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Medieval Probabilities : a Reappraisal

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The late Ernest Coumet devoted some ground breaking articles to the origins of a mathematics of decision, respectively published in 1965 and 1970 : *Le problème des partis avant Pascal* and *La théorie du hasard est-elle née par hasard*³. Assuming that the so-called « points problem » had first been solved in the mid-XVIIth Century, Coumet went into great details to show the legal background of the aleatory contracts upon which Blaise Pascal built on to find a proper solution, using a set of tools that earlier writers dealing with the same problem, in the late XVth and XVIth Centuries, had not put to use. Coumet was also pointing to the sources of such a perspective, in casuistic writers of the XVIth Century such as Domingo de Soto, in whom he perceived a conceptualisation of uncertainty situations. More generally, it has been recognised that the growth of a probabilistic reasoning in the XVIIth and XVIIIth Centuries owed to the coalescence of various components, each of which had a previous history, often starting in the Middle Ages. During the last decades, the genealogies of these components have been investigated separately ; these trends are now gathered in an

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3 [Coumet 1965, 1970].

important volume published in 2001 by James Franklin. In the course of those researches, new elements have appeared, that testify to the interest of the late Middle Ages in the formation of such « proto-probabilists » elements.

For instance, solutions to the same « points problem » have recently been identified in Italian writings of the late XIVth and early XVth Century. These findings do not alter the import of Coumet's researches on the cultural conditions that allowed for the emergence of a mathematisation of chance in the XVIIth Century. Nevertheless, the appearance of such documents put the early history of probability calculation in a totally different perspective. What was considered as its main landmark has to be pushed back centuries earlier. Italian teachers of commercial arithmetics knew how to solve the problem of division of stakes between partners in an interrupted game, taking into account what could have happened if the game would have been pursued until its end. They did so in the context of a teaching that had mainly practical purposes, and that did not lead them to develop a wider mathematics of chance and aleatory phenomena. It is important to stress that the solutions they found were later forgotten, and that subsequent authors who unsuccessfully confronted the problem ignored its proper origin. In that case, as in many others, it has to be admitted that history of science is not unfolding in a linear fashion. More importantly, this leads us to distinguish between two equally important historical moments – when the probable outcome of an aleatory process could first be calculated, and when the epistemological consequences of such a calculation could be drawn in a more general way.

On another aspect as well, Coumet's presentation has to be updated. During the last decades, numerous researches have been devoted to the economic topics discussed by moral theology and canon law in the medieval period. One prominent result has been to underline the importance attributed to the notion of risk in the legitimation of some dubious moral cases that could escape, on that basis, the prohibition of usury. The writings of some late XIIIth or XIVth Century Franciscan theologians provide the most interesting place for such discussions. In their view, the aleatory element of a commercial contract could be evaluated in its own terms, and possibly sold separately. It is remarkable that this process fits in exactly with the way in which maritime insurances were invented in Tuscany, in the first half of the XIVth Century, the 'risk' of a specific commercial operation being 'bought' by an insurer against the payment of a *premium*.

The combination of these various trends of current research calls for a reappraisal of the medieval contribution to the history of probabilistic reasoning. This issue of the *Electronic Journal for the History of Probabilities and Statistics* is aiming at showing the convergence of such perspectives. In the first place, a paper [Piron, 2007] is offering a synthetical view of the way in which scholastic thinkers of the XIIIth and XIVth Century dealt with the theme of uncertainty, when discussing life rents, commercial investments, or the negotiation of titles of the Florentine public debts. This paper is complemented by the reproduction of two articles, published by contributors to this present issue. One [Piron, 2004] is dealing with the history of the notion of risk in the XIIth and XIIIth Centuries, showing that the word *resicum* was borrowed from the arabic by Italian merchants. The other [Ceccarelli, 1999] is discussing the first author, Peter John Olivi, who reflected on game as a possible model for aleatory contracts. Giovanni Ceccarelli is also contributing to this issue with a major original article, on the evaluation of risk by merchants [Ceccarelli, 2007]. Thanks to a first-hand research in the rich Datini archives in Prato, Ceccarelli is able to analyse the various risks factors acknowledged by merchants when negotiating maritime insurance premiums. The medieval businessmen had recourse to intuitive or experience-based evaluation and did not need to develop sophisticated mathematical tools for such a purpose.

A third paper [Meusnier, 2007] complements the first two by putting in its proper context the earlier solutions given to the « points problem ». The problem of division of stakes between partners in a game is confronted to similar problems arising on the occasion of commercial associations that have to be split before the scheduled term. An evolution is perceptible in the type of problems that can be found in commercial arithmetics during the XIVth Century. Situations appear in which the contract is broken, not by mutual consent, but by the fault of one of the partners. In such a case, the estimation of what has to be given to the unfaulty one needs to take into account the probable outcome of the enterprise if it had been pursued until its end. Such situations bears such a strong similarity with the « points problem » that it can be hypothetised that the latter one was invented in such a context, and not earlier.

Other « proto-probabilistic » components would also deserve more attention than could be given within this current issue of *JEHPS*. Among medieval mathematician, Nicole Oresme is the only one who appears to have ever used a probabilistic argumentation, using the model of an imaginary game in a chapter of his *De proportionibus proportionum*. E. Grant raised some

objections against N. Meusnier's interpretation of this text, to which Meusnier is responding here. For the sake of discussion, we are reproducing all contribution to this debate. It would have been useful to include a study on the mid XIIIth pseudo Ovidian *De vetula*, that contains an impressive description of all possible outcomes of a game of dice. This will be for another occasion ... probably.

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