

Part I:    The Biology of Laterality

"... many things are philosophically  
delivered concerning right and left,  
which admit of some suspension"

Browne, Pseudodoxia Epidemica, IV, V

CHAPTER 1:    INTRODUCTION

"In the matter of left-handedness I should be rather inclined to regard the organic factor as the primary one, not the psychical, but I have no proper judgment about it all"

Sigmund Freud (see Jones, 1955)

The subject of this thesis, and in particular the reconciliation of the apparent disparity between the two parts, may be construed, like so many exercises in Western thought, as yet further 'footnotes to Plato', for it is in Plato that we find the first clear statements of our problem. In the Republic, Socrates tells of how Er had been taken up into heaven and seen two gateways,

"and that judges were sitting between these, and that after every judgment they bade the righteous journey to the right and upward through the heaven ... and the unjust to take the road to the left and downward ....." (614.c).

In this quasi-Biblical passage Plato automatically assumes the symbolism of right representing good and left representing evil. This symbolism may be traced back further, and it was probably formalised by the Pythagoreans, and extant well before then. The unravelling of some of the ramifications of this symbolism will occupy the whole of Part II of this thesis.

Part I of the thesis discusses the biological aspects of laterality and in particular of handedness and as so often we may find evidence of a tension between the purely intellectual Plato and the more empiricist Aristotle. To Plato, as to most modern physicists up to the year 1957, it was offensive, and indeed incredible, that at bottom the universe could be anything but symmetric. In

the face of the greatest of human functional asymmetries, Plato could only suggest that,

"it is only the folly of nurses and mothers to whom we owe it that we are all, so to say, lame of one hand. Nature, in fact, makes the members on both sides broadly correspondent; we have introduced the difference between them for ourselves, by our improper habits" (Laws, 794.d).

The theory was repeated by Plutarch, and reached Renaissance England through a translation by Sir Thomas Elyot (ca. 1535), who referred to the

"... great folly or madness that where we do accustom our children to take meat with right hand, or if they do put forthe the left hand, anon we correct them"

(Moralia, The Education of Infants, 4)

Thus was formed the environmentalist hypothesis for the origin of handedness; in its strong form it is little held today, but its weak form manifests in many guises.

Aristotle, the biologist, was too influenced by the great morphological asymmetries to be able to subscribe to the Platonic theory. The asymmetries of the heart and viscera led Aristotle to propose:-

"And it is a universal law that, as regards above and below, front and back, right and left, the nobler part and more honourable part invariably is placed uppermost, in front, and on the right ....

unless some more important object stands in the way" (De Partibus Animalium, 665 a.21)

The latter proviso is, of course, to account for the heart's position, the heart being on the left, "so that it may counter-balance the chilliness of that side" (ibid, 666.b.8). Aristotle of course could not make the left superior since he also accepted the Pythagorean left-right symbolism (see his Metaphysics).

As a result of his theories, Aristotle felt that the predominance of right-handedness was a biological fact, and not just a cultural bias. Thus:-

"I mean, for instance, if we were all to practice always throwing with the left hand, we should become ambidextrous. But still by nature left is left, and the right is none the less naturally superior to the left hand, even if we do everything with the left as we do with the right. Nor because things change does it follow that they are not by nature. But if for the most part and for the greater length of time the left continues thus to be left and the right right, this is by nature"

(Magna Moralia, 1194.b.32)

The dichotomy between Plato and Aristotle thus typifies the modern dispute between those who profess a biological or a cultural origin of handedness.

A further historical complexity, perhaps also derivative from the Greeks, is a change in the status of symmetry. George Herbert, the metaphysical poet, could

write that, "Man is all symmetric", and thus be, in essence, a Platonist. Sir Isaac Newton echoed Herbert when he said:-

"Can it be by accident that all birds, beasts and men have their right side and left side alike shaped (except in their bowels)... Whence arises this uniformity in all their outward shapes but from the counsel and contrivance of an author?"

Two centuries later, with the advent of the Romantic interest in Nature, Goethe would prefer the more Aristotelian position that "The absence of symmetry seems to be evidence of the progress of evolution" (see Riese and Goldstein, 1950). The association of symmetry with theology was later to be reflected in Pauli's comment that:

"I do not believe that the Lord is a weak left-hander ..."

Half a century after Goethe and only eleven years after the publication of Darwin's Origin of Species, Pye-Smith published the first truly evolutionary theory of handedness<sup>1</sup>:

"If a hundred of our ambidextrous ancestors made the step in civilisation of inventing a shield, we may suppose that half would carry it on the right

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\*<sup>1</sup> Often attributed to Thomas Carlyle (eg. Fritsch, 1968 who says that he discusses it in his unpublished diaries of 1871).

arm and fight with the left, the other half on the left and fight with the right. The latter would certainly, in the long run, escape mortal wounds better than the former, and thus a race of men who fought with the right hand would gradually be developed by a process of natural selection" (Pye-Smith, 1870).

In this thesis I shall develop several of Pye-Smith's ideas, notably his emphasis upon the base-line for asymmetry being a fluctuating asymmetry, and the concept that there must be advantages to being right- or left-handed. And overall I will come down heavily on the side of Aristotle, although the symmetry of the Platonic view, and its modern variants in the expositions by Kant and Mach, will help me to arrive at that position.