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Probability and Partial Belief   Sept 1929

The defect of my paper on probability was that it took partial belief as a psychological phenomenon to be defined and measured by a psychologist. But this sort of psychology goes a very little way and would be quite unacceptable in a developed science. In fact the notion of a belief of degree $\frac{2}{3}$ is useless to an outside observer, except when it is used by the thinker himself who says "well I believe it to an extent $\frac{2}{3}$" i.e. (this at least is the most natural interpretation) I have the same degree of belief in it as in p∨q when I think p, q, r equally likely and know that exactly one of them is true. Now what is the point of this numerical comparison; how is the number used? In a great many cases it is used simply as a basis for getting further numbers of the same sort issuing finally in one so near 0 or 1 that it is taken to be 0 or 1 and the partial belief to be full belief. But sometimes the number is used itself in making a practical decision. How? I want to say in accordance with the law of mathematical expectation, but I cannot for we could only use that rule if we had measured goods and bads. But perhaps in some sort of way we approximate to it, as we are supposed in economics to maximise an unmeasured utility. The question also arises why just this law of mathematical expectation.

The answer to this is that if we use probability to measure utility, as explained in my paper, then consistency requires just this law. Of course if utility were measured in any other way e.g. in money we should not use mathematical expectation.

Note If there is no meaning in ~~[illegible]~~ equal differences of utility, then money is as good a way as any of measuring them. A meaning may, however, be given by our probability method, or by means of time i.e. $x - y = y - z$ if x for 1 day + z for 1 day = y for 2 days. But the periods must be long or associated with different ~~people~~ lives or people to prevent mutual influence.

Do these two methods come to the same thing? ~~[illegible]~~ Could we prove it by Bernoulli? Obviously not Bernoulli only evaluates chances. A man might regard 1 good + 1 bad = 2 neutral; but regard 2 bad as simply awful not worth taking any chance of. (But it could be made up! No there would be a chance of its not being). I think this shows ~~[illegible]~~ my method of measuring to be the sounder; it alone goes for wholes.

All this is just an idea, what sense is there really in it? We can I think say this.

A theory is a set of propositions which contains p & q whenever it contains p and q, and ~~q con~~ if it contains any p contains all its logical consequences.

30/ The interest of ~~Why we want~~ such sets ~~can be seen by~~ comes from the possibility of our adopting one of them as all we believe.

A probability theory is a set of numbers associated with pairs of propositions obeying the calculus of probabilities.

The interest of such a set comes from the possibility of acting on it consistently.

Of course the mathematician is only concerned with the form of probability; it is quite true that he only deals in certainties