

Selection Alone Raises the Mean by **1.52** Standard Deviations and Shrinks the Spread to **0.45**

— With everyone equally able, looking only at the top **16.02** per cent gives a mean of **1.5236** — At the same time the standard deviation falls from **1.0007** to **0.4473**, so the group also looks “consistent” — Both illusions come from one operation — [Paper 364]

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— *From thinking to syncing.* —

Abstract

Look only at the survivors and they seem superior. This paper asks by how much—the answer is **1.52** standard deviations, with everyone equally able. No new mathematical theorem and no new law is claimed. First, the population of 200000 has mean **0.002419** and standard deviation **1.000719** (Section 2). Second, this is the core of the paper. Taking only the top **16.02** per cent gives a mean of **1.5236**, a lift of **1.5212** standard deviations (Section 2). Third, at the same time the standard deviation shrinks from **1.0007** to **0.4473** (Section 3). Fourth, the top **2.29** per cent gives mean **2.3733** and standard deviation **0.3466** (Section 2). Fifth, the measurement matches the truncated-normal theory (**1.5236** against **1.5251** at $c = 1$) (Section 2). Sixth, the separator is whether the dropouts are recorded, not how severe the selection is (Section 5).

Scope of this paper (scope note): No new mathematical theorem and no new law is claimed——survivorship bias, the truncated normal distribution, and selection effects are all standard. We do not build statistics——maximum-likelihood estimation for truncated distributions and Heckman’s two-step correction are not entered. They are named and no more. We use no real data——no actual records of companies, funds, or people are used. The computation is on standard normal draws. We do not discuss causation——what caused the dropping out is not the subject. Only the single fact that dropouts are invisible is treated. We give no estimator——how to correct the bias is not the subject. We do not generalise——1.52 standard deviations is not claimed for every selection. It is the value under a stated normal distribution and a stated top 16 per cent. Relation to earlier papers: Paper 361 showed a boundary drawn from equilibrium temperature excluding Earth——there too the verdict came from testing on a known instance. Paper 353 showed a claim turning false when its condition is dropped——here the dropped condition is “we saw the dropouts”. Paper 300 showed whether two things share a root is decidable——by that test, a difference in ability and the effect of selection have distinct roots. Paper 357 showed one circuit holding two optima——here one operation makes two illusions at once. What is added is giving mean and standard deviation at six selection strengths, showing the lift to be 1.5212 standard deviations, checking the measurement against truncated-normal theory, showing that the shrinking of spread happens simultaneously, and putting the separator on whether dropouts are recorded.

1. Notation and the Question

Setting: Draw 200000 values from the standard normal and remove everything below a threshold c from observation.

$$X \sim \mathcal{N}(0, 1), \quad \mathbb{E}[X \mid X \geq c] = \frac{\phi(c)}{1 - \Phi(c)}$$

Here ϕ is the density and Φ the distribution function.

Observation 1.1

Everyone is equally able. All drawn from one distribution——whatever difference exists is luck.

Observation 1.2

The dropouts leave no record. The failed company, the closed fund, the person who left——only what remains is counted.

Observation 1.3

This paper gives that difference as a number. Not “there is a bias” but “how many standard deviations”—— knowing the size changes the judgement.

Question: How much better does selection alone make them look?

2. The Lift Is 1.5212 Standard Deviations

Calculation 2.1: Mean and standard deviation of the survivors against threshold (computed in this paper, 200000 draws).

Threshold c	Survival rate	Mean	Std. dev.	Apparent gain
−3.0	0.9987	0.006584	0.994469	+0.004165
−2.0	0.9775	0.057091	0.942970	+0.054672
−1.0	0.8412	0.290145	0.794879	+0.287725
0.0	0.5005	0.800474	0.604049	+0.798054
1.0	0.1602	1.523616	0.447334	+1.521197
2.0	0.0229	2.373342	0.346628	+2.370922

The population has mean 0.002419 and standard deviation 1.000719.

Observation 2.2

This is the core of the paper. Taking only the top 16.02 per cent gives a mean of **1.5236**——a lift of **1.5212** standard deviations, with ability entirely unchanged.

Observation 2.3

It matches theory. The truncated normal gives $\phi(c)/(1 - \Phi(c)) = 1.525135$ at $c = 1$ ——0.0015 from the measured 1.523616. A cross-check against an independent formula.

Observation 2.4

Halving the field alone gives 0.80 standard deviations. $c = 0$, survival rate 0.5005—even “the top half”, a mild selection, opens this much of a gap.

Observation 2.5

The top 2.29 per cent gives 2.37. $c = 2$ —that a group called “elite” averages 2 standard deviations above the population is not evidence of ability.

Observation 2.6

Without selection it returns. At $c = -3$ the mean is 0.006584, near the population’s 0.002419—a check that the construction is doing the work.

3. The Spread Shrinks at the Same Time

Observation 3.1

The standard deviation falls from 1.0007 to 0.4473. At $c = 1$ —less than half.

Observation 3.2

This makes a second illusion. “This group is consistent”—it is not consistent; the lower side has simply been cut off.

Observation 3.3

Both illusions come from one operation. The mean rising and the spread shrinking—both follow from cutting the bottom. They are not two separate pieces of evidence.

Observation 3.4

This is the most dangerous point in practice. “High mean and low variance” normally looks like strong evidence—and selection alone produces both.

Observation 3.5

The top 2.29 per cent shrinks to 0.3466. A third of the population’s—the harder the selection, the more “stable” the group appears.

4. Count the Dropouts and It Returns

Observation 4.1

If the dropouts can be counted, the bias vanishes. That is what the $c = -3$ row is—look at 99.87 per cent and the mean returns to the population’s.

Observation 4.2

So the trouble is not the selection but the asymmetry of the record. Selection itself distorts nothing—what distorts is that the dropped side leaves no record.

Observation 4.3

So report the survival rate. With 0.1602 written alongside, the 1.5236 can be corrected—the same shape as stating the circle of confusion fixing the number in Paper 358.

Observation 4.4

To be stated honestly—in real settings the threshold c is not known. One looks at survivors without knowing how many dropped out—this paper gives the size for a given c ; it does not give a way to estimate c .

Observation 4.5

Knowing the size is still worth something. 0.80 for the top half, 1.52 for the top 16 per cent—not a size that “there is some bias” covers.

5. The Separator: Are the Dropouts Recorded?

Observation 5.1

The separator—whether the dropouts leave a record; not how severe the selection is.

	Visible group	Apparent mean	Apparent std. dev.
Dropouts recorded	everyone	0.0024	1.0007
Only survivors recorded	top 16.02 per cent	1.5236	0.4473

Observation 5.2

Ability is exactly the same in the two rows. The same sequence of draws—only what was recorded differs, and the numbers move by 1.52 and 0.55 standard deviations.

Observation 5.3

Distinct roots by the criterion of Paper 300. A difference in ability comes from the distribution; the effect of selection comes from the cropping of the observation—both produce the same figure “a high mean”, with different roots.

Observation 5.4

The separator can be moved. Keep the records of the dropped side and the top row returns—so this is not a problem of statistics but of how records are designed.

Observation 5.5

To be stated honestly——**1.5212** and **0.4473** are values under a standard normal and a stated threshold $c = 1$. Another distribution gives other numbers——what does not move is the direction: selection raises the mean and shrinks the spread at the same time.

Observation 5.6

One last thing——“high mean and low variance” must not be counted as two pieces of evidence. One operation makes both——when two seemingly independent pieces of evidence come from one cause, the count of evidence is one.

6. The Census and the Close

1. Population mean **0.002419**, s.d. **1.000719** (Calculation 2.1): everyone equally able.
2. Top **16.02** per cent gives mean **1.5236** (Calculation 2.1): a lift of **1.5212**.
3. Theory gives **1.525135** (Observation 2.3): a difference of **0.0015**.
4. Top half gives **0.80** (Observation 2.4): even mild selection.
5. Top **2.29** per cent gives **2.37** (Calculation 2.1): not evidence of ability.
6. Standard deviation falls to **0.4473** (Observation 3.1): less than half.
7. **0.3466** at $c = 2$ (Observation 3.5): harder selection looks more stable.
8. Both illusions from one operation (Observation 3.3): the evidence is one.
9. $c = -3$ returns to the population (Observation 2.6): the construction works.
10. Report the survival rate (Observation 4.3): a problem of record design.

Closing: Look only at the survivors and they seem superior——the question is by how much. Draw 200000 values from the standard normal, so that everyone is equally able——the population has mean **0.002419** and standard deviation **1.000719**. Take only the top **16.02** per cent and the mean becomes **1.5236**. A lift of **1.5212** standard deviations, with ability entirely unchanged. It differs by **0.0015** from the truncated-normal value **1.525135**. Even mild selection works——the top half (survival rate **0.5005**) already gives **0.80** standard deviations, and the top **2.29** per cent gives **2.37**. That a group called “elite” averages 2 standard deviations above the population is not evidence of ability. And the spread shrinks at the same time——the standard deviation falls from **1.0007** to **0.4473**, and to **0.3466** for the top **2.29** per cent. This makes a second illusion — “this group is consistent” — when it is not

consistent, the lower side has simply been cut off. “High mean and low variance” normally looks like strong evidence, and selection alone produces both. Count the dropouts and it returns——looking at 99.87 per cent brings the mean back to the population’s, so the trouble is not the selection but the asymmetry of the record. Report the survival rate 0.1602 alongside and the 1.5236 can be corrected. In real settings, though, the threshold is not known: this paper gives the size for a given c , not a way to estimate c . One thing separates them——whether the dropouts leave a record; not how severe the selection is. Ability is exactly the same in the two rows — the same sequence of draws — and only what was recorded differs. Keep the records of the dropped side and it returns, so this is not a problem of statistics but of how records are designed. To be said honestly——1.5212 and 0.4473 hold under a standard normal and a stated threshold $c = 1$; another distribution gives other numbers. What does not move is the direction: selection raises the mean and shrinks the spread at the same time. One last thing——“high mean and low variance” must not be counted as two pieces of evidence. One operation makes both. When two seemingly independent pieces of evidence come from one cause, the count of evidence is one.

References

1. Wald, A. (1943). *A Method of Estimating Plane Vulnerability Based on Damage of Survivors*. Statistical Research Group, Columbia University.
 2. Heckman, J. J. (1979). Sample Selection Bias as a Specification Error. *Econometrica*.
 3. Brown, S. J., Goetzmann, W., Ibbotson, R. G., Ross, S. A. (1992). Survivorship Bias in Performance Studies. *Review of Financial Studies*.
 4. Johnson, N. L., Kotz, S., Balakrishnan, N. (1994). *Continuous Univariate Distributions, Volume 1* (2nd ed.). New York: Wiley.
 5. Elton, E. J., Gruber, M. J., Blake, C. R. (1996). Survivorship Bias and Mutual Fund Performance. *Review of Financial Studies*.
 6. Yamagishi, Y. (2026). *The Three Hundredth Census: Whether Two Things Share a Root Is Decidable* [Paper 300]. Zenodo. 10.5281/zenodo.22171914
 7. Yamagishi, Y. (2026). *Adding Noise Can Improve Detection — But “More Is Better” Is Not the Rule* [Paper 353]. Zenodo. 10.5281/zenodo.22696835
 8. Yamagishi, Y. (2026). *Maximum Power and Maximum Efficiency Are Not the Same Point* [Paper 357]. Zenodo. 10.5281/zenodo.22697180
 9. Yamagishi, Y. (2026). *The “Depth” of Depth of Field Is a Convention, Not a Measurement* [Paper 358]. Zenodo. 10.5281/zenodo.22697216
 10. Yamagishi, Y. (2026). *A Habitable Zone Drawn from Equilibrium Temperature Puts Earth Outside It* [Paper 361]. Zenodo. 10.5281/zenodo.22697436
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