Estimating Ethnic Genetic Interests:
Is It Adaptive to Resist Replacement Migration?

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Analyses of the costs and benefits of immigration have not considered the dependence of an ethny's reproductive fitness on its monopoly of a demarcated territory. Global assays of human genetic variation allow estimation of the genetic losses incurred by a member of a population when random fellow ethnics are replaced by immigrants from different ethnies. This potential loss defines an individual's ethnic genetic interest as a quantity that varies with the genetic distance of potential immigrants. W. D. Hamilton showed that self-sacrificial altruism is adaptive when it preserves the genetic interests of a population of genetically similar individuals. Ethnic genetic interest can be so large that altruism on behalf of one's ethny—'ethnic nepotism'—can be adaptive when it prevents replacement. It follows that ethnies usually have an interest in securing and maintaining a monopoly over a demarcated territory, an idea consonant with the universal nationalism of Bismarck and Woodrow Wilson.

KEY WORDS: genetic interests; replacement migration; immigration; ethnicity; Hamilton's Rule; inclusive fitness; evolution; territory; carrying capacity; kinship.

Does ethnic competition over territory pay off in terms of reproductive fitness? The question is barely raised in contemporary analyses of population, even when discussing the costs and benefits of immigration on such a scale that it is appropriately called 'replacement migration.'[1] Perhaps the idea that humans have reproductive interests does not occur to most social scientists after almost a century of that tradition separating itself from the biological sciences (Salter, 1996). Whatever the cause, analysts behave as

if the only interests humans have are 'proximate,' such as economic and physical security, rather than 'ultimate,' in the form of genetic continuity. Thus it is implied that immigration on any scale is acceptable so long as it raises aggregate income or makes life more interesting (e.g., Rubin, 2000; Simon, 1989).

The focus on proximate interests raises doubts from the perspective of ethnic nepotism theory (Eibl-Eibesfeldt, 1972; van den Berghe, 1981). According to this theory, ethnic solidarity is due to an ethnic group—hereafter referred to as an ethny[2]—constituting an extended family. From this perspective accepting replacement migration for the convenience afforded by migrant labor is equivalent to foregoing bearing children in order to live in greater luxury. But this argument has not as yet been supported by quantification of ethnic genetic interests—the number of copies of an individual's distinctive genes carried in his or her ethny. Without such estimation it is impossible to determine who has it right, those who see ethnies as extended families, or those such as Lewontin (1972) who deny that humans have genetic interests in their ethnies.

In this paper I shall not question the verities of classical liberalism—that international trade can produce win-win outcomes and that wars should be fought only in defense and as a last resort when diplomacy fails (Caton, 1988). But I shall disagree with the view that the benefits of interethnic trade necessarily render mass immigration harmless to native ethnic genetic interests. I begin with a qualitative argument based on evolutionary theory before introducing quantitative theory and data from population genetics.

From the neoDarwinian perspective the issue is whether being altruistic towards one's ethny can be adaptive in the context of ethnic rivalry. Behavior is adaptive when it maintains or increases the frequency of one's distinctive genes in the population. Rivalry can involve peaceful as well as violent means. The latter consist of armed conflict, including warfare both defensive and aggressive. Examples of peaceful means are competitive breeding (Parsons, 1998; 2000) and discrimination, for example in controlling borders and in economic affairs (Bonacich, 1973; Landa, 1994; Light & Karageorgis, 1994).

In neoDarwinian theory, genes are the basic unit of selection and humans are 'survival machines' evolved to perpetuate them into succeeding generations (Dawkins, 1976). Conversely, for humans and all other organisms, reproductive interest consists of perpetuating their distinctive genes (Hamilton, 1964). '[H]umans like other organism[s] are so evolved that their "interests" are reproductive. Said differently, the interests of an individual human (i.e., the directions of its striving) are expected to be toward

ensuring the indefinite survival of its genes and their copies, whether these are resident in the individual, its descendants, or its collateral relatives. . . . ' (Alexander, 1995/1985, p. 182). Thus genetic interests are the number of copies of our distinctive genes carried by reproducing individuals. Individual genetic interest is the number of copies carried by offspring. Familial genetic interest is carried by close kin, and ethnic genetic interest by one's ethnic group. Genetic interests are often confused with 'inclusive fitness.' The latter concept was coined by Hamilton (1964) to describe his theory of altruism. It refers to the *effect* that an individual has on the reproduction of his distinctive genes, not to a static gene count. Thus a parent who has ceased reproducing and aiding her many offspring has no individual fitness. The two concepts are closely related, since an individual with positive fitness is acting so as to perpetuate his distinctive genes.

Which modern events affect ethnic genetic interests? This interest is ultimately a matter of population size, which can be directly reduced through warfare, genocide, and the loss of limiting resources such as territory. The fact that a 30 percent loss of population is a 30 percent loss of ethnic genetic interest is obvious. But competition can have powerful effects without any behavior that is aggressive in the usual sense of the word. The prime example in the contemporary world is peaceful migration between states and high rates of reproduction by one ethnic group within multi-ethnic states. Like the bands and tribes in which humans evolved, states are territorially based and act to police their borders. The special quality of a defended territory is that it insulates a population from the vicissitudes of demographic disturbances in the metapopulation, namely the connected phenomena of uneven population growth and migration. When an ethny controls the borders of a territory that is large enough to support the population, loss of fitness relative to other ethnies is not necessarily fatal; it need not lead to replacement. A decimated, defeated, or impoverished population can quickly recover if it retains control of its territory, but a large-scale influx of genetically distant immigrants has the potential permanently to reduce the genetic interests of the original population. Territory adequately defended guarantees continuity and the chance to ride out a temporary downturn in numbers relative to other populations.

The territorial component of the tribal strategy was so fundamental in *Homo sapiens'* evolutionary past that it has become deeply imbedded as a psychological need. It has been long known from cross-cultural comparisons that all hunter-gatherer societies defend their territories against incursions by neighbors (Service, 1962; van der Dennen, 1995, pp. 427–8; 564–5). An innate component is indicated by the territoriality of humanity's closest relatives, chimpanzees, who patrol the community borders (van der

Dennen, 1995, p. 159). Among humans, territorial bonds and the sense of collective ownership vary in intensity and according to culture, for example both being strengthened by tribal rituals that cause individuals to identify and bond with the group's territory (Eibl-Eibesfeldt, 1989, pp. 321–34). Whether the association of peoplehood with a land is genetically or culturally transmitted, it appears to be universal in both the tribal and national worlds (Connor, 1985; Spicer, 1971; see review by van der Dennen, 1995, pp. 427–8, 564–5). Persistent ethnic identities all include a territory as part of their identities, either presently or once occupied by the group (Spicer, 1971, p. 798). The evolutionary background of human tribal territoriality was discussed by Keith (1968/1947, chapter 4). In tribal societies a territory is necessary for subsistence and also for continued solidarity. Removed from its land, a tribe's social organization tends to breaks down, reducing its ability to maintain independence and continued existence (p. 33). Keith argued for an intimate connection between a people as a descent group and their claim to a territory as essential constituent elements of nationhood:

> [A people constitute] a nation because they are conscious of being "members one of another" and of being different from the peoples of other lands. They are, and always have been, an inbreeding people. They have a particular affection for their native land. . . . If their country or its people are in jeopardy . . . they rally to its defence; they would give their lives freely to preserve the integrity of the land and the liberty of its people. . . . They are sharers in a common interest and in a common destiny; they hope and believe that their stock will never die out. They inhabit a sharply delimited territory and claim to own it. (Keith, 1968/1947, pp. 316–17)

Keith (1968/1947, p. 317) also recognized the psychological continuity between tribalism and nationalism. "Group spirit, tribal spirit or tribalism, national spirit or nationalism are one and the same thing. . . ."

Loss of fitness within one's own territory robs the native ethny of the time needed to recover numbers, mobilization, or organization, all contributing to a loosening of the ties between political leadership and ethny. Since in modern societies the state has come to replace traditional tribal institutions, loss of state sponsorship is likely further to undermine mobilization and organization. In a competitive world an ethny's loss of ability to mobilize and organize as a self-interested group is tantamount to loss of fitness.

Mass migration between diverse populations combined with the existence of collective goods in wealthy societies such as low cost medical support and other forms of welfare have produced effective ethnic competition within many Western states. For example the founding European-derived ethnies of the United States, Canada, Australia, Britain and some other Western societies are declining as proportions of the overall population due to periods of liberal immigration policy from the 1960s. These challenges are real enough for majorities, but minorities have usually fared worse, as diaspora peoples have discovered through the centuries. Not to control a territory creates risks of repeated group subjugation, displacement, and marginalization. For all of past human experience and still today, territory is a resource for maintaining ethnic genetic interests in the long run.

The foregoing qualitative argument might be plausible, but only a quantitative analysis will allow us to assess whether, and under which circumstances, immigration harms native populations' genetic interests to a significant degree. Such an analysis requires clarification of territorial carrying capacity and the quantification of ethnic kinship.

CARRYING CAPACITY

The vulnerability of ethnic genetic interests to immigration depends on there being some limit to population growth that causes immigrants to displace native born. Hardin (1968; 2001/1974; 1993) argues that in the modern world most habitable spaces have been colonized. Moreover, the earth's surface has a carrying capacity, as do its parts. This is the maximum population beyond which some value, such as freedom from hunger or overcrowding, is lost. The most basic carrying capacity is the number beyond which population growth is self correcting, because any further growth is cancelled out by die-offs. Technological advance can increase carrying capacity, but not indefinitely.

E. O. Wilson (2002) uses a different analysis to make essentially the same point: the earth is full and its present population is probably unsustainable. His formulation is based on the 'ecological footprint,' 'the average amount of productive land and shallow sea appropriated by each person in bits and pieces from around the world for food, water, housing, energy, transportation, commerce, and waste absorption' (p. 72). The developing world has a per capita ecological footprint of about one hectare, while that for the United States is 9.6 hectares. If every human being were to consume at the average level of the United States with existing technology, four more planet earths would be needed to accommodate them. Populations and

levels of consumption appear set to continue growing for the time being, but only at the cost of lost biodiversity and a collapse in the earth's capacity to renew ecosystems. Population must level off at some point, whether through design or accident. Either way, average family size must fall to that of zero population growth, about 2.1 children.

Hardin (1974) points out that to control run-away population growth in the world requires that every state limit its population. However, a society practicing such self discipline is vulnerable to immigration, which tends to reduce the size of the native population. Hardin did not discuss ethnic genetic interests, but did remark that in this situation the cost of immigration would fall "most heavily on potential parents, some of whom would have to postpone or forgo having their (next) child because of the influx of immigrants." Hardin thus only considers individual fitness. Yet, as we shall see, the damage immigration inflicts on genetic interests contained in the native ethny is usually much greater than that contained in any family.

Immigrants are liable to affect a country's capacity to hold the native population. If the immigrants contribute to the economy in ways that the native population cannot, the carrying capacity is raised. If they are a drain on resources or even of average productivity, they lower that capacity by taking the place of potential native born. In the present example, let us assume that immigrants have equal capacities to the native born, and let us consider immigrants in lots of 10,000. This number of immigrants will lower the effective carrying capacity of a country by 10,000, more or less—more if the immigrants have a higher birth rate than the native population and less if their birthrate is lower. To simplify further, assume that birthrates are equal, in which case the loss of effective carrying capacity is 10,000. If the immigrants and native born have the same ethnicity the native population loses no ethnic genetic interests. Ethnic kin are being replaced by ethnic kin of similar degree. But if the immigrants are from different ethnic groups, especially genetically distant ones, there will be a loss of genetic interest for each member of the native population. How large is that loss? Answering this question will allow an assessment of immigration's impact on ethnic genetic interests and, potentially in turn, its impact on society and politics.

GENETIC INTERESTS AND KINSHIP

The scale of ethnic genetic interests can in principle be calculated from the data of population genetics, the science of counting and explaining gene frequencies. The quantity of direct relevance is the coefficient of kin-

ship. This was commonly used until the 1980s, and is of special utility in genetic epidemiology (e.g., Morton, 1982; Gudmundsson et al., 2000). However, kinship coefficients are limited to within-population measures, or within a regional cluster of populations. What is needed for present purposes is a global assay of inter-population kinship measures, to capture the effect of immigration from adjacent and distant ethnies. Some ethnic groups are closely related, originating from the same regional or continental population. Other groups are more distantly related. Unfortunately, no world assay of genetic kinship at the population level exists.

A global genetic assay performed by Cavalli-Sforza et al. (1994) measured not kinship but variance or 'genetic distance' (Cavalli-Sforza et al., 1994, p. 29). Fortunately, there is a well defined relationship between genetic kinship and variance that can answer our question. In population genetics the coefficient of kinship, f, between two individuals is defined as the probability that an allele taken randomly from one will be identical to an allele taken at the same locus from another. This definition is close to that of Hamilton's (1964) original coefficient of relatedness r, which he used in his classic formulation of inclusive-fitness theory (except that it omits reference to the alleles being "identical by descent" and in simple cases $2f = r$). Modern population genetics theory usually refers to kinship rather than relatedness, since the latter is not very clearly defined mathematically. Hamilton subsequently redefined inclusive fitness such that genealogical relatedness—the basis of kin selection—becomes a special case of his theory. The new definition allowed kinship to be calculated from assay data alone, with no requirement for data on genealogical relationships. Genetic distance, F_{ST}, is, then, both a measure of genetic variance and a measure of kinship (Cavalli-Sforza & Bodmer, 1999/1971, pp. 399, 451; Cavalli-Sforza et al., 1994, p. 29; Wright, 1951). On this basis, Harpending (1979, p. 624) found that kinship can be expressed in terms of variance thus:

$$f_o = F_{ST} + (1 - F_{ST})[-1/(2N - 1)]$$

where f_o is the local kinship coefficient, F_{ST} the variance of the metapopulation, and N the overall population. When N is large, as it usually is with modern ethnies, a good approximation for the above equation becomes, simply:

$$f_o = F_{ST}.$$

This formula allows the estimation of average kinship within local populations based on F_{ST} measures.

The kinship of two randomly chosen individuals in a population is zero. In the same context, two siblings have a kinship of 0.25. Hamilton's original genealogy-based coefficient of relatedness measures siblings as sharing 0.5 of their genes, but Hamilton later (1970; 1972) redefined relatedness as a statistical measure of genetic similarity (Pepper, 2000, p. 356). Using this new definition individuals can have negative kinship, meaning that they share fewer genes than is typical for the population, as well as positive kinship, when they share more genes than is typical. (Therefore it is necessary to distinguish kinship from relatedness-by-descent.) Hamilton summarized thus:

> Because of the way it was first explained [by Hamilton], the approach using inclusive fitness has often been identified with "kin selection" and presented strictly as an alternative to "group selection" as a way of establishing altruistic social behaviour by natural selection. But . . . kinship should be considered just one way of getting positive regression of genotype in the recipient, and that it is this positive regression that is vitally necessary for altruism. Thus the inclusive fitness concept is more general than "kin selection." (1975, pp. 140–41; [p. 337 in the 1996 reprint])

Moreover, Michod and Hamilton (2001/1980, see especially pp. 108–9) reviewed alternate definitions of kinship formulated to that date and concluded that they were all equivalent. Thus inclusive fitness theory is not limited to explaining altruism between genealogical relatives, but between any individuals who have positive kinship as defined above, even if their relatedness is remote and cannot be documented. This frees the analyst from the "identical by descent" clause, allowing the direct analysis of inclusive fitness using genetic assay data alone. Without this broader conception of inclusive fitness direct analysis is impossible because genealogical data are very limited. Harpending explains the implication of his conversion equation thus:

> This will mean that helping behavior within the subdivision [*e.g.*, an ethny] will be selected against locally, because kinship is negative locally, but it may be positively selected within the species because kinship between donor and recipient is positive with reference to the global base population. (Harpending, 1979, p. 624)

Returning to Harpending's formula, this can be summarized by the rule that genetic variation between populations is equal to kinship within them. Kinship within an ethny thus varies in proportion to the genetic variation between it and competing ethnies. The resulting relativity of ethnic kinship can be illustrated with a version of Haldane's (1955) famous hypothetical example of altruism between kin. Recall that Haldane suggested that it is adaptive to give one's life to save two drowning siblings or eight drowning cousins. What he omitted to make explicit was the background assumption that the relatedness between random pairs in the population is zero. Cousins have a relatedness of one eighth not in an absolute sense, but *in comparison to* this zero background relatedness. Hamilton defined the kinship of two random members of a population as zero, but as we have seen when the variance of the meta-population is taken into account it is possible for relatedness of random pairs within a population to be more than zero. Hamilton (1975) argued that intra-group relatedness could rise as high as 0.5 (equivalent to a kinship coefficient of 0.25), which is the level of siblings. Families within such a population would then have even higher relatedness.

What if the world consisted of cousins? For the purpose of estimating genetic interests, their kinship would be zero, and it would not be adaptive for them to show altruism towards each other. In this hypothetical case, there is no competing group against which cousins have an elevated level of kinship. Adaptive altruism would then be limited to the nuclear family, where relatedness is four times higher than between cousins (eight times higher for identical twins).

If the world consisted of only one ethny, the relatedness of random pairs would be effectively zero for the purposes of estimating genetic interests; only genealogical kin would have higher kinship. Thus adaptive altruism would only exist between parents and offspring, siblings, cousins, etc. But in fact the world consists of a great many ethnic groups. Taking the whole world population together, the kinship of random pairs is zero. The question is, in this situation what is the kinship of random pairs chosen from an ethnic group? To answer this question we must turn to the data on genetic variance between populations.

IMMIGRATION, GENETIC DISTANCE, AND LOSS OF GENETIC INTEREST

Data from Cavalli-Sforza et al. (1994, p. 75; see Table 1) indicate that intra-ethnic kinship coefficients range from 0.0021 (English in relation to

TABLE 1

F_{ST} Distances Between 26 Selected Populations (sampled from Cavalli-Sforza et al., 1994, p. 75; standard errors omitted)

	BAN	EAF	WAF	SAN	MBU	IND	IRA	NEA	JPN	KOR	MNK	THA
Bantu	0											
E. African	658	0										
W. African	188	697	0									
San	94	776	885	0								
Mbuti	714	1232	801	1495	0							
Indian	2202	1078	1748	1246	2663	0						
Iranian	2241	1060	1796	1267	2588	154	0					
Near Eastern	1779	709	1454	880	2138	229	158	0				
Japanese	2361	1345	2252	1905	3089	718	1059	1056	0			
Korean	2668	1475	1807	1950	2996	681	905	933	137	0		
Mon Khmer	2446	1538	1951	1977	2766	866	1282	987	961	946	0	
Thai	3364	1602	2480	2064	3872	852	1155	1023	743	814	99	0
Mongol-Tungus	2882	1423	1733	1398	2568	509	681	827	218	170	1093	957
Malaysian	1658	1216	1365	1434	1743	1130	1489	1173	1175	1001	264	455
Filipino	2913	1770	2299	1922	3776	872	908	909	1020	1218	552	625
N. Turkic	2486	1386	2163	1448	2989	638	821	710	627	732	1259	1225
S. Chinese	2963	1664	1958	2231	3384	847	1092	983	541	498	254	105
Basque	1474	922	1299	1307	1965	418	285	246	1481	1063	1831	1726
Danish	1708	909	1458	1025	1462	293	179	238	1176	947	1463	1390
English	2288	1163	1487	1197	2373	280	197	236	1244	982	1100	1143
Greek	1479	892	1356	1068	1735	272	70	129	1175	904	1482	1355
Italian	2292	1234	1794	1181	2931	261	133	208	1145	936	1446	1382
C. Amerind	2237	1475	2293	2143	3499	1089	1199	1037	658	790	1522	1323
Eskimo	3251	2116	2693	2217	3329	940	1234	1225	791	843	1595	1417
Polynesian	2649	1414	1992	1940	3136	927	1142	869	823	890	860	589
Australian	3272	2131	2694	2705	4287	1176	1546	1408	821	850	1699	1314
	BAN	EAF	WAF	SAN	MBU	IND	IRA	NEA	JPN	KOR	MNK	THA

Danes) to 0.43 (Australian Aborigines in relation to Mbuti Pigmies of Africa). In general, kinship between autochthonous populations within the one region is close while between continents it is distant. Using the two extreme cases just mentioned, Table 1 shows kinship in the following way. Recall from the discussion in the previous section that if the world population were wholly English then the kinship between random pairs would be zero. But if the world consisted of the English and Danes, then two random Englishmen would have a slightly positive kinship of 0.0021 (kinship coefficients are multiplied by 10,000 in Table 1). This is slightly closer than the kinship of eight linear generations separation, or a descendant to his or her great great great great great great grandparent. This is another way of saying that the English and Danes are very close kin. Australian Aborigines and the Mbuti people of Africa are very distant kin according to Cavalli-Sforza's data. In a population made up of Mbuti and Aborigines, two random Abo-

MNG	MAL	FIL	NTU	SCH	BAS	DAN	ENG	GRK	ITA	CAM	ESK	PLY	AUS
0													
1251	0												
737	485	0											
728	1189	1044	0										
705	635	315	1109	0									
1049	1784	1634	903	1675	0								
680	1628	1279	820	1306	184	0							
896	1275	1117	866	1152	119	21	0						
735	1482	1109	794	1095	231	191	204	0					
905	1599	1136	949	1236	141	72	51	77	0				
970	1731	1527	859	1192	1539	1266	1246	1271	1198	0			
545	1617	1597	796	1304	1637	1180	1185	1254	1135	903			
969	849	650	1147	508	1406	1210	991	1096	1215	1312	1627	0	
781	1665	1300	1580	1081	1949	1400	1534	1498	1413	1360	1977	1145	0
MNG	MAL	FIL	NTU	SCH	BAS	DAN	ENG	GRK	ITA	CAM	NAD	PLY	AUS

rigines are almost as closely related as identical twins, with a kinship of 0.43 (identical twins have a kinship of 0.5).

Taken together with the limits imposed by carrying capacity, these kinship coefficients mean that, other factors being equal, immigration is more harmful to the receiving population's genetic interests the more genetically distant the immigrants.

The F_{ST} distances shown in Table 1 allows us to estimate the loss in genetic interest caused by uni-directional migration of 10,000 individuals between 26 native populations. Appreciation of the genetic interests involved is aided by converting this loss to child-equivalents. Losses of genetic interest will not be counted in units of random fellow ethnics, but in the larger unit of offspring. In Hamilton's (1975) town model the kinship of random co-ethnics could rise as high as that between parent and child in outbred populations. Hamilton noted that when this happened, actual par-

ent-child kinship would rise significantly higher, though he did not specify how high. Harpending (2002) offers a formula for that higher figure, based on the genetic distance (F_{ST}) between populations.

$$f = 0.25 + 3F_{ST}/4$$

Applying this formula allows us to estimate the impact on the genetic interests of a random Englishman of 10,000 ethnic Danes replacing 10,000 ethnic English (or vice versa). To simplify, let us assume that this is a neat replacement, so that over succeeding generations all the immigrants survive to reproduce.[3] We also assume that the Englishman loses no genealogical kin in the process. Replacement involves two effects, the removal of 10,000 Englishmen and the introduction of 10,000 Danes, who in the mathematics of population genetics have negative kinship to the English population. Removal of the English in this case reduces genetic interests by $10,000 \times 0.0021 = 21$. The replacing Danes bring a negative kinship of the same magnitude. Subtracting the latter from the former gives a loss to a random Englishman's genetic interests of 42 units. Now we express those units in number of children by dividing by the parent-child kinship of the English, which is

$$f = 0.25 + (0.0021 \times 3/4)$$
$$= 0.2516$$

The number of children lost due to the immigration of 10,000 Danes is therefore $42/0.2516 \approx 167$ children (or siblings). This is a large family indeed. Repeating the scenario with Bantu immigrants, the loss to a random Englishman's genetic interests of replacement of 10,000 English is 10,854 children (or siblings).[4] Bantu suffer the same loss from 10,000 English immigrants to a Bantu territory.

This last figure is puzzlingly high. How can the loss due to replacement exceed the number replaced? Actually it does not, because we are counting genes, not individuals. The result only looks strange when gene counts are converted into child-equivalents. Random members of an ethnic group are concentrated stores of each other's distinctive genes, just as children and cousins are concentrated stores. Some ethnies are so different genetically that they amount to large negative stores of those distinctive genes. Also, migration has a double impact on fitness, first by reducing the potential ceiling of the native population, and secondly by replacing those lost individuals' familiar genes with exotic varieties. Referring to carrying capacity also helps understand the dramatic loss of fitness caused by inter-

racial immigration. In a large nation the loss of 10,000 fellow ethnics, say due to a natural catastrophe or war, could be made up in a generation, as the population rose to the country's carrying capacity. Filling their places with immigrants reduces that loss by an amount equal to the immigrants' kinship with the natives. When Danes replace English, the loss is almost completely reduced because the two ethnies are closely related. But when Bantu replace English (or vice versa) the loss is exacerbated, because these populations have negative kinship with one another.

The loss is not diminished by somehow being spread across the entire ethny. For the native it is a collective loss in the same way that collective goods are shared without being diminished. It applies to every randomly-chosen member of the native ethny, wherever he or she may live. Children per se are not lost. It is assumed that there will be the same number of children in the society. Neither is it a symbolic loss for people everywhere, like some humanitarian disaster. After all, the immigrants produce replacement children. For them the process of ethnic replacement increases fitness. The loss is limited to the native ethny in a very personal way. For a native woman it is equivalent to the loss of *her* children and grandchildren, for a native man it is equivalent to the loss of *his* children and grandchildren, though on a much larger scale. The magnitude of these ethnic genetic interests means that the loss is only slightly mitigated if these individuals' own children are not replaced.

It becomes clear from these data that ethnic genetic interests are usually very large compared to familial genetic interests. The mathematics on which these estimates rely would need to be in gross error for this not to be true. Indeed, for inter-racial immigration the losses would still be large if ethnic kinship were one hundredth the values estimated above. Neither would inaccuracies in other assumptions of the analysis necessarily alter the result by much. For example, the genetic loss occasioned by cross-racial immigration can be mitigated by the immigrants increasing the country's long-term carrying capacity. I have assumed nil economic benefit (and cost), but the genetic loss will still be large even if the economic benefit mitigates half or even 90 percent of the loss. The result is also robust for all except radical modifications of the assumption of a neat replacement of natives by immigrants, since partial replacement still causes large losses of ethnic kin.

Ethnies are indeed super families as van den Berghe argued. Although being more dilute stores of genetic interest than families, ethnies can number in the millions and so are often orders of magnitude more precious. If immigrants replaced one quarter of the English nation of approximately 50 million people, the remainder would suffer a very large loss even if their own relatives were not affected. If 12.5 million Danes and similar peoples

moved to England, the genetic loss to the remaining English would be the equivalent of 209,000 children. The corresponding loss due to the same number of immigrants from India would be 2.6 million children, and due to Bantus over 13 million children. All these losses apply in the reverse direction, if there was mass English immigration to Northern Europe, India, or Bantu Africa.

Large ethnic genetic interests make public charity and self-sacrificial heroism directed towards one's ethnic group potentially adaptive. As we see from the above estimates, ethnic altruism is most adaptive when it aids fellow ethnics in the face of competition from genetically distant ethnies, such as those belonging to different geographic races. Figure 1 shows the relative genetic distances of the major races, based on a world-wide assay of 88 genes by Cavalli-Sforza et al. (1994). The F_{ST} measures between nine races are shown in Table 2. Subjects were individuals who could trace their ancestry from indigenous populations, the autochthonous peoples that inhabited a region before the great migrations of the modern era began to mix geographical races from about 1600.

The genetic distance between English and Bantu is so great that, on the face of it, competition between them would make within-group altruism among random English (or among random Bantu) almost as adaptive as parent-child altruism, if the altruism were in the service of that competition. Thus it would appear to be more adaptive for an Englishman to risk life or property resisting the immigration of two Bantu immigrants to England than his taking the same risk to rescue one of his own children from drowning,
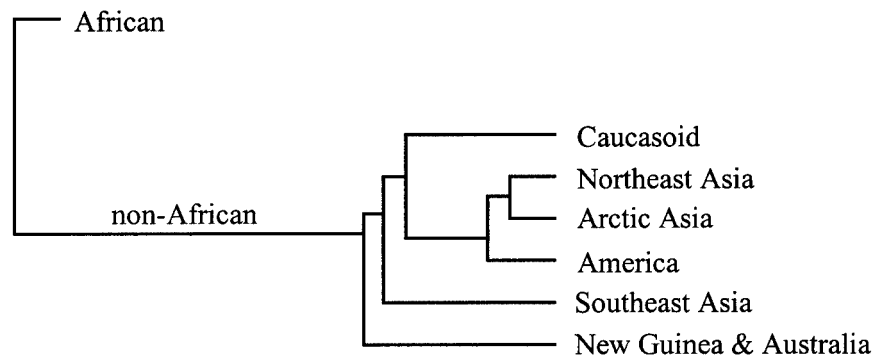

FIGURE 1. Genetic clustering of seven geographical races. The African group is more distant from all the others, which are more closely related to each other than to the Africans (drawn from Cavalli-Sforza et al., 1994, p. 79).

TABLE 2

Racial Kinship Coefficients of Nine Geographical Races $\times$ 10,000 (These show the kinship of random individuals from within a race in contrast to another race. Random co-ethnics have zero kinship when the ethnic group is taken in isolation. [Based on F_{ST} distances provided by Cavalli-Sforza et al., 1994, p. 80; rounded to nearest integers; standard errors omitted].)

	AFR	NEC	EUC	NEA	ANE	AME	SEA	PAI
Africans	0.0							
Non-European Caucasoids	1340	0.0						
European Caucasoids	1656	155	0.0					
Northeast Asians	1979	640	938	0.0				
Arctic Northeast Asians	2009	708	747	460	0.0			
Amerindians	2261	956	1038	747	577	0.0		
Southeast Asians	2206	940	1240	631	1039	1342	0.0	
Pacific Islanders	2505	954	1345	724	1181	1741	437	0.0
New Guineans and Australians	2472	1179	1346	734	1013	1458	1238	809
	AFR	NEC	EUC	NEA	ANE	AME	SEA	PAI

unless the immigrants were bringing qualities of such economic value that they would permanently raise the Island's carrying capacity. The same applies in the reverse direction, two Englishmen migrating to Bantu Africa constitute a greater loss of long-term genetic interest than does a random Bantu losing a child. But the genetic distance between English and Danes is so small that in the equivalent situation it would be adaptive to expend only slight altruism in resisting small numbers of immigrants. Despite the potentially large payoff, intra-ethnic altruism can be maladaptive when it benefits the reproduction of free riders within the group. This problem and institutional counter-strategies are discussed in Chapter 6.

That cross racial immigration is most damaging to ethnic genetic interests becomes apparent if one considers the number of immigrants needed to reduce the ethnic genetic interest of a random native by the equivalent of one child (assuming as before that immigrants are economically equivalent to natives and that there is a finite carrying capacity for each country). Table 3 shows these numbers for immigration between races, Table 4 the numbers for immigration within Europe, a generally racially homogeneous region. The latter are usually about an order of magnitude greater than the former, meaning that immigration within a race is usually less harmful to ethnic genetic interests than immigration between races. There are excep-

TABLE 3

Number of Immigrants Between Nine Geographical Races Needed to Reduce the Ethnic Genetic Interest of a Random Native by the Equivalent of One Child

Immigrants/host	AFR	NEC	EUC	NEA	ANE	AME	SEA	PAI
Africans	∞							
Non-European Caucasoids	1.3	∞						
European Caucasoids	1.1	8.5	∞					
Northeast Asians	1.0	2.3	1.7	∞				
Arctic Northeast Asians	1.0	2.1	2.0	3.1	∞			
Amerindians	0.9	1.7	1.6	2.0	2.5	∞		
Southeast Asians	0.9	1.7	1.4	2.4	1.6	1.3	∞	
Pacific Islanders	0.9	1.7	1.3	2.1	1.4	1.1	3.2	∞
New Guineans and Australians	0.9	1.4	1.3	2.1	1.6	1.2	1.4	1.9
	AFR	NEC	EUC	NEA	ANE	AME	SEA	PAI

tions. According to these data, immigration of non-European Caucasoids to Europe (and the reverse; see Table 3) causes less kinship loss than immigration of Lapps or Sardinians to England (or the reverse; see Table 4). Note, however, that this exception occurs within regional subsets of the broad Caucasoid racial group. The overall pattern is clear. Within local regions of Europe the genetic impact of immigration declines by up to another order of magnitude. Immigration between ethnies of the same race can still be maladaptive for the receiving population, but the threshold is typically 10 to 100 times that of inter-racial immigration.

Hamilton's theory of inclusive fitness allows the calculation of, in principle at least, the number of coethnics that must benefit if an altruistic act is to be adaptive. Hamilton formulated a rule for calculating when an act of altruism may be adaptive, or 'evolutionarily stable', such that the altruist's genes are not reduced in frequency in the population. Hamilton formulated his rule in terms of relatedness r, for which $2f$ is substituted here to retain compatibility with the data of population genetics. Hamilton's Rule states that altruism is only evolutionary stable when

$$\frac{b}{c} > \frac{1}{2f}$$

where f is the average coefficient of kinship between the altruist and the recipients of the altruism; where b is the sum of fitness benefits to all indi-

viduals affected by the altruistic behavior; and where *c* is the fitness cost to the altruist.

Hamilton characterized his rule thus:

> To put the matter more vividly, an animal acting on this princi-ple would be sacrificing its life adaptively it if could thereby save more than two brothers, but not for less. (Hamilton, 1996/1963, p. 7)

Hamilton's Rule eases the condition for adaptive ethnic altruism in the case of repeated altruistic acts of small cost to the giver, the more so when the benefit to the receiver is a multiple of that cost. For example, small change given to street beggars can have much greater value to the receiver than cost to the giver. Also, someone with discretionary control over hiring or awarding contracts can dispense large benefits at little or no personal cost. Altruism can be highly adaptive when it benefits a large number of fellow ethnics all at once. An act of charity or heroism that prevented 10,000 Danes from replacing 10,000 English would be adaptive even if it cost the altruist his or her life and with it all prospects of raising a family (at least a family of less than 167 children), since this would save the equiv-alent of 167 children for the altruist. Preventing replacement by 10,000 Bantu would warrant a much larger sacrifice because the genetic benefit is about 65 times larger. Despite these large benefits, ethnic altruism that does not contribute to security from replacement migration is maladaptive. The considerable genetic variation within all populations leaves much room for individual competition. Altruism is only adaptive when it serves to protect shared (ethnic) genetic interests.

Ethnically competitive behavior easily obeys Hamilton's Rule when the cost of ethnic competition is low, for example when competition takes the form of politics rather than sacrificing one's life defending borders. An instructive example is the United States, the world's largest recipient of immigrants. Since the immigration reforms of 1965, Americans of European descent—"whites"—have fallen rapidly in relative numbers. In 1960, the white population was 88.6 percent (*Statistical Abstract of the United States: 2001*, Table 10; Hispanics were not yet counted separately). By the 2000 census the non-Hispanic white population was down to 69.6 percent of the population (U.S. Census Bureau website, May 2002, Table PCT002). While the white population kept growing, the higher birth rate of minorities and the large immigration influx of almost one million legal immigrants per year plus many illegals, caused its proportion of the population to decline by 21 percent within two generations. By 2050 the Census Bureau projects the

TABLE 4

Number of Immigrants Between 26 European Ethnies Needed to Reduce the Ethnic Genetic Interests of a Random Native by the Equivalent of One Child (Based on F_{ST} genetic distances provided by Cavalli-Sforza et al., 1994, p. 270.)

	BAS	LAP	SAR	AUT	CZE	FRE	GER	POL	RUS	SWI	BEL	DAN
Basque	∞											
Lapp	2.4	∞										
Sardinian	5.2	2.2	∞									
Austrian	6.8	4.4	4.6	∞								
Czech	8.2	3.0	4.2	35.1	∞							
French	13.8	3.9	4.8	33.3	17.7	∞						
German	7.8	4.4	4.2	66.2	24.4	46.7	∞					
Polish	8.9	3.5	4.8	17.7	19.9	19.3	27.0	∞				
Russian	9.3	4.2	5.1	19.9	17.0	21.6	21.2	42.0	∞			
Swiss	8.0	3.7	3.9	104	40.7	54.7	125	21.2	16.4	∞		
Belgian	12.1	4.1	5.3	78.5	29.4	39.4	83.7	31.6	24.9	89.7	∞	
Danish	7.2	4.1	4.0	46.7	23.5	29.4	78.5	18.5	16.0	66.2	59.9	∞
Dutch	11.0	4.0	4.4	33.3	19.3	39.4	78.5	23.5	22.3	78.5	104	139
English	10.9	3.5	4.1	23.1	21.2	52.5	57.2	18.2	16.2	45.0	83.7	59.9
Icelandic	6.0	2.9	3.5	8.5	7.6	8.9	12.2	9.1	7.8	11.2	16.4	14.6
Irish	9.0	2.6	3.6	11.2	11.1	13.8	15.3	8.7	8.2	14.9	17.0	18.8
Norwegian	6.8	4.3	3.3	20.9	16.8	22.7	59.9	21.9	14.3	38.3	52.5	66.2
Scottish	8.9	3.2	3.9	17.3	12.4	20.5	24.0	10.7	10.1	21.6	21.6	31.6
Swedish	7.8	4.1	3.7	16.0	14.3	16.4	32.4	15.6	11.7	23.1	37.1	35.1
Greek	5.8	4.4	7.0	14.9	10.3	9.9	9.1	7.4	8.1	8.8	12.5	6.9
Italian	9.2	4.1	6.0	29.4	16.6	37.1	33.3	19.9	17.0	28.8	42.0	17.7
Portuguese	9.0	4.2	4.1	26.4	27.5	26.4	24.9	19.6	13.1	24.0	40.7	16.6
Spanish	12.4	3.1	4.6	18.5	19.6	32.4	18.5	11.1	10.6	29.4	30.1	16.0
Yugoslavian	7.5	2.6	4.6	11.7	12.8	10.5	11.0	9.5	7.7	10.8	25.4	8.3
Finnish	5.7	6.3	4.1	16.6	7.5	12.1	16.6	9.4	8.5	11.5	20.2	13.4
Hungarian	8.5	4.1	4.9	31.6	18.5	18.2	27.5	50.4	42.0	22.3	24.4	16.4
	BAS	LAP	SAR	AUT	CZE	FRE	GER	POL	RUS	SWI	BEL	DAN

non-Hispanic white proportion of the population to be 52.8 percent (*Statistical Abstract of the United States: 2001*, Table 15). The United States' founding population is heading towards minority status by 2060.

Note that the statistics just cited are approximations. The white population is somewhat larger than stated, because a minority of Hispanics are of predominantly European descent. It is impossible to put a precise figure on the racial makeup of Hispanics, because the necessary information is not collected by the Census Bureau.

Immigration is effectively replacing large numbers of ethnic kin of the native born, not only whites but all native born Americans who are ethnically distant from the major immigrant ethnies; that includes African Americans. These populations have increased absolutely, but in the long run,

DUT	ENG	ECE	IRI	NOR	SCO	SWE	GRK	ITA	POR	SPA	YUG	FIN
∞												
73.9	∞											
12.8	16.8	∞										
16.8	42.0	13.0	∞									
59.9	50.4	17.3	16.2	∞								
26.4	46.7	11.6	43.5	21.9	∞							
30.9	34.2	12.2	13.7	69.8	17.3	∞						
6.7	6.5	4.7	4.7	5.7	5.3	5.8	∞					
19.9	24.9	9.1	9.8	14.6	11.5	13.5	16.6	∞				
21.2	8.9	8.8	11.2	17.5	13.3	16.4	12.5	28.8	∞			
16.8	27.0	8.0	11.4	13.3	12.9	13.0	8.1	20.9	26.4	∞		
9.6	8.2	4.3	5.0	7.6	5.4	6.2	6.2	10.9	9.4	7.6	∞	
10.5	11.2	8.3	6.0	13.7	7.9	15.6	8.7	13.7	10.9	8.2	5.4	∞
18.0	18.2	7.6	8.6	16.6	10.5	13.0	14.6	20.9	20.2	11.0	9.6	11.2
DUT	ENG	ECE	IRI	NOR	SCO	SWE	GRK	ITA	POR	SPA	YUG	FIN

when America's carrying capacity is reached, they stand to be a much smaller proportion of the population than they were in 1965. Interbreeding will not change the situation, because what counts is the proportions of a people's distinctive genes in a territory, irrespective of how they are mixed.

By the same token, the immigrants now diluting the native-born gene pool are benefiting their own genetic interests. Their home countries typically accept no immigrants and have much higher fertility rates or populations than do Western societies. So the process is a boon for the genetic interests of immigrant ethnies.

If one construes ethnically-restrictive immigration policy as a form of inter-group competition, then the American majority would have been handsomely rewarded in terms of genetic continuity had it engaged in com-

petitive behavior of this form by maintaining the quota system put in place in 1924. This system was aimed at maintaining the ethnic proportions that existed within the country in the late 1800s. Conversely, efforts by minorities—meaning lobbying efforts within the country combined with instances of illegal entry, work, and residence—to overturn that quota system and widen the 1965 open door constituted acts of competition with the ethnic majority. Those efforts, combined with other lobbies such as some employers seeking cheap labor, has decreased white genetic interests more than all American war losses combined.

If genetic interests are so valuable, why do countries such as the United States accept their loss on such a large scale? The short answer is that, as a rule, they do not. The United States is one of a handful of societies, all Western and mainly English-speaking, that are currently managing the replacement of a large fraction of their founding populations as a proportion of their territories' carrying capacity. The immigration policies of the overwhelming majority of societies are slight variations on a total ban. Any explanation of the acceptance of ethnic replacement must therefore deal with particularities. What is different about America?

One candidate explanation that can be immediately rejected it that the American majority's failure to defend itself against genetic replacement reveals a preference for the dissipation of genetic interests or ambivalence about its value. This is an unlikely proposition, since it assumes widespread knowledge of the analysis being put forward in this paper. It also assumes that the electorate is biologically literate and is kept informed of events impinging on their genetic interests. I noted above that the US Census Bureau does not keep track of relative ethnic fitness within the country. This is odd from the Darwinian perspective. It is understandable that in a democracy precise statistics are kept of murders and accidental deaths, which number in the thousands, because such events not only affect individual fitness but are barometers of public safety. Yet the annual displacement of hundreds of thousands of native-born Americans is haphazardly reported. The pre-Darwinian state of western political culture is surely a contributing factor to the loss of relative ethnic fitness.

A more hopeful explanation is that, despite ignorance of the biological issues at stake, United States policy has somehow managed to shape immigration so that it is not maladaptive, despite coming mainly from populations genetically distant from the European gene pool. As noted earlier, economic effects can indirectly benefit the native population by increasing carrying capacity thus helping all resident groups increase their absolute fitness. Has post 1965 immigration to the United States boosted the genetic interests of the native born? This issue is not treated by the extensive eco-

nomic and sociological literature on immigration, but it seems likely that some immigrants have enhanced the majority's fitness through provision of comparatively low-priced expert services. Others have helped undercut uneconomic labor costs by providing a pliable low-cost pool of labor, and stimulated those industries responsible for providing education, housing and other infrastructure. These benefits are compatible with many immigrants being a net burden on the public purse and the jobs of the native born (Borjas, 1999; Smith & Edmonston, 1997). Another set of benefits flows from the cultural diversity introduced by immigrants, though this too incurs costs in social capital, as unspoken ethnic ties are replaced by communal conflict and alienation. The United States is no longer an ethnic nation but a diverse multicultural state. This makes it more difficult to extract much public altruism in the form of civic altruism and patriotic sacrifice (Alesina et al., 1999; Walzer, 1990/1992, p. 24; see literature review by Salter in press-a).

Even if immigrants always boosted genetic interests, this argument can be taken to absurd lengths. For example, if an immigrant ethnic group is generally more productive than the natives, complete replacement would result in the carrying capacity being greatly increased, though the natives would hardly benefit. Is an economy meant to serve people or be an end unto itself? Clearly there will be an optimum level of immigration rather than a maximum. And that maximum will be less than indicated by economics alone if the natives wish to maintain control over their affairs. The state is a powerful instrument for maintaining group identity, mobilization and coordination. In a democracy, maintaining possession of the state apparatus requires maintaining demographic dominance as well as control of the economy, even if that lowers the rate of growth.

Any argument based on economic carrying capacity must guard against being short-sighted, since limits to growth can take generations to take effect. Eibl-Eibesfeldt (1998) has argued that humans are congenitally obsessed with short-term gains in modern environments due to their evolutionary history. Imagine that in 1600, before they sold Manhattan, American Indians had been offered an informed choice between two futures in the year 2000. One future was the present United States with a level of economic development unattainable without the efforts of millions of settlers and immigrants from Europe. The other was one or more Indian nations in possession of the present area of the United States but with economies less developed than at present. Which would they have chosen if they had valued ethnic genetic interests? A temporary delay, even one of decades or centuries, in acquiring some skill or institution would seem a weak excuse for sacrificing the future of all succeeding generations. And in the

modern era of automation a rush to import manual labor would seem especially short-sighted. Even if the economy and with it the population temporarily receded, this would be a small price to pay for retaining a continent for one's descendants.

THE MALADAPTIVENESS OF UNITARY MULTI-ETHNIC SOCIETIES AND A PROPOSAL FOR UNIVERSAL NATIONALISM

Population-genetic data show that great genetic diversity still exists between ethnic groups. Modern ethnies are less homogeneous than their ancestral tribal forebears due to improvements in transport and the increasing size of administrative and economic units. But the same developments have widened the competitive realm from neighboring tribes to encompass all human populations. Populations that have not been in contact for many tens of millennia are now able to migrate to each other's lands in large numbers. Enculturation of immigrants does not necessarily eliminate ethnic competition. The genetic distance between modern ethnies is often so great that it is visible in racial differences of skin color, physiognomy, and body proportions. These differences are reliable markers of significant ethnic kinship distance, as predicted by Hamilton (1975, p. 144): "[A]t about the point where the colony members are related to each other like outbred sibs it should become relatively easy for individuals to detect a fairly clear difference in appearance when comparing fellow colony members with outsiders. . . . [This] should make possible fairly accurate separation of 'us' and 'them' . . . " This is not the "green beard" effect in which the same gene causes altruism and some visible characteristic, since Hamilton is referring to "several traits which are independently inherited". He is thus referring to the same kind of broad-based genetic similarities that characterize genealogical kin.

Citizens in multi-ethnic societies, especially multi-racial ones, are faced with an invidious choice. They can do what comes naturally and practice ethnic nepotism, which is adaptive by promoting relative fitness but, especially when exhibited by the majority, engenders social conflict and can make the economy less productive. Alternatively, citizens can adopt the discipline of non-discriminatory behavior which, when they are in the majority might raise the carrying capacity of society as a whole but sacrifices relative fitness. Eliminating majority discrimination only worsens the problem if minority discrimination is not also eliminated, since asymmetrical mobilization is likely to give minorities disproportionate influence,

hastening the majority's decline. For historical reasons this asymmetry is commonly accepted as multiculturalism that is "working."

Until about 1965 Western multi-ethnic societies gave the ethnic majority precedence, disadvantaging minorities. Majority free-riding on minority labor was commonplace, for example in the institution of slavery and the post-emancipation importation of low-cost labor. However, since the 1960s and the broad acceptance of civil rights claims a new *modus operandi* developed. Majority ethnic groups restrained their own discrimination towards minorities more than the reverse, a formula known as multiculturalism. This unilateral withdrawal from ethnic competition arguably benefited the economy as a whole and certainly benefited minorities. But this formula was risky for a majority when minorities were genetically distant, since it turned minorities into potential free-riders on majority altruism. In several Western societies, including the United States, Canada, and Australia, the new approach coincided with the lifting of controls on non-European immigration and consequent rapid changes to those countries' ethnic makeup. From the majority perspective, it would seem that the only thing more maladaptive than multiculturalism that does not "work" is multiculturalism that *does* "work."

Minority free-riding occurs in a number of ways. When there is ethnic stratification, a characteristic of all multicultural societies, minority free-riding can occur at the bottom of the class structure in the form of social-welfare and other benefits conferred by public goods. A redistributive system thus entails majority-ethnic taxpayers paying for their own loss of relative fitness by financing reproduction by families belonging to other ethnies. Ethnic majorities can also find themselves economically or culturally dominated by a highly competitive minority, when minority free-riding is liable to take top-down forms such as steering cultural, immigration, and foreign policies towards minority goals with collateral harm to majority interests.

Multi-ethnic societies thus tend to be maladaptive for majorities under multicultural regimes and maladaptive, or at least inequitable, for minorities under traditional regimes. Confirmation of the large scale of ethnic genetic interests will warrant a reconsideration of the essential nature of national interests as well as the meaning of a just world system. The present analysis reaffirms the value of national sovereignty. From a Darwinian perspective, a sovereign polity is one that controls immigration to its territory, both in times of war and peace. A biologically just world order might be something like the universal nationalism advocated in the nineteenth century by Otto von Bismarck and in the early twentieth century by Woodrow Wilson. In a growingly integrated world, one people's disaffection is liable

to reduce everyone's interests, so that all stand to benefit from a formula that acknowledges both the need for autonomy and the reality of interdependence by respecting the most basic interest, genetic continuity. The same formula would make stabilization of the world's population evolutionarily sustainable by protecting the genetic interests of the most restrained populations.

Universal nationalism means thinking again about ethnic states where the state unambiguously serves the ethnic interests of the majority. By ethnic state I mean something closer to the traditional German than the French model of the nation. The German model adopts ethnicity as shared descent as a criterion of citizenship and thus offers a constitutional barrier to replacement migration. In the second half of the twentieth century this barrier collapsed in wealthy states that adopted the French model. The main risk appears to be the substitution of a set of abstract concepts as the defining symbols of the nation in place of ethnicity. The 'constitutional patriotism' espoused by anti-nationalists such as J. Habermas (1998) is a formula for reconciling ethnic majorities to their own demise while serving the sectional interests of minorities and free-riding elites. Every state currently managing the replacement of its founding ethnic group (e.g., Australia, Britain, Canada, France, USA) has adopted constitutional patriotism of one form or another. This is usually linked to the doctrine of multiculturalism, which encourages minority ethnocentrism while directing majority patriotic feelings towards universalistic ideals. According to this formula a country would lose nothing if the founding ethnic group were peacefully replaced so long as some set of values—democracy, equality, non-discrimination, minority rights—were retained. The combination of constitutional patriotism and multiculturalism is, as one would expect, subversive of the ethnic interests of the majority.

The revival of ethnic nationalism would run counter to current liberal democratic opinion. However, from the original liberal perspective such a substitution would be warranted since it would salvage majority interests from precipitous decline. Minority interests could be partly served in an evolutionarily stable manner through federalism, in an evolutionarily uncertain manner through assimilation, as well as in a preventative manner through restrictive immigration combined with a foreign policy that adopted an informed and even-handed version of nineteenth century nationalist doctrine.

I do not suggest that any simple or uniformly beneficial solution exists. Consider the question of the optimal size for nation states. For the purpose of conserving genetic interests, small is indeed beautiful, since a population will usually have a higher concentration of distinctive genes the smaller it

is. But for the purposes of economic and military viability, bigger has usually been better. The traditional nation states that had developed by the end of the nineteenth century are actually amalgamations of ethnies. Although too large to represent a pure ethnic interest, states had to be large in an anarchic international system if they were to be economically and militarily viable. The spread of free trade zones has allowed small states to thrive, but if the model is to be generalized powerful global institutions will be needed to enforce international law as an alternative to war. International governance carries its own risk, including the entrenchment of an exploitative global elite unmoderated by alternate centers of power, and the plundering of the most productive economies by the least.

Another factor certain to confound simple solutions is the mass immigration that has occurred over the last few decades, which has increased the number and the zero-sum character of conflicting ethnic interests. But there is hope in humankind's ingenuity. For example, Eibl-Eibesfeldt (1989) has discussed ethnic federalism constrained by reproductive interests, while recognizing that no all-purpose solution exists.

> In multi-ethnic states, federalistic structures allow different ethnic groups self-government within certain bounds and in co-operation with the other groups sharing a superordinate interest on the basis of reciprocity. This can work as long as such a social contract implies that differential reproduction at the cost of the other is avoided. (p. 622)

> Since the state is historically a very recent development, it is no wonder that man is still in the experimental stage regarding governmental forms. No one could provide a ready-made governmental recipe, but there are a number of guidelines available. Unless we remain receptive to new ideas and adaptations, we will face serious problems. (p. 624)

Nation states have the advantage of allowing relatively individualistic behavior to be adaptive by muting ethnic genetic interests as a factor in intra-state politics and economics. Perhaps this is why the industrial revolution was the product of nation states in the European tradition. In principle the ethnic state is conducive to liberalism in its political and economic forms. When competition is limited to individuals and families and does not involve ethnies, individuals can behave in ways that approximate the optimal (individual) utility maximization modeled by econometricians. But in multi-ethnic states individual economic rationality is maladaptive when

it leads to loss of relative ethnic fitness and ethnic stratification, as is common in multicultural societies.

From an evolutionary perspective a theoretical problem remains with ethnic states. A homogeneous nation state precludes ethnic free-riding on collective goods, but is no guarantee against free-riding by co-ethnics. Intra-ethnic elite free-riding should be less maladaptive than inter-ethnic free-riding, if only because co-ethnics benefit in the former case; but it still endangers the inclusive fitness of the majority of the ethny as well as the inclusive fitness of non-free-riders relative to co-ethnics. Thus altruism directed towards the ethny is evolutionarily unstable when free-riding is not controlled. The two main types of non-ethnic free-riding parallel the types of ethnic free-riding: welfare-dependent classes and elites. A democratic state will lose legitimacy if it fails to provide welfare by transferring resources from rich to poor. However, a modern economy will lose its competitive edge if it does not reward large economic contributions with substantial advantages in prestige and resources. A related phenomenon is the managerial class, critical for running the state and corporate bureaucracies. This elite group has privileged access to the levers of cultural and political power and tends to develop self-serving ideologies and institutions that put its interests ahead of the national interest (Burnham, 1975/1964; Francis, 1999/1984). Class and ethnic interests potentially conflict because they threaten defection by winners as well as losers in the competition for resources.

Class competition is complicated by reproductive interests at the family level, in contrast to ethnic competition which involves group-level interests. The problem is to strike a *bio*social contract between the classes that does not compromise individual reproductive opportunities while defending jointly held ethnic kinship. If a solution exists to this problem it will probably involve treating ethnic genetic interest as a collective good (Goetze, 1998), one that is managed by the state as an evolutionary group strategy (Boyd & Richerson, 1985; MacDonald, 2002/1994). Collective goods are already managed by states, such as group defense, education, and communication infrastructure. Contemporary states also exercise some control of free-riding on these collective goods through such means as law-based policing of public behavior, universal taxation, and compulsory national service. One challenge would be to maintain the transparency of both the strategy and its management by the state as a means of protecting against elite free-riding of the form that manipulates state power. An equally important challenge would be to prevent the double-edged sword of ethnic nepotism from cutting both ways. This will involve such strategies as balance-of-power diplomacy and participation in international institutions that blunt

aggressive military nationalism in the international arena. The trick is to advance this agenda while leaving room for other institutions that husband national solidarity and its multiple benefits (Salter 2002; in press-b). This would seem the appropriate domain for constitutional idealism in which abstracted values become a basis for legitimating social arrangements. A principled resolution of class and national conflict could become the basis for a truly universal nationalism.

ACKNOWLEDGMENTS

ENDNOTES

1. A recent example is the special issue of *Population and Environment 22(4)* (March, 2001), devoted to the subject of replacement migration.
2. An ethny is typically 'a named human population with myths of common ancestry, shared historical memories, one or more elements of common culture, a link with a homeland and a sense of solidarity among at least some of its members' (Hutchinson and Smith, 1996, p. 6). For present purposes I adopt a wider meaning, of a population sharing common descent. Ethnies are thus concentric clusters of encompassing populations, such as tribe, regional population, and geographic race. 'Ethny' is a preferable term to 'ethnic group' because members of such a category often do not form a group.
3. In fact, if die offs due to exceeding the carrying capacity were randomly distributed, the immigrants or their descendants would bear their share of the general population decline. In the case of 10,000 immigrants to a population of 50 million, which subsequently falls from 50,010,000 to its original size, that share would be 2 individuals. $(1 - 10,000 \times 50,000,000/50,010,000)$. Neat replacement becomes a poorer approximation when the number of immigrants is a large fraction of the native population.
4. English parent-child kinship in the context of a population consisting of English and Bantu is $f = 0.25 + (0.2288 \times 3/4) = 0.4216$.
   10,000 English removed = $10,000 \times 0.2288 = 2288$ kinship units lost. 10,000 Bantu entering = $10,000 \times -0.2288$ kinship units lost. Total loss = 4576 kinship units. The equivalent number of English children = $4576/0.4216 \approx 10,854$ children lost.
   While this paper deals with ethnic genetic interests, it should be noted that familial genetic interests can also be greatly affected by immigration. I noted in the main text that Hamilton (1975, p. 144) argued that within-population matings produce higher parent-offspring kinship than matings in an outbred population. Harpending (2002) argues that exogamous matings depress parent-offspring kinship by $F_{ST}/4$, compared to the outbred kinship of 0.25, where F_{ST} is the genetic distance between the two parental populations. Since endogamous matings yield a gain of 3 $F_{ST}/4$ in parent-offspring kinship, compared to outbred populations, an individual who mates endogamously will have a kinship with his or her offspring 3 $F_{ST}/4$——$F_{ST}/4 = F_{ST}$ greater than an individual who mates exogamously. This

TABLE 5

Percentage Parental Kinship Gained Through Endogamous Versus Exogamous Mate Choice Between Nine Races

	AFR	NEC	EUC	NEA	ANE	AME	SEA	PAI
Africans								
Non-European Caucasoids	54							
European Caucasoids	66	6						
Northeast Asians	79	26	38					
Arctic Northeast Asians	80	28	30	18				
Amerindians	90	38	42	30	23			
Southeast Asians	88	38	50	25	42	54		
Pacific Islanders	100	38	54	29	47	70	17	
New Guineans and Australians	99	47	54	29	41	58	50	32
	AFR	NEC	EUC	NEA	ANE	AME	SEA	PAI

means that exogamously conceived children have $100 \times F_{ST}/0.25$ percent fewer of their parent's distinctive genes than do endogamously conceived children. Enhanced kinship due to ethnic endogamy was hypothesized by Rushton (1989, pp. 506–10). Parental kinship is not the only factor affecting individual fitness. Exogamous families can benefit from hybrid vigour, for example. However, the number of parental genes transmitted to offspring will affect the efficiency of parental investment. Unless exogamous individuals have $F_{ST}/0.25$ more children than their endogamous peers, and assuming other factors are equal, they lose individual fitness of the same quantity. For exogamy between closely related ethnies, the difference is small. For example, a person of English ethnicity who chooses an English spouse over a Danish one gains less than one percent kinship with offspring. But choosing an English spouse over a Bantu one yields a fitness gain of 92 percent (0.2288/0.25). In both cases the same applies in reverse order. Thus assortative mating by ethnicity can have large fitness benefits by increasing the efficiency of parental investment, the largest usually derived from endogamy within geographic race. Table 5 shows the percentage fitness losses avoided by racially endogamous matings, ignoring other effects such as hybrid vigour.

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