I dropped maths with a sigh of relief, for I had always loathed it, always felt uncomprehending even while getting tolerable marks, didn't like subjects I wasn't good at, and had no notion of this subjects' appeal or significance.

The reason, I imagine, was that, like most girls I had been badly taught from the beginning: I am not really as innumerate as I pretend, and suspect there is little wrong with the basic equipment but I shall never know.

.... And that effectively, though I did not appreciate it at the time, closed most careers and half of culture to me forever."

(The Guardian, 5 Aug. 1975, p.16).

Sometimes, the lack of confidence becomes a stronger emotion: ... "she had spoken to me of her terror in an exam when she did not know seven times seven. She resorted to adding up seven lots of seven and then got stuck in the middle of the column in total panic".

(Buxton 1981, p.4).

Second an example where an apparent lack of numeracy had substantial practical consequences. On Saturday 23 July, 1983 "A simple metric mixup nearly cost the lives of 61 passengers and eight crew members aboard an Air Canada Boeing 767 The airline admitted ... that the fuel for Flight 143 from Montreal to Edmonton was calculated in pounds instead of kilograms (resulting in less than half the fuel necessary for the trip). The incident may rekindle opposition to metrication".

(Toronto Star 30 July 83, pp.1 & 4).

Finally an example concerning the critical appreciation of information. In an era like this when reduction in public expenditure are being proposed - and implemented - people are concerned to know what reductions in actual services - rather than "elimination of bureaucratic waste" - will result from such cuts. In Britain, people are particularly concerned that the National Health Service should be preserved. In the run-up to the recent election the Secretary of State for Health claimed that the N.H.S. will have grown between 1979 and 1984 by 7½%. As a leading British newspaper commented, "The Government claims that it has increased spending on the National Health Service. Everyone else seems to believe otherwise" (Guardian 14 Mar. 1983).

The article goes on to show that this alleged growth depends on the following assumptions (in the current year):

- (i) The rate of inflation decreases to 4½% for pay and 5.6% for prices.
- (ii) The Area Health Authorities can find £40 M. themselves through "efficiency savings".
- (iii) Needs remain constant (which they manifestly will not do, because of the rapidly ageing population).

The mention of assumptions about the rate of inflation is significant. The Conservatives' claims to have reduced the rate of inflation, opposition claims about the governments' responsibility for ever-increasing levels of unemployment - as well as discussion of what these levels of unemployment actually are, and debates on the need for Britain to have nuclear weapons, in the context of the actual balances of forces in Europe, were all major election issues - and all are based to some extent at least, on numerical information which must be interpreted critically.

I. The nature and extent of the problem of non-numeracy (lack of numeracy).

In discussing how widespread is the problem of lack of numeracy it is of course important to specify the population in which we are interested. There is a great deal of information available on the measured skills of school children of various ages, e.g. from the Assessment of Performance Unit (A.P.U.) in Britain, the N.A.E.P. in the U.S., the Ontario Assessment Instrument Pool in Ontario (one of the provinces of Canada), and from the 1st and 2nd International Education Association Surveys of maths achievement. [...]

The Gallup survey, conducted for A.C.A.C.E., recruited a sample of 2890 adults in February 1981 at 200 sampling points in 10 regions in England, Wales and Scotland. The interviews were given quotas for sex by age, social class and employment of respondents.

Some of the Gallup questions are shown on the following two pages (Figure 1), and the results analysed by age and social class are given in Figure 2.

Figure 1

1. How much would it cost you altogether to buy a cup of coffee at 17p and a sandwich at 24p? (Read out and show CARD 1)

ANSWER (write in):

Method: 1 Oral
2 With writing
3 Calculator used

Response: 4 Confident
5 Unconfident

6 Immediate
7 'Pause for thought'

2. How much does it cost to buy eight 14p stamps? (Read out and show CARD 2)

ANSWER (write in):

Method: 1 Oral
2 With writing
3 Calculator used

Response: 4 Confident
5 Unconfident

6 Immediate
7 'Pause for thought'

4. Which is bigger, three hundred thousand or a quarter of a million? (Read out and show CARD 4)

ANSWER (write in):

Method: 1 Oral
2 With writing
3 Calculator used

Response: 4 Confident
5 Unconfident

6 Immediate
7 'Pause for thought'

BREAK

5. If you buy five Xmas cards for 65p, how much is each card costing you? (Read out and show CARD 5)

ANSWER (write in):

Method: 1 Oral
2 With writing
3 Calculator used

Response: 4 Confident
5 Unconfident

6 Immediate
7 'Pause for thought'

3. This is a restaurant bill. If you wanted to leave a 10% tip, how much would the tip be?

Soup	.35p
Main course	£2.20p
Sweet	.68p
Coffee	.30p
Total	£3.53p

ANSWER (write in):

Method: 1 Oral
2 With writing
3 Calculator used

Response: 4 Confident
5 Unconfident

6 Immediate
7 'Pause for thought'

6. Here is a railway timetable. I live in Leicester and have arranged to meet a friend at the station in London at 4 o'clock in the afternoon. Assuming the trains run on time which is the *latest* train I can get from Leicester to arrive in time for the meeting?

Mondays to Fridays

Leicester	London
dep.	arr.
01.36	03.52
02.20	05.22
05.00	07.34
06.17	08.18
06.52	08.47
07.17	09.02
07.33	09.12
08.07	09.45
08.23	09.50
08.34	10.11
08.55	10.36
09.11	10.45
09.33	11.36
10.22	12.06
10.40	12.50
11.27	13.08
11.42	13.40
12.27	14.08
12.48	14.59
13.25	15.02
13.44	15.42
14.27	16.10
14.42	16.52
15.31	17.13
15.44	17.42
16.27	18.08
17.13	18.51
17.28	19.10
17.53	19.55
18.27	20.05
19.30	21.03
19.41	21.42
20.30	22.04
21.24	23.31

8. If you bought a raincoat in the 'summer sales' reduced from £44 to £29.50, how much would you save? (Read out and show CARD 8)

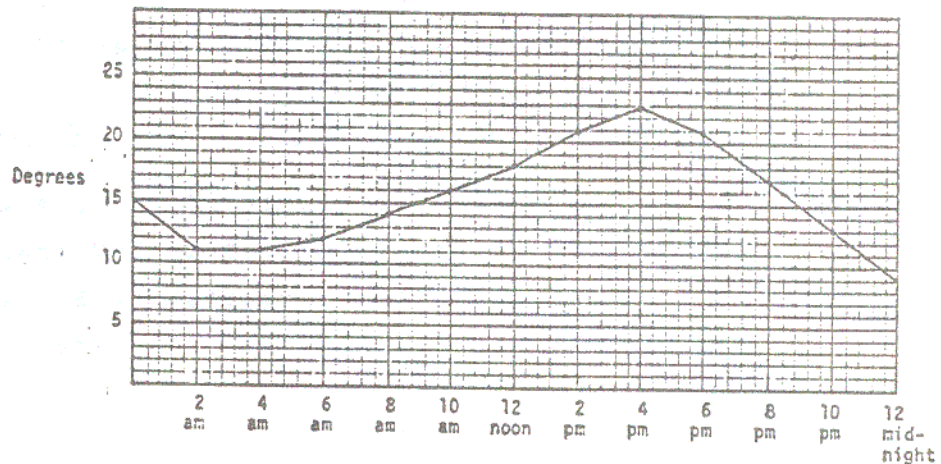
ANSWER (write in):

Method: 1 Oral
2 With writing
3 Calculator used

Response: 4 Confident
5 Unconfident

6 Immediate
7 'Pause for thought'

9. This shows you the temperature changes on a hot day last summer. What was the hottest time of day? And how hot was it then?



7. Suppose that the rate of inflation had dropped from 20% to 15%, which one of these results would you have expected:

- (a) Prices would have gone down, or
- (b) Prices would have stayed the same, or
- (c) Prices would still be rising but not as fast as before, or
- (d) Prices ought to have gone down but didn't

ANSWER (write in):
 Response: 4 Confident
 5 Unconfident
 6 Immediate
 7 'Pause for thought'
 If answer (d): Why do you say that? (write in)

10. **25% OFF**
 ALL MARKED PRICES

If you saw this sign in a shop, would you expect to pay:
 a half, or
 three-quarters, or
 a quarter, or
 a third
 of the original price?

ANSWER (write in):
 Method: 1 Oral
 2 With writing
 3 Calculator used
 Response: 4 Confident
 5 Unconfident
 6 Immediate
 7 'Pause for thought'

Figure 2 - Results of Gallup National Survey on Numeracy Skills.

CORRECT ANSWERS (PERCENTAGES) ANALYSED BY SEX, AGE AND SOCIAL CLASS

	Total	SEX		AGE					CLASS			
		Men	Women	16-24	25-34	35-44	45-64	65+	AB	C1	C2	DE
Base	2,890	1,385	1,505	529	581	493	812	476	463	636	943	848
Question 1	88	89	87	93	92	89	87	81	94	91	88	83
Question 2	74	77	71	70	75	77	76	70	84	83	71	65
Question 3	72	77	67	73	82	79	70	63	91	81	68	58
Question 4	77	87	67	73	83	79	78	70	89	82	78	65
Question 5	68	72	65	66	75	70	67	64	84	77	65	58
Question 6	55	61	50	59	68	63	52	54	79	67	53	37
Question 7	40	45	36	48	51	44	34	28	60	49	36	29
Question 8	70	73	68	73	79	77	69	63	85	77	70	58
Question 9 Time	87	90	83	94	94	91	84	70	95	92	88	76
Question 9 Temp.	72	78	66	82	80	75	68	51	87	79	72	57
Question 9 Both	71	77	65	82	80	74	68	49	86	79	71	56
Question 10	64	68	60	66	68	70	64	51	77	73	64	51

CORRECT ANSWERS (PERCENTAGES) ANALYSED BY TERMINAL EDUCATION AGE

	Total	TERMINAL EDUCATION AGE				
		14 or under	15	18-18	19-20	21 or over
Base	2,890	813	750	1,056	73	199
Question 1	88	81	80	91	91	94
Question 2	74	68	74	74	87	91
Question 3	72	57	70	78	92	94
Question 4	77	70	74	79	88	93
Question 5	68	60	65	72	92	90
Question 6	55	37	53	64	82	85
Question 7	40	27	35	47	69	72
Question 8	70	58	72	75	79	87
Question 9 Time	87	74	87	93	99	96
Question 9 Temp.	72	56	70	80	91	92
Question 9 Both	71	54	69	80	91	91
Question 10	64	65	62	67	84	84

We can see that, in general:

- (i) most questions are answered fairly well, but two (Q's 6 and 7) were answered correctly less than 60% of the time;
- (ii) men do better than women, but sometimes by no more than the expected margin of error³;

- (iii) the 25-34 age group generally do best, and the over 65s least well;
- (iv) social classes AB (professional and intermediate occupations) do best and classes DE (semi-skilled and unskilled) do least well.⁴

In addition,

- (v) the higher the terminal education age (another indicator for social class), the better the level of performance.

There is no breakdown according to race or ethnic origin; in any case, we would expect only about 3% of the sample, or fewer than 90 respondents, to be black.

In addition to these results, interviewers recorded whether each response was made in a 'confident' or 'unconfident' way and 'immediately' or after a pause for thought. In general, the higher the proportion of correct answers in a group, the more confidently and immediately the answer was given.

Though all of these ten questions were posed in a formal interview situation, all of them involved reasoning which might be required in an everyday situation rather than merely performing a pure sum in abstract. In particular, questions 3, 6, 8 and 10 seem fairly "practical" (UNPACK)

None of the questions required skill in critically assessing numerical information before doing calculations with it. However, one question (No.7) addresses an issue of considerable political and public policy importance - that of the meaning of the notion of 'inflation'.

Any of the wrong answers on this question indicate that the respondent will be substantially confused over an issue which has been widely discussed for at least the last 10 years, and which the current government has specified as a top priority.

³ The margin of error quoted by Gallup for a sample size of 1500 is about 3% for percentage results of 70 to 80%; thus any difference between the male and female subgroups of less than 6% would not be impressive (since it would possibly be due to sampling variation).

⁴ The corresponding margins of error for samples of size 500 are about 5%; thus only differences of 10% or more between social classes would be impressive.

It was by far the least well answered question. Note further that of the 54% of people answering this question incorrectly (with 5% "Don't Knows" or "No Answer"), about $\frac{1}{3}$ (or 17% of the whole sample) answered "Prices ought to have gone down, but didn't."

This particular incorrect answer may lead the respondent to be cynical about statistics and politicians and perhaps the media in a way that is, in this particular case, apparently not deserved.⁵

Another study (ALBSU, 1983) used data from the 4th follow up of the National Child Development Study (NCDS) in 1981, which interviewed some 12,500 British 23 year olds, about (inter alia) their experiences with literacy ("reading", "writing" and "Spelling") and numeracy ("number work" or "basic maths") since leaving school. The results were as in Fig.3.

	Literacy	Numeracy	Literacy or Numeracy
% of sample reporting problems of men	10%	5%	14%
% of sample reporting problems of women	12%	5%	
	7%	5%	Literacy and Numeracy 2%
% of those reporting problems who said this caused difficulties in everyday life	29%	27%	
	29%(men) 29%(women)	N.A. N.A.	
% of those reporting problems who had attended classes	8%	7%(est.)	
	10% of men 5% of women	10% 2.5%	
% of those reporting everyday difficulties who had attended classes	15%		
	20% of men 10% of women		

Fig 3 - Results on 23 year olds Literacy and Numeracy from the NCDS (ALBSU, 1983).

⁵ It is interesting to recall, however, Ted Heaths' 1970 election promise "We shall cut prices at a stroke" (and even Harold Wilson's 1967 post-devaluation claim: "The pound in your pocket will buy the same") as potentially misleading statements about inflation (and inflationary pressures, respectively).

There are two points to keep in mind when comparing these results with the ACACE's results from the Gallup study, also done in 1981. First, the NCDS results are based on the individual's own assessment of his or her skills, whereas the ACACE's include scores on 11 skills questions (considering the 2 parts of question 9 separately). The 95% reporting no problems in the first should be compared with a 73% average of correct answers on the 11 skills questions for the 16-24 age group (n = 529), on the second; the 5th percentile for this age is 3 questions correct. It appears that respondents' self-ratings of their numerical skills may be over-optimistic - or alternatively the ACACE questions were invalid, formulated at too high a level.^{6*}

The second point arises from the fact that all respondents in the NCDS study were 23 years old. The best performance in the ACACE study of all age groups was that of the 25-34s - an average of 78% of questions correct, but the overall average for all age groups was only 78% - even lower than the 16-24 year old results. Thus we could reasonably expect the level of skills in the adult population to be even lower than portrayed in the NCDS data.

These two surveys are the only large-scale ones (so far known to me) which allow us to assess the level of adults' skills in the areas of numeracy; further, the ACACE study allows us to estimate inequalities in this area related to social class and gender, as does the NCDS for gender, and as it could do for social class (and also perhaps for ethnic/cultural origins?)

Before leaving these two surveys I should discuss the work of Sewell (1981). Some months before the Gallup survey, Brigid Sewell was commissioned by A.C.A.C.E. and the Cockcroft Committee "to provide evidence and information on the mathematical needs of adults in daily life, so as to identify the fundamental skills and understanding needed" (p.1). Her definition of numeracy as aiming to help adults "to handle with confidence such mathematics as they encounter in daily life", and her wanting to emphasise "functional" competency rather than abstract concepts, is supportive of my emphasis on aspects of numeracy to do with confidence and practicality.

6. However, the ALBSU was quoted recently, as believing that during National Numeracy Week (TES 9 Sept. 1983), in 4 adults are not able to calculate change from £5 for 1 item. (This estimate of 25% having difficulty calculating change from £5 seems acceptably close to the 30% average of wrong answers for all adults of the ACACE skills questions, and acceptably close to the 30% wrong answers from question 8, about savings when a coat, originally priced at £44, was bought for £29.50).

Sewell decided to interview members of her sample twice: the first time to "ease tension", to discuss selected situations in which maths might be used (numerical "needs"), and the respondent's attitude to mathematics and the second interview to discuss in detail strategies for solving, and actual answers for, problems chosen for their common relevance. The sampling method might be called "multiple snowball recruitment" with the snowballs starting from the enquiry officer's friends, colleagues, adult numeracy classes, WEA class, and Open University introductory course for ... the Arts Foundation Course). Thus 107 respondents were recruited for the first interview, and their representations is acknowledged as a problem (pp.10-12).⁷

Besides the indication of how widespread were various needs for numeracy, the first interview produced some indicators of attitudes in two senses. First, the refusal rate for the first interview was about half (p.11) and the enquiry officer attributed this to potential respondents' perceptions of maths as a "daunting subject" (p.11). Second, in answer to Question 22. "Do you enjoy working with numbers?", half the sample said yes and the other said no "with varying degrees of antipathy"; in answer to Question 23: "How well would you say you can manage in everyday situations when numbers are involved?" 76% answered "very well" or "all right", 18% "mostly" and 5% "with difficulty". The unsolicited remarks about the experience of maths were much more negative (p.16).

The most useful indicator of numeracy as a critical capacity was again a question of inflation.⁸ The answers were: 32% correct; 44% wrong (e.g. falling inflation means prices should fall, but they don't: "it's all a big con trick!"); 14% don't know; all of the preceding answers were given confidently, with only 10% being ambiguous or incomprehensible. (These percentages are for n = 50 for the second interview, for which a number of respondents, considered to have interesting patterns of experiences with and perceptions of maths, were selected from 3 bands of competency - depending on facility with percentages - produced at the first interview.) [...]

⁷ The representativeness of the sample could be assessed further by comparing its breakdown on age, number of years of initial education and occupational class, with the breakdown of the national population of adults. Further its responses on the competency questions in the second interview could be compared with those from the Gallup national sample, which used two or three questions very similar to several in Sewell's second interview; however, these would be difficulties of comparison because of the different contexts of the responses in the two interviews and because of the slightly more complex (i.e. practical) formulations for the questions used by Sewell.

⁸ The wording of this question was as follows:

"On the news recently, it was said that the annual rate of inflation had fallen from 17.4% to 17.2%. What effect do you think this will have on prices? (If answer 'NONE') What do you think ought to happen if it had fallen to, say, 12%?"

REFERENCES

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Buxton, Laurie (1981) Do you Panic about Maths? Coping with Maths Anxiety. London: Heinemann.

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Things you might have missed.

From the latest BSSRS Bulletin (November, 1984), in a report from the Agricapital Group, by Tim Lang:

"Currently, the politics of food is reemerging on the political agenda for the first time in 40 years. This is, in my humble opinion, not unconnected with the recession. The 'Look After Yourself' healthy eating neurosis bears strong resemblance to what happened in the 1930's. This time, however, the Left has failed to look beyond the bland experts' assurances that people have enough to eat. This is where the contradictions of the anti fats, salt, sugar and lack of fibre argument come in. These issues ... are commonly seen as the 'problems of affluence'. But look around you, have you noticed (Rad Stats, back me here please) that not everyone is 'average'. As unemployment grows, benefits are tightened and taxed... Meanwhile a middle class attack on food processors misses the political and economic reality that it is retailers who call the tune in the UK food system..." (Emphasis added: it's nice to know we're wanted, even if I'm not completely clear what precisely is required in the way of backing.)

BSSRS Speakers List: BSSRS is compiling an up-to-date speakers list, and also a list of contacts who are prepared to provide occasional advice upon their areas of interest or - dare I say it? - expertise. Volunteers from Radstats especially are sought - please write to Kate Godwin at BSSRS (9 Poland Street, London W1V 3DG), providing the following information:
Name, Address, Telephone numbers.

Areas you are willing to speak on.

Are you prepared to travel if expenses are paid?

How often are you prepared to speak?

Do you prefer certain types of audience? If so, which?

Areas you feel you could answer general queries on (list in descending order of ability)