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The Growth of the Canadian Education System: An Analysis of Transition Probabilities

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ABSTRACT

Canada is shown, in a comparison with 23 other industrialized nations, to have distinctively low rates of school attendance from age seventeen onwards. Closely comparable data from a Canadian and an American national survey make a detailed comparison of the two nations possible. There has been a strong trend towards virtually universal completion of grade and high school in the U.S. Canada has followed this trend at the lower levels, but retains a low rate of secondary school completion. Rates of attending post-secondary and post-graduate training show little trend in either country. The "transition probability" analysis, in which each level of schooling is examined separately, is further pursued in an assessment of the effects of social background factors, called "ascription," upon progress through the system. Background factors are found to have generally weaker effects upon higher levels of education in Canada, as in the U.S. They are especially weak at the crucial point, the completion of high school, showing that social background is not a significant element in the creation of Canada's high rates of dropping out of high school. The overall effects of background seem higher in Canada, and especially so for females.

RÉSUMÉ

Si l'on compare le Canada à vingt-trois autres pays industrialisés, on remarque que celui-ci a un taux particulièrement bas de jeunes qui fréquentent l'école après dix-sept ans. On a pu comparer de façon précise la situation du Canada et celle des États-Unis, grâce à des sondages organisés à l'échelle nationale dans les deux

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pays, sondages dont les données étaient très semblables. On a ainsi pu constater qu'aux États-Unis, il semblait de plus en plus fréquent que tous les élèves, ou presque, finissent l'école secondaire tandis qu'au Canada, cette tendance n'apparaissait qu'à un niveau inférieur, le nombre d'élèves capables d'aller jusqu'au bout de leurs études secondaires restant très faible. Quant à l'inscription dans des établissements postsecondaires ou dans des centres professionnels, elle ne semble indiquer aucune tendance particulière dans les deux pays. L'analyse de « transition-probabilité », pour laquelle on a considéré chaque niveau d'enseignement séparément, est complétée ici par une évaluation des effets du milieu social, ou « ascription », sur la progression dans le système. Les facteurs sociaux semblent avoir des effets moindres dans les classes les plus élevées de l'école secondaire, au Canada comme aux États-Unis. Or, s'ils sont particulièrement faibles à ce moment crucial, en fin d'études secondaires, cela montre que le milieu social n'est pas un facteur qui contribue à déterminer de façon significative le taux élevé d'abandon dans les écoles secondaires du Canada. Malgré tout, le milieu semble jouer un rôle plus marqué au Canada qu'aux États-Unis, surtout pour les femmes.

INTRODUCTION

A striking difference between Canadian and American society is the comparatively low level of schooling in the former. Canadian under-education preoccupied both John Porter, in *The Vertical Mosaic* (1965:53–4), and S.M. Lipset's widely noted comparison of the english-speaking democracies (1963:261). One explanation would be that ours in a highly ascriptive society. "Ascription" in sociological studies of education refers to the extent to which social background traits such as socioeconomic status or ethnicity determine the level, or years, of education a person attains. That ascription in post-secondary educational attainment was especially high in Canada was a dominant theme of 1970s research (George and Kim, 1971; Breton, 1972; Porter, Blishen, and Porter, 1973; Gilbert and McRoberts, 1977; Anisef, 1977; MacKinnon and Anisef, 1979; Porter, Blishen, and Porter, 1982).

Recent results by Guppy *et al.* (1984) and by Wanner (1986:61,63), however, have re-oriented explanation of Canadian under-education. While all agree with earlier researchers that ascription exists within Canada, Wanner, analysing equivalent surveys from Canada and the US, found little evidence that inequalities in access to American education were any less than in Canada. Linkage between total years of schooling and social background was roughly comparable across the two societies. Wanner also did level by level analysis, following a style developed by Mare (1979, 1981). This detailed analysis, treating the acquisition of each level of education as a separate statistical problem, revealed essential Canada-US equivalence in ascription in the transition from high school attendance to

completed high school, and from completed high school to post-secondary. It seemed that either retention rates tend across all socio-demographic groups to be lower in Canada or that ascription occurs in different form, and more intensively prior to the late secondary and the post-secondary levels, in Canada than in the US.

We endeavour in this paper to build upon the work by Wanner and by Guppy *et al.* in two respects. First, ascription is examined from the elementary level on. Second, our analysis proceeds from the conviction that in the Canadian context "social background" should be defined broadly, to include gender, ethnic, regional and religious inequalities. Wanner, in order to maintain explicit comparison with the US data, limited attention to males and to five social background variables: father's education and occupation, farm background, broken family, and number of siblings. Guppy *et al.* focused upon father's occupation alone. While our analysis retains the US as a comparative yardstick, the comparison necessarily becomes loose. Indeed, we maintain that conceptually no more than broad comparison is possible in such work. Not only are the two education systems structured somewhat differently, as Wanner nicely described (1986, 50–52), but variables such as "broken family" entail dissimilar meanings. In the US a code for broken family largely reflects the weaker family structure among blacks, while in Canada early departures from the home by a child account for much of the family dislocation (Boyd *et al.*, 1985:207).

From the recent style in educational research, it might be thought more fitting to write of American over-education than Canadian under-education. The tradition of Berg (1970), Boudon (1974), and Collins (1979) insists that high US rates of formal education reflect excessive credentialism. Even granting that controversial (e.g., Burris, 1983; Rubinson, 1986) thesis, however, Canadian education remains a striking international anomaly.

The anomaly is demonstrated in Table 1, a descriptive tabulation comparing full-time enrolment rates for ages 15–20 in 24 industrialized societies. Entered in the table is mean enrolment for the countries, together with Canadian and US figures adjusted for level of economic development, indexed by per capita national income. Equations for estimating enrolment from national income were computed for each level. The prediction capitalizes on the linkage between economic development and level of education (Carroll, 1981; Walters and Rubinson, 1983), without pre-judging cause and effect. As notes to Table 1 show, the relationship is strong, but diminishes with ascending level of education, as expected from Collins (1971:1006). The table gives enrolment rates adjusted for economic development. (Statistical details appear at the bottom of the table.) The comparison year, 1970, is appropriate since the survey data used below date from the early 1970s.

Results of the adjustment reveal that Canada compares favourably with the other industrial countries until ages 18–20 – the post-secondary population, in other words. For the eighteens, Canadian educational retention becomes about typical (although one should discount for the stronger apprenticeship tradition in Europe), but for the 19 and especially 20 year olds, Canadian enrolments fall well below the cross-national norm. Educational retention among Canadian 15 and 16 year olds

Table 1: Enrolment Rates Adjusted for Level of Economic Development: Canada and USA, 1970

Percent Enrolled	Mean for 24 industrial societies*	Canada (adjusted)	USA (adjusted)
Age Level			
15	72.5	92.9	84.6
16	56.8	83.2	80.5
17	44.5	68.1	71.4
18	29.3	32.9	37.7
19	21.3	16.5	23.4
20	16.8	9.8	17.0

*Source: "The Educational Situation in OECD Countries." Organization for Economic Co-operation and Development. Paris, 1974, pp. 23-34.

Notes on adjustment: Source for per capita national income is Statistical Yearbook, Dept. of Economic and Social Affairs, United Nations, 1973 and other years. The regression equations linking enrolment and national income are, with Y=logit transformation of predicted enrolment, and X=per capita national income, 1970 dollars equivalent:

Age 15:	Y=.000514X - .425	R square= .653
16	Y=.000300X - .453	= .459
17	Y=.000221X - .572	= .309
18	Y=.000124X - .719	= .282
19	Y=.000098X - .876	= .262
20	Y=.000097X -1.024	= .256

Adjusted = Grand mean at each level - regression residual

actually exceeds the US average, but from age 17 on the familiar pattern of higher retention in the US appears. The key point of the table is that once into the post-secondary phase of formal education, the US becomes the more "typical" society, with Canada the anomaly.

As already implied above, our work derives conceptually from Mare's (1979, 1981) analysis of US education. Mare's essential point was that educational attainment should be analysed level by level, and generational cohort by generational cohort, rather than simply in the global sense of years completed. For Canada, his work is important for (i) stressing that educational rates in a contemporary cross-section of a population average out potentially massive historical change in educational enrolment, (ii) showing that the retention rates are also cumulative, in the sense that one level of education typically requires successful completion of an earlier one. Starting from a lower base, Canada

industrialized at an even faster pace than the US, during the 20th century (Boyd *et al.*, 1985:190). A plausible hypothesis would be that low Canadian educational retention among 19 and 20 year olds is an historical legacy that will fade. And from Mare's second point, the notion must be entertained that the low post-secondary enrolments derive not merely from the barriers of social background (as defined in the broad sense suggested above) or disinclination causing Canadians with post-secondary education to foresake further studies, but from checks that early in the educational system pare down the pool of eligible 19 and 20 year olds.

Data

The data for this analysis come partially from the Canadian censuses of 1976 and 1981 but principally from the Canadian Mobility Study, hereafter CMS (for details see Boyd *et al.* 1981, 1985). This data set is sufficiently large to generate estimates of transition probabilities across age cohorts. ("Transition probabilities" is a term from Mare referring to the probability that people who have completed one level of education will enter the next higher level.) The CMS is also valuable since it was designed to be a Canadian equivalent to the Blau and Duncan (1967) and Hauser and Featherman (1976) studies in the US and these are the data sets used in the US research. The CMS survey cannot provide recent estimates of educational achievement, for several reasons. It is now somewhat dated, having been conducted in 1973; the educational experiences of the recent cohorts in such a survey are not complete (Hauser and Featherman, 1976:102), and there is evidence that for the most recent cohorts in Canada longstanding patterns of achievement have been somewhat disrupted (see Goyder, 1980; Harvey and Charner, 1975). In addition, the Canadian survey purposively omitted all cases of young adults still in school. These limitations have little bearing upon our analysis which focusses upon the long term trends revealed particularly by the cohorts born between 1907 and 1946.

The comparison of the Canadian results with those from the US can be close but not perfect. The questions soliciting educational level in the two countries are almost identical when it comes to measuring early years of schooling but the studies differ in their measurement of post-secondary education. The Canadian research probed into the kinds of post-secondary education undertaken while the US study measured only "years in college" leaving undefined what is meant by college. Also the US study contains no direct information on females.

Basic Findings: Transition Probability Tables

Table 2 presents transition probabilities across the levels of schooling, for males and females, divided into five year cohorts according to year of birth. The logic of the table is straightforward, with one exception. The entry in the top left cell (.85 for males) indicates that of all the males captured in the survey and born between 1907 and 1951 inclusive, 85 percent reported they had at least completed primary school (i.e. grade 8). But from this point on down in the table each probability is

Table 2: Probabilities of proceeding to the next level of schooling by cohort (Canadian Mobility Study data)

			Cohorts born:								
		TOTAL	1907 -11	1912 -16	1917 -21	1922 -26	1927 -31	1932 -36	1937 -41	1942 -46	1947 -51
Complete Primary	M	.85	.66	.75	.77	.80	.83	.86	.90	.94	.96
	F	.87	.73	.78	.82	.83	.84	.87	.91	.94	.96
Some High	M	.83	.66	.72	.74	.73	.80	.81	.86	.92	.95
	F	.83	.67	.73	.76	.77	.76	.82	.85	.92	.95
Complete High	M	.68	.62	.63	.63	.64	.64	.64	.71	.73	.73
	F	.69	.69	.64	.64	.65	.66	.63	.68	.74	.76
Postsec	M	.70	.70	.65	.63	.71	.72	.74	.75	.74	.66
	F	.69	.69	.69	.67	.68	.70	.72	.71	.73	.64
Some Univ.	M	.49	.47	.46	.49	.47	.49	.52	.52	.54	.46
	F	.29	.28	.29	.24	.25	.26	.26	.28	.30	.33
Complete Univ.	M	.56	.50	.41	.58	.55	.63	.60	.64	.59	.47
	F	.45	.38	.35	.37	.44	.40	.46	.49	.49	.48
Postgrad	M	.47	.57	.56	.49	.52	.56	.63	.50	.45	.19
	F	.27	.30	.40	.29	.39	.43	.33	.33	.22	.16

based on the sub-set which successfully survived the earlier transition. Thus the next entry for males (.83) indicates that of those completing primary, 83 percent then went on to high. Computing the transition probabilities isolates each level of schooling from the effects of shifts in probabilities at earlier levels. Multiplication produces the probabilities for the whole cohort, as .85 × .83 or 70.6 percent reported some high school attendance.

The transition probabilities in Table 2 are as close to identical in computation as possible to those given for the US by Mare (1981: 79–80), except for the different treatment of the post-secondary levels discussed above. Comparing the Canadian results to Mare's data (not given) shows Canada has lagged throughout this century in both the proportions completing primary schooling and those entering high school, but has been catching up. For Canadian males at the beginning of the century, the probability of completing primary schooling lagged 17 points behind the US. The most recent cohort shows only 2 points difference.

It is at the next level of schooling – the completion of high school – that the greatest US Canadian difference emerges. Among those who entered, some 91 per cent of the most recent US cohort successfully completed high school; in Canada for the same cohort only 73 percent of the males and 76 percent of the females did so.[1] The percentages have not been so low in the US since the 1912 to 1916 cohort, and Canada is falling behind rather than catching up. In the oldest cohorts, 70

percent of US males who entered high school subsequently completed and 62 percent of the Canadian males did so. This difference of 8 points widens to 18 points in the most recent cohort of males. High school drop-outs are now rare in the US but still common in Canada. As a result, for the male cohort born 1947–51 only 12 percent in the US entered the labour force with less than high school graduation compared to 33 percent in Canada.

The US analysis gives an estimate of some 55 percent of those completing high school going on to some form of college. For Canada, with a broader definition of post-secondary education, the equivalent percentages are 70 for males and 69 for females. More closely equivalent data would probably reduce this gap or even reverse it, but the propensity to continue into some form of post-secondary education is substantial in Canada. Among those who do enter some post-secondary schooling, in Canada, a total of 49 percent of males and 29 percent of females enter university. Multiplying the probabilities ($.70 \times .49$ for males and $.69 \times .29$ for females) provides estimates that 34 percent of the males and 20 percent of the females with high school graduation have entered the Canadian universities. No equivalent estimate is possible from the US data. Among those entering "college" in the US a total of 55 percent of males complete the program, defined as attending four complete years. For Canada the equivalent, defined as obtaining the B.A., is 56 percent. Finally, among those who complete university, 50 percent of the males proceed to post-graduate work in the US and 47 percent in Canada.

Despite the problem of equating Canadian and American post-secondary systems, the two nations show a common and interpretable pattern. Unlike the lower levels of school, at the post-secondary level there is no clear trend toward higher transition probabilities. The final cohort must be discounted here since it includes many with incomplete education. Among the oldest males, 70 percent of those who completed high went on to some form of post-secondary, and this rises only to 74 percent in the cohort born in 1942–46. For the same cohorts the percentages are 69 and 73 for women. Among those going to university, the trend varies irregularly from 47 percent to 54 among males and from 28 to 30 percent among women. Rates of completing university after having entered are again essentially stable, ranging irregularly for males from 50 to 59 percent and from 38 to 49 percent among females, again excluding the youngest cohort. The rates of attending post-university appear to fluctuate haphazardly across the cohorts.

Thus in Canada, and for males at least in the US, there is little trend in the propensity to seek out or complete training at any level beyond high school. In both countries the changes in rates of attendance at the highest levels of schooling have resulted almost solely from changes at the lower levels, particularly in the proportions completing high school. American academics note that as high school completion is now almost universal and the transition probabilities beyond this level are stable no future growth in university enrolment, beyond general population growth, should be expected. In Canada, the important dynamic, the

Table 3: Probabilities of proceeding to the next level of schooling by Cohort, from the 1981 Census of Canada

		Cohorts born:										
		UP TO 1906	1907 -11	1912 -16	1917 -21	1922 -26	1927 -31	1932 -36	1937 -41	1942 -46	1947 -51	1952 -56	1957 -61
Complete Primary	M	.56	.65	.71	.75	.77	.79	.83	.88	.92	.95	.97	.97
	F	.66	.69	.74	.76	.78	.81	.84	.88	.91	.95	.98	.98
Some High	M	.64	.68	.72	.76	.78	.81	.84	.89	.93	.95	.97	.96
	F	.70	.74	.77	.79	.82	.85	.88	.91	.94	.96	.97	.97
Complete High	M	.55	.55	.57	.60	.62	.64	.66	.71	.76	.79	.74	.61
	F	.56	.55	.53	.53	.56	.58	.59	.64	.71	.76	.75	.69
Postsec	M	.79	.77	.77	.79	.81	.80	.81	.82	.82	.82	.78	.62
	F	.73	.74	.70	.70	.70	.71	.71	.72	.73	.71	.69	.60
Some Univ.	M	.52	.47	.42	.41	.44	.41	.42	.45	.47	.47	.42	.23
	F	.33	.35	.35	.33	.32	.34	.34	.37	.40	.44	.41	.25
Complete Univ.	M	.62	.57	.56	.58	.59	.60	.60	.62	.64	.61	.56	.29
	F	.32	.33	.33	.36	.38	.41	.40	.43	.48	.55	.56	.34
Postgrad	M	.30	.33	.35	.32	.33	.38	.41	.43	.38	.28	.17	.06
	F	.29	.33	.33	.31	.31	.31	.31	.30	.28	.24	.18	.07

Source: Custom tabulation from the 1981 Census of Canada. Computations exclude those currently attending school full time.

completion of high school, is far from universal and it is showing a slow upward trend. Thus gradual increases in the Canadian university population should be predicted.[2]

Evidence from the Canadian Census

Table 3 parallels Table 2, giving the transition probabilities for males and females, by cohorts, based on information from the 1981 census of Canada. Differences in the question wording and tabulation categories result in a somewhat different table and one which can less readily be compared to the US results. As a second source of data for Canada, Table 3 modifies some observations based upon Table 2 and confirms others.

The first observation from Table 3 is that the long-term trends both in completing primary and in subsequently attending high school have continued throughout the late 1970s, now approaching 98 percent for both males and females. The census results also confirm that the proportions completing high school are appreciably lower in Canada than in the US, and that the difference is not eroding. The two further cohorts provided by the census show generally lower rather than higher rates of high school completion than did the final cohort of Table 2.

The census data detect a much stronger trend across the cohorts in the proportions completing high school than is shown in Table 2, possibly owing to

different classification of those who have attempted some post-secondary training, as mature students, without having high school completion. While the sample showed an increase of only 10 percentage points across 45 years, the census finds an increase of over 20 points across the equivalent cohorts. This would be crucial to any prediction about how quickly Canada is likely to approach the US rates of high school completion. If the census trend were to continue, the catch-up to current US levels would be achieved before the year 2020; the sample suggests a much later date. Evidence from the final cohorts in the census hints that the trend may, however, be slackening – the fall-off in the final cohorts at this level is greater in the census than was observed earlier in the sample or in the 1976 census (Statistics Canada, 1978).

Rates of attendance at post-secondary levels given high school graduation appear higher in the census data than in the sample, at least for males, and the census confirms the absence of any trend in the rate. The fall-off in completion rates for the youngest cohorts at these higher levels of schooling is again the inevitable consequence of incomplete education.

The census estimates for attendance at university, given some post-secondary, are higher than in the sample, particularly for females, partially because academically oriented programs in community colleges are included as "university" in the census but not in the sample. However, other factors must also be at work, since the attendance at community college cannot have been frequent in the earliest cohorts. In any case, for the men, the census confirms the observation from the CMS sample that there is virtually no trend toward greater attendance at the university level given entrance into post-secondary education. Some evidence of a modest trend can perhaps be seen in the data for females. Little trend for men is to be observed in the rates of completing the university work after having entered although there is some positive direction. The trend is larger for women. Finally, the census gives much lower estimates of the proportions with the B.A. going on to further work.

Socioeconomic "Bias" in Schooling

We now return to a more intensive analysis of the CMS data, and the issue of ascription as an explanation for the under-education of the Canadian population. Following Mare (1981), logistic regression models were constructed for educational transition probabilities. In specifying the model, we built, as noted earlier, on Guppy *et al.* (1984), and Wanner (1986). The strategy was to assemble summary indicators for three broad groups, or "sets" (Cohen and Cohen, 1975:124) of background factors. The first combined information on the city size and region characterizing the respondent's childhood years. "Family background" forms the second set and comprises essentially the variables analyzed by Wanner, although the scheme is rather more exhaustive and definitions sometimes different. Finally, the variables describing the respondent's ethnicity, religion, country of origin, and language were combined into an ethno-religious set. The

conceptualization of sets resembles one developed by Beach and Finnie (no date). An important part of our strategy was to minimize missing data. Missing data, when more than trivial (in which case means were inserted but no further action taken) were handled using dummy variables (Cohen and Cohen, 1975: 274–79).[3]

Along with the three summary variables, gender and age were analysed. Gender is important, of course, because studies of access to university (e.g., Porter, Blishen, Porter, 1973; Breton, 1972; Anisef, 1977) have consistently revealed important sex-role differences. Age has usually been handled by Mare (1981) and others by computing separate regression equations for age bands, coded as narrowly as the analyst dares. A cleaner procedure, followed here, is to retain the reality that age is continuously distributed, and enter years of age directly into analysis, as a main effect and in interaction with gender.[4]

The strategy entailed, then, a model with seven main effects – community, social background, ethnicity, gender, age, and, to correct for aberrant results for the youngest and eldest cohorts, dummy variables identifying under 27 and over 76. Education among the under 27s is biased by programs not yet complete and for the cohort aged over 76 educational attainment may relate to mortality. Since the analysis was intended to yield the same information given by separate runs for combinations of age and gender, the three sets, community-region, family background, and ethno-religion, were specified in two way interaction with age (linear aspect) and gender.

Logistic regression results from the models, for the seven education transitions starting with completes primary and culminating in completes post-graduate or professional education, are presented in Table 4. Logistic regression uses a dependent variable of the form log(p/1-p) where p is the probability of (in this case) transition to a higher education level. See Mare (1981) for details. The first column in each section presents the estimates for a main effects model (model 1) while interactive effects are included in the second model. The first two terms in the main effects model, gender and age, express, with statistical control for background endowments, findings already seen in simpler form in Tables 2 and 3. Thus, the coefficient of $-.041$ for age in model 1 reveals for example that older respondents are less likely than the young to have completed primary school, assuming equivalence on social background (as understood in the threefold sense defined above).

Back transformation (explained in Mare, 1981) clarifies the meaning of effects in the model. A sub-population possessing a combination of background circumstances entailing a logit of .5, for example, would carry a .62 probability of completing primary school. Those a generation (say, 30 years) younger with the same background endowments would hold a logit $((-30)(-.041) + .50) = 1.73$, equivalent to p of .85, 23 points higher than for the first group. But if the comparison involved a high SES endowment group with, say, $p = .90$, the 30 years later increment would only rise to $p = .97$. The purpose of logit transformation is, of course, precisely to statistically model the so-called "ceiling effect" in educational transition. If 99 percent of one group achieves primary

school, for example, the theoretical maximum for another can only be one percentage point higher, and the transformation corrects for that.

Gender is scored in the model as male = 0, female = 1, meaning that a positive logistic regression coefficient denotes high completion probability for women, and *vice versa*. The coefficients are positive at early transitions, but this net educational advantage of females over males declines at later transition levels, the Table 4 main effects (model 1) reveal. By the non-university post-secondary level, the coefficient changes sign, meaning that from this level onward males gain the advantage over women. None of the (model 1) positive coefficients for females, at early transition levels, achieves .05 significance. Since the case base in each computation is large (around 10,000), it can be concluded that even in a statistically powerful test the sex difference is too trivial to be generalizable to the population. In contrast, the coefficients for some university and higher levels are .01 significant, even for transition levels where case size falls below 10,000.

The main effects for age capture historical development of the Canadian education system, but a development adjusted for changes in the Canadian occupational structure, urban/rural and provincial mix, ethno-religious composition, and even (from the control for parental education) for educational development a generation earlier. The main effects reveal that such is the strength of historical change in educational completion levels that even in this rather artificial sense the probabilities of transition have increased over time, to a statistically significant degree at most transition levels. For example, of two people holding an identical socio-demographic profile but aged, say, 30 and 60, the odds of educational transition would favour the 30 year old – the person more recently moving through the education system – at every level excepting only the final transition, the completion of post-graduate work. The age coefficients reveal, however, this net historical trend to be most pronounced at early transition levels. In particular, the failure of Canada to achieve historical upgrading in high school graduation, noted in earlier discussion, re-appears in Table 4 as a system characteristic. That is, the failure is not attributable merely to shifts in the social composition of succeeding historical cohorts (compare age main effect of B = −.033, significant, for some high school, −.001, not significant, for completes high school).

The three social background factors, community/region, family background, and ethno-religious background, reveal main effects typical (e.g., Mare, 1981) of educational transition analysis. For each component of background, ascription is greatest at early transition levels such as the completion of primary, and dissipates with succeeding levels. As noted earlier, socioeconomic bias does not disappear, because the probability of completing a level of education is derived by multiplication of probabilities for preceding levels. Nevertheless, the Table 4 main effects for endowment factors underline that if a disadvantaged category within a society can be brought through the highly ascriptive earlier hurdles of educational completion the final gates pose diminished barriers, even though being far from fully egalitarian. Two deviant patterns qualify that general conclusion. On

Table 4a: Logit Regression Estimates of the Determinants of Transitional Probabilities

	Completes Primary		Some High		Completes High		Post-secondary	
Model	1	2	1	2	1	2	1	2
Intercept	2.810**	2.818**	1.656**	1.841**	.599**	-.756**	-.249*	-.436
Main Effects								
Gender	.075	.102	.015	-.054*	.014	-.493**	-.013	-.638**
Age	-.041**	-.042**	-.033**	-.034**	.001	.004	-.005**	.002
Community,region	8.810**	10.805**	6.645**	9.090**	.962**	9.994**	4.808**	1.229
Family Background	12.775**	10.913**	9.275**	11.375**	.574**	6.930**	4.971**	6.661**
Ethno-religion	8.469**	-.092	7.196**	1.338	.472**	8.847**	5.138**	4.015
Young	.412**	.396*	.635**	.622**	.235**	.223**	-.353**	-.363**
Old	.440**	.362*	.068	.044	.032	.005	.107	.080
Two Way Interactions								
Gender*Age		-.001		.007		.008**		.011**
Gender*Community		- 2.232		- 1.536		-3.052**		5.947**
Gender*Background		.462		-.839		.965*		.697
Gender*Ethnicity		5.134**		6.448**		-3.117*		.932
Age*Community		-.011		-.030		-.056		.052
Age*Background		.030		-.042		-.044**		-.051**
Age*Ethnicity		.098**		.006		-.023		.001
Community*Background		- 6.534		10.283		-4.060		-5.937
Community*Ethnicity		-19.488		-28.216		13.559		-6.911
Background*Ethnicity		5.979		17.202*		-4.577		2.286
"R Squared"	.538	.541	.445	.449	.186	.190	.147	.149
N (weighted)		40,709		33,823		27,376		18,713
(Used in analysis) ‡		10,151		10,357		10,605		10,950

* P<.05 ** P<.01

‡ Cases randomly omitted to match computer resources

Table 4b: Logit Regression Estimates of the Determinants of Transitional probabilities

Model	Some University 1	Some University 2	Completes University 1	Completes University 2	Completes Postgraduate 1	Completes Postgraduate 2
Intercept	-2.092**	-2.717**	-.767**	-1.043*	-.583**	-.854**
Main Effects						
Gender	-.963**	-.604**	-.461**	-.509	-.880**	-.684*
Age	-.001	.010	-.012**	-.015	.013**	.020**
Community region	5.063**	8.176**	4.335**	1.525	4.602**	1.566
Family Background	4.813**	6.110**	4.341**	5.466**	5.069**	6.914*
Ethno-religion	4.815**	7.775**	4.434**	6.639**	4.793**	2.255
Young	-.136*	-.153*	-.463**	-.457**	-1.032**	-1.028**
Old	.118	.062	-.059	-.074	.028	.131
Two Way Interactions						
Gender*Age		-.003		-.009		-.002
Gender*Community		-1.582		-.079		1.051
Gender*Background		-.708*		2.056**		-1.409
Gender*Ethnicity		.565		-.329		.709
Age*Community		-.054		-.134**		.049
Age*Background		-.019		.006		-.041
Age*Ethnicity		-.053**		.015		.049
Community*Background		2.367		19.185*		14.053
Community*Ethnicity		-23.321*		24.103*		2.819
Background*Ethnicity		-3.419		-10.697		4.965
"R Squared"	.152	.153	.061	.066	.133	.135
N (weighted)		12,979		4,924		2,528
(Used in analysis)		12,979		4,924		2,528

* P<.05 ** P<.01

balance, completion of non-university post-secondary education is less ascriptively determined than completion of the next level, some university (compare main effects "R-square" of .147 and .152 respectively).[5] "Non-university post-secondary" is an amorphous collection of various educational types, but it is fair to conclude that institutions such as Ontario community colleges and CEGEPS in Quebec have fulfilled some of their designers' hopes for broadening access to higher education. Post-graduate completion presents the second deviant pattern, with a main effects "R-square" of .133, more than twice as large as the "R-square" for completes university, meaning that access to this level remains constricted.

The discussion of main effects in Table 4 is completed by noting that the dummy variable code for cohorts aged under 27 proves of enduring importance (and statistical significance) at every transition level. The dummy code for the aged 76 and over cohort is, according to the Table 4 significance test for main effects, a peculiarity of the completes primary level.

The interaction models in Table 4 investigate the possibility that slopes for predictors are inter-dependent. The interactions as a whole add significantly to the overall explanatory power of the model for all transition levels except the completion of post-graduate work, as tested using the chi square distribution for the decrement in the log likelihood ratios.[6] Gender interacts significantly ($p = .05$ or lower) with age, community, family background, and ethno-religion although the alignment of significant terms varies across transition levels. At completes primary, for example, the term for gender by ethno-religion is .01 significant. The interaction term coefficient, 5.134, means that the main effect of gender becomes strongest for women of high ethno-religious status and, equivalently, that ethno-religious ascription in primary school completion is greater for women than for men. In total, across all seven completion levels, ten interactions by gender are significant, and seven of these are positive. We conclude, on balance, that the Canadian educational system acts more ascriptively upon women than on men.

It is already known from the main effects that historical upgrading in Canadian education is massive. The interactions for age show how Canadians of varying endowments have shared in the upward trend. Five of the 21 age-related interaction terms with social background pass significance, all at the .01 level, and four of these are negative, meaning that ascription assumes greater importance in recent cohorts. The interactions seem randomly spread over the three varieties of endowment – community/region, family background, and ethno-religion. At the completes high school and non-university post-secondary levels, for example, family background interacts negatively with age. At some university, in contrast, ethno-religion generates the trend.

The finding of traces of increasing ascription in education concurs wth Mare's results and, in Canada, with Wanner's (1986:63) analysis of a simpler model for native-born males only. Guppy *et al.* (1984:328) prove correct in predicting that declining ascription for father's occupation would not hold for ascription understood in a broader sense. An attempt at interpretation of the interactions with age appears below.

CONCLUSIONS

Transition probabilities by cohort, whether from the CMS data or the census, revealed steady progressions towards virtually full attendance at the lower levels of schooling in Canada. At this point the Canadian system duplicates the US pattern, with some years of lag, and the lesser affluence of Canada could explain the lag. At the level of high school completion, however, rates in Canada are much lower and there is only a modest historical tendency for them to rise. Given this, an attempt to explain the difference from the US would require an immediate complication of "lag theory." Beyond the level of high school completion the Canadian data detect yet another pattern. The Canadian system becomes, with the exception that lower levels of high school completion reduce the numbers of starters in the higher levels, otherwise remarkably similar to the US. Thus there is considerable complexity in comparison of the two systems.

Mare, using logistic regression, found for the US that the power of social stratification variables, and of other sociological variables, diminished in capacity to predict successful transitions at the higher levels of schooling. Our finding is essentially the same, although the drop is less regular in Canada (compare the R squares of Table 4 with Mare, 1979:66). At the lowest levels of schooling the "R square" representing the explanatory power of our several social variables is as high as 54 percent. At the highest levels it is as low as 6 percent. The post-graduate level is a major exception, with the statistic some ten times larger in Canada than in the US. Inclusion of women in the sample in Canada is part of the reason for this, but is not likely to be the whole. With these exceptions noted, in Canada, as in the US, the influence of social background peaks in the earliest years of school and subsequently diminishes.

The Canadian model appears to produce higher variance explained than does the US at most of the levels. Admittedly, more variables appear in the Canadian analysis, including age, but it is doubtful this is the whole explanation. As Porter (1965) had suspected, sociological factors play a bigger role in determining educational attainments in Canada than in the US. This may be called "ascription," if understood in our broad sense, encompassing more than merely the core variables analysed by Wanner (1986). The extremely large R squares for the lowest levels of schooling suggest that the school system is failing to engage at the earliest levels some sociologically identifiable pockets of the population. Parental education is a powerful factor in the earliest levels implying that the school system fails to absorb those coming to it from families with very poorly educated parents.

The logistic regressions contribute in other ways to increasing understanding of the school system. The main effects model shows, for example, that the trends over time in the completion of primary school and entering high school are sufficiently powerful to hold even with controls for social background. The absence of any trend in the proportions proceeding to post-graduate training and the weakness of the trend in the completion of high school are also confirmed. Differences by gender, on the other hand, prove weak at the lowest levels while

they are of considerable strength, and always to the disadvantage of the females, at the university and post-graduate levels. The main effects establish that as well as the "family background" set of variables having importance so also do the sets measuring community-region and ethnicity-religion. The variable identifying those in the oldest cohort was included because of a concern that differentials in mortality might lead to bias. The fear seems to have been unwarranted. The variable identifying the youngest cohort was included to compensate for incomplete education, and it does exert the anticipated effect on the upper transitional levels. Unexpectedly the variable is also a significant factor at the lower levels, and in these cases the sign on the coefficient is positive, signifying high completion. This indicates that imposing linear assumptions provides an imperfect fit with the data.

In the second set of logistic regression models, interactions with gender are recurrently significant. The results are scattered, consistent with the idea that the causal structure at one transitional level may be different from that at another. On balance, one is led to conclude that ascription operates somewhat more strongly upon women than men.

The interaction effects also allow for investigation of the classic sociological issue of whether ascription is growing or diminishing in strength. Again if attention is focused upon the coefficients passing significance tests the evidence is that ascription is growing. This may be added to the earlier suggestion that in general ascription appears stronger in Canada than in the US. Again, it seems that the two countries are far from identical in educational attainment. Mare's analysis of the US began from the seeming anomaly that in the US the effect of social background on years of education has been invariant over the 20th century. The stability was illusory, he showed, the result of two contradictory trends: (i) a decrease in ascription, resulting from rising proportions reaching high transition levels (where, as noted above, ascription was weak), (ii) a net increase in ascription, due to the importance of social background rising over time. These two forces which so neatly cancelled out in the US do not do so in Canada. Rather the first of the two trends has overwhelmed the second. Most probably this derives from the particular stage of development of the Canadian system. A large component of the Canadian population in the older cohorts was lost to the school system at the end of the primary years – a point at which ascription is strong. More recently the first major point of loss is at the completion of high school, where ascription is weaker. It is important to recognize that Canada is a newly industrialized society. Features that are relatively distant history in the US – the first post-industrial society – remain recent and sociologically important to Canada.

NOTES

1 Here and throughout estimates may differ from reports based on institutional statistics. It is assumed that any bias in the survey data is a constant and would not affect comparisons within or between survey data sets.

2 Table 2 has been regenerated excluding the French (defined as those "most comfortable" in French) the rural population and finally the foreign born. None of these changes seriously reduced the magnitude of the U.S.-Canadian differences.

3 The reduction of many variables, over 50 in all, into three sets was accomplished though a procedure resembling the first stage of two stage least squares. Details on this and other technical matters can be obtained from a working paper (No. 137) of McMaster University's Quantitative Studies in Economics and Population Series.

4 In an equation:

$$Y = b_1X_1 + b_2X_2 + b_3(X_1)(X_2)$$

the first two terms after the equals sign are the main effects, while the third is an interaction effect. The interaction effect is tantamount to computing the equation $Y = b_1X_1$ separately for each level of X_2, or *vice versa*.

5 The quotation marks denote that logistic regression calculates an R square analogy, rather than a true R square in the Ordinary Least Squares sense.

6 With 10 degrees of freedom, the change in the likelihood ratio chi squares are: completes primary, 42.7; some high school, 48.0; completes high school, 49.4; post-secondary, 42.3; some university, 24.4; completes university, 32.6; post-graduate, 6.5. Thus all but the final are statistically significant.

The effects of three way interactions were also tested. Only two passed .05 significance – (i) to the lower order effects should be added the informtion that the combination of female gender, old age (i.e. schooling early in the century) and *high* socioeconomic background detracts from the probabilities of achieving the "some university" level, while young males from lower socioeconomic backgrounds enjoy enhanced odds; (ii) for "complete post-graduate" work, the effect of ethno-religious status has decreased over time for males, but increased for females. It is thus small wonder that the two way term for age by family background failed significance for males and females merged.

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