CARREAU

D'ALEMBERT
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Franc-carreau (*free*-tile), a kind of game of which M. de Buffon gave the calculation in 1733, being before the Academy of the Sciences. Here is the excerpt that one finds in his memoir on this topic, in the volume of the Academy for this year.

In a tiled room of equal, & assumed regular *tiles*, one throws a louis or an écu into the air, & one asks what are the odds that the coin will fall only on a single *tile*, or *freely*.

Suppose that the given *tile* is square; in this square we inscribe another within it which is distant everywhere by the length of the half-diameter of the coin; it is apparent that every time that the center of the coin will fall on the small square or on its circumference, the coin will fall freely; & that to the contrary it won't fall freely, if the center of the coin falls outside of the inscribed square: so the probability that the coin will fall freely, is to the contrary probability, as the area of small square is to the difference of the area of the two squares.

Therefore in order to play a fair game, it is necessary that the large square be double the small; that is to say, let the diameter of the coin be 1, & x the side of large square, one will have $x^2 : (x-1)^2 :: 2 : 1$, whence one draws easily the value of x, which will be incommensurable with the diameter of the coin.

If the coin, instead of being round, were square, &, for example, equal to the square inscribed in the circular coin of which we have just spoken; it jumps to the eyes that the probability of falling freely would become greater: because it may happen that the coin falls freely outside of the small square: the problem becomes then a little more difficult, because of the different positions that the coin is able to take; those which do not take place when the coin is circular, because all the positions are then indifferent. Here is in a simple problem one idea that one is able to form of these different positions.

On a floor formed only of equal & parallel boards, one throws a rod of a certain length, & supposed without width: one asks the probability that it will fall freely on a single board. If one conceives the point of the middle of the rod at any distance from the edge of the board, & if with this point as center one describes a semicircle of which the diameter is perpendicular to the sides of the board; the probability that the rod will fall freely, will be to the contrary probability, as the circular sector contained within the board is to the remainder of the area of the semicircle; whence it is easy to draw the sought solution. For naming x the distance from the center of the rod to one of the sides of the board, X the corresponding sector, of which it is always easy to find the value in x, & A the area of the semicircle; the sought

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probability will be to the contrary probability, as $\int X dx$ is to $\int dx(A - X)$. See. Jeu, Pari. (O)