ABSTRACT. The current paradigm in medicine generally distinguishes between genetic and environmental causes of disease. Although the word "paradigm" has become a commonplace, the theories of Thomas Kuhn have not received much attention in the journals of medicine. Kuhn's structuralist method differs radically from the daily activities of the scientific method itself. Using linguistic theory, this essay offers a structuralist reading of Thomas Kuhn's *The Structure of Scientific Revolutions*. Our purpose is to highlight the similarities between these structuralist models of science and language. In part, we focus on the logic that enables Kuhn to assert the priority of perception over interpretation in the history of science. To illustrate some of these issues, we refer to the distinction between environmental and genetic causes of disease. While the activity of scientific research results in the revision of concepts in science, the production of significant differences that shape our knowledge is in part a social and linguistic process.

*Key words*: epistemology, interpretation, linguistics, logic, methods, paradigm, perception, philosophy of medicine, philosophy of science, structuralism

INTRODUCTION

The philosophy of science generally appears in the journals of medicine as an occasional piece. Among recent practitioners, Karl Popper has received considerable attention [1–6]. What distinguishes a scientific from a non-scientific theory is, for him, the ability of the former to be tested. Scientific theories result in testable hypotheses, and scientific experiments are capable only of proving that a theory is false. The process of conjecture and refutation, as Susser points out [4], accords well with the statement of the null hypothesis in formal statistical inference. This structural similarity may account in part for the high level of interest in Popper among epidemiologists.

Another practitioner of the philosophy of science is Thomas Kuhn. Although the word "paradigm" has become a commonplace, his theories have received less attention in the journals of medicine perhaps because his structuralist method differs so radically from the daily activities of the scientific method itself. David Healy and Michael Marmot have used Kuhn's approach in their...
excellent critiques of the contemporary medical models of depression and coronary heart disease [1,7]. Recently, one of us provided a structuralist reading of the literature on patient-physician communications [8], and the current essay describes important aspects of the structuralist model underlying that analysis.

To illustrate several key structuralist concepts, we begin by considering the traditional distinction between genetic and environmental causes of disease in medicine. With an emphasis on the linguistic concepts of synchronic and diachronic, the next section summarizes some of Kuhn’s central ideas in *The Structure of Scientific Revolutions* [9]. In the fourth part, we turn to Ferdinand de Saussure’s description of the linguistic sign in *Course in General Linguistics* [11]. Our purpose is to highlight the similarities between these two structuralist models. The fifth section reexamines Kuhn’s discussion of perception and interpretation in light of Saussure’s structuralist model. The activity of scientific research results not only in the description of objects in the world but also in the re-ordering of concepts in science: the production of significant differences, which give shape to knowledge, is in part a linguistic process.

ENVIRONMENTAL AND GENETIC CAUSES OF DISEASE

The difference between genes and environment serves to organize much of our thinking about the etiology of disease in medicine. Here, the term “environment”, is used broadly and includes not only environmental agents such as bacteria or asbestos but also individual behaviors such as cigarette smoking and dietary intake. Textbooks of medicine generally place the discussion of inherited metabolic disorders in a section separate from the discussion of other illnesses. This distinction in etiology is also associated with differences in clinical approach. Selected disorders – especially those caused by external or environmental agents – generally have the potential to be prevented if we can identify and remove the exposures that are said to be the cause. On the other hand, genetic diseases, like gender or family history, may be detectable; but they are not generally thought to be preventable at the level of the individual person although genetic counselling may be appropriate for future generations.

Phenylketonuria (PKU) is a classic example of a genetic disease. A rare autosomal-recessive disorder, PKU is the result of a defect in the enzyme, phenylalanine hydrolase, which converts phenylalanine to tyrosine. While affected infants are normal at birth, the defective enzyme allows phenylalanine to accumulate in the blood, and this accumulation causes a progressive impairment of cerebral function that manifests itself as mental retardation and seizures. Infants detected at birth and treated with a diet low in phenylalanine show none of these abnormalities. Despite the classification of PKU as a genetic disease,