



Fig. 4 a) and b) show three-dimensional renderings of voxels color-coded using the primary diffusion direction. These figures include representations of the cingulum bundle, internal capsule, corpus callosum, pallido-thalamic and ponto-cerebellar fibers and the cerebral peduncle. Fiber orientations are indicated by the color-coded sphere where S/I represent superior/inferior (blue), L/M represents lateral/medial (red) and A/P represents anterior/posterior (green).

will be committed to their development. As in all areas of science and in particular in medical science this question must be answered on an application by application and an investigator by investigator basis. The affirmative answer implicit in the dedication of our own and other laboratories to this project, arises from two fundamental considerations. The first, a profoundly practical consideration, is that judgements critical to the most central objectives of clinical science require volumetric determinations and, in particular, volumetric comparisons. The second, a more theoretical yet promising consideration, is the argument that enquiry into the volumetric properties of brain as tissue, carries us into a richly promising domain of fundamental brain science with implications for evolution, ontogeny and principles of neural systems operation. We will say more about these possibilities in our conclusion where we introduce a set of possible dividends of such fundamental inquiry which, rather like orienting “north stars,” may coax and enable elucidation of some of the most vexing problems in all of developmental clinical neuroscience. These are the yet unsolved mysteries

relating to the structural nature and the developmental origins of obscure developmental disorders, in particular autism and schizophrenia.

Volumetric determinations in the clinic: There are myriad situations, encountered daily, where the volumetric question is “satisfied” by “seat of the pants” estimates. They relate to the recognition of disorder, for example, the question of whether a structure or a brain is of normal size, in the case of an unending parade of children with developmental handicaps of diverse nature. They relate to the issues of whether a tumor, the pattern of multiple sclerosis plaques or brain volume loss in degenerative disease has stabilized or advanced. They relate to the needs of high precision quantitative longitudinal volumetric determinations as the principal independent variable in clinical trials of the efficacy of drugs that might impede degenerative process or tumor growth and the option to express such processes as rate functions. They relate to clinical trials of drugs that might salvage viable brain within a stroke penumbra. Before giving the knee jerk response that