such a statement is made whenever this type of problem arises it will be true precisely 95 per cent of the time; (2) the mean of a normal sample, being technically a 'sufficient' statistic, incorporates all the available relevant information in the sample; and (3) complete absence of knowledge *a priori* about μ ensures the validity of the 95 per cent probability statement on this particular occasion of use. The statement has exactly the same logical content as the statement "This penny, which I have just tossed but which is still hidden on the back of my hand, has probability one-half of being heads."

Howson and Urbach repeat Neyman's old *non-sequitur*, that in the classical approach a parameter is not a random variable and therefore cannot be the subject of a probability statement. The case of the already-tossed penny proves this false. Bayesians have no exclusive claim to probabilities for parameters — fiducial theory has been there already, as the example given above indicates; but their claim that all parametric uncertainty can be measured by probabilities will remain in doubt until compelling arguments are advanced and scientists' misgivings thus removed. This is probably not possible.

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Tumbling controls bean weevils

SIR — The larvae of the common bean weevil, *Acanthoscelides obtectus* (Say), bore into and develop inside bean (*Phaseolus vulgaris* L.) seeds. In tropical conditions, the adults emerge within one month of seed infestation, whereupon each female lays about 60 eggs loosely among the beans[1]. Lack of effective controls for exploding *A. obtectus* populations severely limits bean storage by tropical subsistence farmers[2]. Human hardship is caused both by direct loss of the chief dietary source of lysine and leucine, requisite supplements to a mainly cereal diet, and by indirect losses to poor seed germination.

Video analysis of *A. obtectus* host-colonization behaviour[3] reveals that the mobile 0.2-mm diameter by 0.6-mm-long first instar larvae bore into beans only where they can wedge themselves between a bean and some stable, resistive surface such as another bean or the walls of a container. Apparently, this leverage enables the larvae to direct sufficient forces for their mouthparts to scrape through the tough seedcoat of a dried bean. Remarkably, it takes 24 – 48 hours of nearly continuous scraping for a larva to enter the cotyledon of a red kidney bean[3]. Larval mortality is appreciable during entry, but not thereafter.

We wondered if moving the start of an *A. obtectus* entrance hole out of register with bracing sites would render that hole useless. Based on measurements of beans and attacking larvae, we calculated that there would be only a 0.04 probability that, after bean tumbling, the start of a hole would fall back into register for continued use. We postulated that larvae displaced by bean tumbling would be unlikely to find the rare, realigned entrance hole and be forced to start boring anew. With regular tumbling of beans, the larvae would die of exhaustion or be smashed.

This hypothesis was tested using a paired design with half-filled 0.8-litre glass jars, 16-litre plastic food buckets and burlap bags containing, respectively, 0.24, 7.0 and 22.7 kg of intact, dried red kidney beans (*P. vulgaris*, L.) and 30, 480 and 1,000 *A. obtectus* adults. After introduction of the beetles, jars and buckets were rolled two circumferences every 8 hours for two weeks; similarly, bags were twice tumbled end over end two to three times a day. Control containers were fixed in place throughout the experiment.

Populations of *A. obtectus* in all rolled or tumbled containers were reduced dramatically (by around 97 per cent) relative to those in stationary controls (see table). This level of control was remarkably close to the 96 per cent predicted from calculations of the effect of moving holes out of register before their completion. But as some smashed eggs and larvae were seen on the walls of the glass jars, multiple sources of mortality probably contributed to the overall population reduction.

We recommend tumbling dried beans morning and evening as a practical control of *A. obtectus* populations available immediately to anyone storing beans in clay pots, baskets, jars, tins or bags. This 'technology' is highly appropriate in developing nations as it requires only the transfer of knowledge, unlike controls that rely on chemical application or specialized equipment. Moreover, this control principle might be applicable to other bean and grain pests whose requirements for seed penetration are temporally and spatially constrained. The possible benefits of regularly moving beans and grain in commercial bulk storages should also be considered. Although some attention has been paid to this idea for grain[4,5], attempts at mechanical control of pests in storage need to be backed by more information on pest biology, including behaviour.(A fuller version of this study is to appear in *Entomol. exp. appl.*; details are available from M.E.Q.)

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REDUCTION OF *A. OBTECTUS* POPULATIONS AS A RESULT OF CONTAINER ROLLING.

Container/ Treatment	n	No. beetles introduced	Mean no. beetles emerging
0.8-l Glass jar			
Rolled	10	30	21 ± 15*
Stationary	10	30	575 ± 130
16-l Plastic bucket			
Rolled	2	480	171 (160; 182)†
Stationary	2	480	7,622 (6,812; 8,431)
45-kg Burlap sack			
Tumbled	2	1,000	244 (228; 259)
Stationary	2	1,000	6,857 (5,101; 8,612)‡

* Mean ± s.d.
† Beetle counts for both trials are given in parentheses.
‡ Reduction across the experiment was significant at $P<0.001$ according to paired t-test on log transformed data.

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Odd omission

SIR — Benton (*Nature* **352**, 113; 1991) provides useful information on the natural dispersion and habitat of rubbish. But how can he account for the remarkable absence of supermarket shopping trolleys and condoms in his sample?

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