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The language of evolution: sources of misconception in descriptions of evolutionary processes in non-specialised scientific discourse

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Abstract

Non-specialised discourse describing the theory of evolution by natural selection can be misleading. To investigate this problem, descriptions illustrating how the environment affects biological entities and how these entities change over time have been extracted from specialised and non-specialised texts. The noun and verb phrases employed in these descriptions serve as units of analysis to uncover sources of misconception. These lexical items are analysed focusing on the semantic (especially metaphoric) and syntactic notions of "randomness", "passivity" and "plurality". Purposefulness, the antonym of randomness, dominates descriptions of evolutionary processes. Passivity is reflected semantically; however, the passive voice occurs at low frequencies. Descriptions of evolution remain essentially Darwinian and may

imply that active agents are involved in this process. The use of plurality to denote taxonomic groupings can also lead to misunderstandings.

Key words. Metaphor, randomness, passivity, plurality, specialised and non-specialised scientific corpora, natural selection

Introduction

The theory of evolution by natural selection is considered to be central to the understanding of some of the most fundamental dilemmas faced by the human race in the twenty-first century, including: the erosion of biodiversity; the unpredictable outcomes stemming from the cultivation of genetically modified crops; the increasing resistance to antibiotics and pesticides and the repercussions of genetic engineering. An understanding of evolutionary principles is also central to the debate concerning the "*intelligent design*" movement which fights in some countries for the inclusion of pseudoscientific arguments in school curricula.

Nonetheless, misconceptions concerning this theory abound amongst the lay public. Le Page (2008) listed many of these, including the fallacy that "*natural selection is the only means of evolution*" and that it "*leads to ever-greater complexity*". Trivers (1985: 69) mentioned the widespread misunderstanding "*that natural selection acts for the benefit of the group*" rather than acting on the individual. Shermer (2009: 24) pointed to several myths amongst which he mentioned prescient directionality. The theory of evolution has also been misinterpreted, sometimes deliberately, in political and economic arenas to justify capitalism and cut-throat competition (Lewontin *et al*. 1984: 242; Trivers 1985: 69; Shermer 2009: 24).

In 1859, Darwin published his seminal work *The Origin of Species* in which he expounded his theories concerning the mechanisms driving evolutionary processes. However, the precise workings of these mechanisms were uncovered much later and contributed to the formation of the "*modern evolutionary synthesis*". Many biologists on both sides of the Atlantic were involved in this synthesis. Ruse (2010: 317) mentioned Dobzhansky (1937) working on field genetics, Mayr (1942) on systematics and ornithology, Simpson (1944) on paleontology and Stebbins (1950) on botany, as being key figures in what was later to be called, in the USA, the "*synthetic theory of evolution*".

In Britain, the new synthesis was generally known as "*neo-Darwinism*". According to Provine (1986: 479) and Kohn (2004: 12), three scientists are usually attributed as having made the greatest contributions through the study of population genetics: Fisher (1930) working on a scheme for inheritance, Haldane (1932) on mathematical theories of selection and Wright (1932), who conceived the "*adaptive landscape*" metaphor to examine the roles of genetic drift, mutation, inbreeding, crossbreeding and selection in evolution (Crow 1992: 181).[1]

However, the importance of the contribution of population genetics and in particular the work of Wright was called into question by Mayr (Provine 1986: 477–484). Dobzhansky, nonetheless, initiated and sustained a close collaboration with Wright uniting his field research on the genetics of natural populations with Wright's theories of population genetics; Provine (1986: 327–397) provided a detailed account of this collaboration. Ironically, their partnership illustrates Mayr's view that the main driving force behind the creation of the synthesis was the building of bridges between otherwise isolated experimental geneticists and population naturalists (Mayr 1982: 568–569). Mayr & Provine (1980) and Delisle (2009) discussed in detail the new synthesis and its implications for the development of evolutionary biology.

1. Wright (1932) devised a two dimensional diagrammatic representation of genetic combination which he termed an "*adaptive landscape*". The iconograph resembled the contour lines of a map and gave rise to a whole series of metaphoric expressions. Through genetic change, adaptability changes and species move across this landscape. They climb peaks as they become more adapted to their environment or go down into valleys towards extinction. The semantic domain "move" in Appendix 4 illustrates some of these metaphors.