CHAPTER V

Probability logic, distributions and Zargonion fractals

5.1. Introduction.

There is a mapping between the probability of an event described over propositional logic and the logic of predicate calculus, the latter of which includes the symbol ‘for some’.

For measuring along a variable x, we may encounter other quantities that depend on it. In the case when these quantities are represented by a function f(x), the ways in which x may vary is called a distribution. If we also believe that we have no understanding, or interior model, of why f(x) varies with x, we might be forced to attribute equal probability to each occurrence of f(x) over its domain of definition. But we may be aware, for example, that f(x) is bounded, which is itself a model.

For values of f(x) that are defined over a finite and bounded set of values, the distribution of various f(x) according to some selected model may vary randomly, or it may not.

Polynomials of degree n match exactly a function of degree at most (n – 1). A polynomial of degree less than this may be near the values of the distribution in ways that can be precisely described. Thus for n points we may select n polynomials of degree (n – 1) to zero, to represent the distribution. These n polynomials may be weighted, that is, may combine in an average of some type, which optimises the description of the distribution.

The maximum significance problem asks what weighting, in a situation of no knowledge of the interior dynamics which generates the distribution, is the weighting most likely to fit best, that is, to be predictive as to the behaviour of the function outside of its observed domain?

We extend the idea of probability described in these ways to multidimensional probability, which we call colour probability, and further extend these ideas to Zargonion dimensions. When these dimensions are Zargonions with general real coefficients, the resulting structure describes a fractal space.

5.2. The propositional probability mapping to predicate logic.

There is a mapping, in the language of category theory a forgetful functor, between the probability of an event described over propositional logic and the logic of predicate calculus, which includes the symbol ‘for some’, denoted by ∃, where ‘for every’ is NOT ∃ NOT.

5.3. Distributions.

5.4. Polynomial fit.

5.5. Weighted distributions.

5.6. The maximum significance theorem.

5.7. Colour probability.

5.8. Zargonion probability logic.

5.9. Zargonion dimension and fractals.