

## Genetic and Cultural Diffusion

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A population growing demographically will soon reach saturation in the environment in which it lives, and then if it can expand to other territory in the neighborhood or more distant it will often spread to it, and continue increasing in numbers. This trend may create a repeated colonization process, and this is how *Homo sapiens sapiens* expanded to the whole world in a process that went on during the last 2000-5000 generations. In this process our species grew numerically by a factor of a million-fold, but kept losing progressively genetic diversity with distance from the place of origin according to a regular “serial founder effect” which is very clear genetically. Founders of new colonies are usually few, and therefore the colonies may lose genetic diversity with respect to the mother colony, because of random genetic drift. If the expansion continues at a sufficient rate there will be a continuous loss of genetic diversity toward the periphery. During it there will be inevitably a process of intra-specific genetic differentiation because of drift, accompanied by adaptation to new environments occupied during the expansion.

Modern humans seem to fit this model of genetic diffusion remarkably well, with a complication almost unique to them: the development of a strong culture which has generated the accumulation of knowledge, much of which is useful, is transmitted across generations and evolves over the centuries, at a rate which is increasing dramatically and has become almost explosive in the last few decades. It is the outcome of two characteristics that have developed in the course of human evolution and made our species unique. One of them is a remarkable inventiveness that has generated many tools directed to solve everyday problems felt to be of practical importance, and usually answering common needs or wishes. Its products have led to distinguishing our genus by calling it *Homo*, given by archeologists to our ancestors of almost three millions years ago. This development must be related to the quadrupling of size of our brain in the last 5 or six million years, and was helped by the freeing of our hands made possible by bipedalism. The other advance is the development of language, the last phase of which is probably much more recent, and allows to communicate reasonably well (even if not always unambiguously). Neither advance is limited to humans and is found also in many other animals, but never at the same degree as in our species. Migration is responsible for genetic diffusion and in part for cultural diffusion, but cultural diffusion has become faster at a rapidly increasing rate, mostly through the invention of new techniques of communication, and is now almost independent of space and time.

The two evolutions, genetic and cultural, interact with each other. It is also often difficult to decide if differences among individuals are genetic or cultural, but it is clear that behavioral differences among groups (distinct from physical ones that are mostly due to exposure to different climates, like skin color and many other somatic differences) are largely, if not exclusively, due to culture. Culture is also responsible for the origin and transmission of innumerable forms of prejudice. Racism, the persuasion that behavioral differences among groups are genetic, is one, and must be considered a social disease.