Some Swans Are Black

Stan Kelly-Bootle, Author

You may well expect from my title that I'm about to plumb the depths of Nassim Nicholas Taleb's theories on catastrophe and quasi-empirical randomness. I, in turn, expect that you've already read (or certainly read of) Taleb's best-selling *The Black Swan—The Impact of the Highly Improbable* (Allen Lane, 2006) dealing with life's innate uncertainties and how to expect or even cope with the unexpected. Coping involves learning that the right answer to some problems is, "Don't know." I was tempted to end my column right here in order to prove something or other about our many failures in predicting the future, compared with our occasional successes in "postdicting" the past.

Who knows? Your "great expectations" about my ensuing discourse could be unexpectedly frustrated. Speaking of Charles Dickens's novel, recall that he did leave us a choice between a sad and a happy ending, hoping to please both romantics and realists. In fact, neither group emerges really satisfied since the ploy destroys the basic notion of a narrative unfolding as a credible mirror of real life. Dickensian reality has characters behaving against a precisely described Victorian social milieu. Either ending might be taken as plausible in the absence of the other, yet the readers are allowed to play *deus ex machina* or *diabolus ex machina* to suit their fancies. Nowadays, more in keeping with Taleb's view of life's vicissitudes, we find hyperlinked novels where the reader/browser can click away to trigger plot diversions at almost any point in the story.

Taleb's titular *Black Swan*, of course, goes back ages as a theme in philosophical bantering. It is only to be compared with the nonsensical or oxymoronic "square circle" or "even primes greater than 2" if you start with the axiom "All swans are white," or the equivalent "All nonwhite objects are non-swans!" Once you include "whiteness" in your list of swan-defining attributes (along with neck shape and a host of other avian characteristics), then any nonwhite bird you encounter cannot be strictly dubbed a swan, however many other swan-like attributes it has. Poets were free to dream and write of black swans, but that's known in Brit pubs as "poetic off-license," a major curse in decent philosophical nattering.

...and other

CATASTROPHES

Indeed, up until 1697 there was no reason to doubt that all swans are white. Each swan encountered helped confirm this propo-

sition, as did, bizarrely, the fact that each nonwhite *anything* we observed was definitely a non-swan!

All this changed in 1697 when the Dutch explorer Willem Vlamingh reported the sighting in Australia of what he could only describe as black swans. The reports triggered many distinct reactions. The circle-squarers, angle-trisectors, and poets said, "There, we told you so. Next time, pay attention." Strict taxonomists said, "Them can't be swans, you daft Dutch sod—swans is white." Others said, "Well, all swans really are white; the black ones are exceptional mutations that need not disturb our concept of innate 'swanness.' After all, dogs are four-legged, even if Fido lost one of them under a tram."

The wise said, "We must change our definition of swan." The latter won out, and taxonomists now list many members of the genus *Cygnus*—some white, some black, and some, for all I know, Anfield red. There was certainly a red swan event in Istanbul in 2005 when Liverpool Football Club came back from 0-3 at halftime to beat AC Milan in the European Champions Cup.

How best to redefine *swan* in the light of new evidence? Far from being an arcane linguistic or philosophical problem, it hits us daily in many software development contexts such as object-orienting. We may have had pre-1697 (an early Simula, presumably) the subclass Swan derived from the class Bird. Doesn't that take you back to your first OO class? CanWade; CanFly; EatsWorms; WingSpan; Color! Do we derive new WhiteSwan and BlackSwan subclasses from Swan or just play around with the defaults for Color?

As John Stuart Mill, rephrasing David Hume, put it: "No amount of observations of white swans can allow the inference that all swans are white, but the observation of a single black swan is sufficient to refute that conclusion."¹ Since then, Taleb has popularized the term *black swan event*, now being fashionably bandied around at

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dinner parties to cover every conceivable political and stock-market surprise. I'm reminded of the brief 1960/'70s vogue for René Thom's seven catastrophes, which, in spite of much topological innovation, fizzled out in a burst of extravagant social extrapolations.

On the other hand, chaos theory has attracted a more respectable following than catastrophe theory, although the confusion over the two names is understandable. Taleb's works offer useful, readable, and witty insights into the whole field of real-life uncertainties. These are of vital importance in computer modeling of biological, financial, global climate (Al Gore rhythm, see later), and other complex systems. Security and related risk analyses have been stimulated by the black swan debate. The old deterministic view of "life as a huge case-statement" is replaced by "life as a sequence of zero-prior-probability events." Taleb addresses the hindsight paradox: that someone, somewhere did predict black swan events such as the 1929 market crash and the 9/11 attack. So, in some sense the unexpected was, in retrospect, certain to happen.

There's that familiar but still-puzzling paradox of the "surprising" examination. Teacher announces on Sunday that pupils will sit for an exam on a day of the following week (Monday or Tuesday or... Friday). The

announcement will not be made until the morning of the selected day, and, here's the rub, teacher declares that the announcement is guaranteed to be a complete surprise! Bright students (if any) can rule out Friday, since by the end of Thursday, a Friday exam is inevitable and totally UNSurprising. Likewise, Thursday can be ruled out as a surprise, since the range of possibilities is now reduced to four days (Monday through Thursday), so we can employ the same argument used to eliminate Friday. Proceeding in this way, we eventually rule out Monday, seeming to prove that the teacher lied: he cannot guarantee a "complete surprise" since each of the five days has been eliminated as "surprising."

Some readers may still question the relevance of these excursions into philosophy, seemingly away from the hard-core, nitty-gritty of delivering code on time to an impatient market. It's certainly true that many are content simply to refine their syntax skills in order to push out bug-free systems. To this end, there are plenty of ACM sources in *Queue* and beyond, not least of which are the effective Kode Vicious sermons on common but avoidable coding errors. Yet a mounting theme in our industry is the shortage of competent programmers and the related problem of what sort of people are likely to "give good code." Apart from all the so-called measurable personal-

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ity traits tabulated to assist recruiters (see, e.g., “Does Personality Matter?” Alessandra Devito and David Greathead, *CACM*, May 2007), there’s a hard-to-define general problem-solving ability to juggle between the particular and the general: zooming in and out of systems maps, as it were, without losing focus. It’s a valued balancing act between patient scrutiny and impatient curiosity. My sneaky, covert message is: if you think that the color of swans is simply a matter of avian plumage, it could well be that there’s an element missing in your programmer’s toolbox.

CONTEST NUMBER ONE

Under the new Curmudgeon regime I discussed last month, I invite your own resolution of this paradox or reasons why it resists resolution. E-mail me at curmudgeon@acmqueue.com. My software will detect overactive Google or Wiki plagiarism. Winners will be totally surprised by the prizes awarded.

SUPERLINK

I’ve cleverly planted three links (or segues in show-biz argot) to my next piece of self-puffery. You’ll meet Al Gore again. Then, mention of Fields medalist René Thom leads me to the People’s Republic of Warwick University

where I studied (*aliter*: was bemused by) the just-emerging *theorie catastrophique* (it sounds more ominous in French) with Thom, Christopher Zeeman, and Ian Stewart.

The third link is the Ian Stewart book referenced below, where he discusses *inter alia* the “surprise test” problem in a chapter called “Paradox Lost.” By *lost*, he means a paradox more or less resolved by semantic disambiguation, in contrast to (extending the Miltonic allusion) those he calls *regained*. These are the deeper paradoxes that continue to plague us. Since true paradoxes are also false, why worry? Keep tossing that fair coin if you can find one.

The reading this morning is from the preface of *How to Cut a Cake and Other Mathematical Conundrums* (Ian Stewart, Oxford University Press, 2006):

“Occasionally, when I’m feeling unusually relaxed and my mind starts to wander, I wonder what the world would be like if everyone enjoyed mathematics as much as I do. Television news would lead with the latest theorems in algebraic topology instead of tawdry political scandals, teenagers would download Top of the Theorems to their iPods, and calypso singers (remember them?) would strum their guitars to the tune of ‘Lemma Three’... which reminds me that the folk-singer Stan Kelly

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(now Stan Kelly-Bootle, look him up on Google) actually wrote just such a song, back in the late 1960s when he was studying for a mathematics M.Sc. at the University of Warwick. It began:

“Lemma three, very pretty, and the converse pretty too;
But only God and Fermat know which of them is true.”

I might perhaps add that when I came to publish this parody of “Lemon Tree” in my *Devil’s DP Dictionary* (McGraw-Hill, 1981), I sought and promptly received permission from the composer Will Holt and his copyright guardians, Chappel Music.

I was less fortunate obtaining approval from Ira Gershwin for a tiny, tiny obvious play on his lyrics to “I Got Rhythm.” It went, “Al Gore rhythm—who could ask for anything more?” End of song. Await cries of “Bis! Bis!” (which is French for “Encore!”).

Yes, it is so obvious a pun that a flood of similar parodies soon appeared in diverse comics and cabarets, but I still feel I can claim priority by at least a minute or so (see this column, “You Can Look It Up—Or Maybe Not,” October 2006, on the perils of “citationology”). The great wordsman of the immortal George and Ira songwriting duo, though, wrote back to me refusing my request. At least he signed a letter that had all the marks of a standard legal rejection. I suppose it was one of those “Hey, Doreen, send this guy the ‘we-don’t-allow-parodies’ letter.” It spoke of the need to protect the integrity of the Gershwin heritage, to which I replied, in vain, assuring Ira of my undying respect for the Gershwins’ glorious corpus. In any event, McGraw-Hill editor Barry Richman consulted his IP (intellectual property) lawyers, who gave the welcome ruling that such a short and inoffensive twist was unlikely to provoke litigation from the Gershwin estate.

I mention this episode to indicate that seeking permission to quote or adapt the works of others was taken more seriously in the 1970s. Nowadays, there seems to be a more casual attitude to borrowing, nay, stealing content without due process. There are software products on sale to simplify illicit “protected-file” copying. Ironically, these products are seldom bought but rather used to illicitly copy and distribute themselves in a sort of recursive piracy.

TLA OVERLOADING

I know that you, as ACM members, probably have access to all the magazines (paper or online) that busy professionals can cope with (note the semi-covert flattery?),

yet I’m about to plug another source. As a member of the AAAS (American Association for the Advancement of Science), you’ll enjoy extensive access to a wide range of timely information about the broader aspects of scientific research—in particular, the authoritative weekly magazine *Science*. As a glutton for information, I get my easier-to-navigate popular updates from *Scientific American*, *New Scientist*, and the like, but relish the challenge of swimming in the deeper waters of *Science*. As a recent example, I’m now proud to know that SQL is no longer just the database language we all love or abhor, but a hot, overloaded TLA (three-letter abbreviation) in quantum metrology, meaning the standard quantum limit. We old IBMers prefer to pronounce the database SQL shibboleth as “sequel,” leaving newbies with their “ess-kew-[H]ell”! We’ll now get used to the latter in the context of standard quantum limits.

The May 4, 2007, issue of *Science* offers the startling paper, “Beating the Standard Quantum Limit with Four-Entangled Photons” (Tomohisa Nagata et al). Phase measurements using entangled particles can now beat the SQL precision achieved with unentangled particles. Are you surprised? The Heisenberg limit is still safe! Beating that would be more than a black or even red swan event. The swan would have to be exploding fractal polka dots. ☹

REFERENCES

1. Quoted from Nassim Taleb’s *Fooled by Randomness* (W.W. Norton, 2001), by David Smith in his interview with Taleb: *Sunday Times*, May 6, 2007.

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STAN KELLY-BOOTLE (<http://www.feniks.com/skb/>; <http://www.sarcheck.com>), born in Liverpool, England, read pure mathematics at Cambridge in the 1950s before tackling the impurities of computer science on the pioneering EDSAC I. His many books include *The Devil’s DP Dictionary* (McGraw-Hill, 1981), *Understanding Unix* (Sybex, 1994), and the recent e-book *Computer Language—The Stan Kelly-Bootle Reader* (<http://tinyurl.com/ab68>). *Software Development Magazine* has named him as the first recipient of the new annual Stan Kelly-Bootle Eclectech Award for his “lifetime achievements in technology and letters.” Neither Nobel nor Turing achieved such prized eponymous recognition. Under his nom-de-folk, Stan Kelly, he has enjoyed a parallel career as a singer and songwriter.

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