STIVEN CATALYST

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MANAGEMENT REVIEW

Management without theatre.



KPIS

REGRESSION TO THE MEAN

Why the worst shift improves on its own and the best one slips: Kahneman's flight instructors, Galton's heights, how big the false improvement gets, a control group that got better without help, and a card.

+8.3 points on a physical-health score for the controls who started below the high-risk cut-off, three months later, with no intervention at all.

LINDEN, 2013

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NO. 82 · KPIS

In this issue

Every month a site picks out its worst shift, its worst driver, its worst store, and steps in. Next month the worst usually looks better and the best a little worse. Part of that movement would have happened anyway. This issue is about telling the two apart.

Kahneman's flight instructors believed shouting worked better than praise. Galton's heights of 1886 show the same pull: children of tall parents were tall, but less so. In a simulation, the costliest fifth fell by $1,417 with no programme when two years agreed weakly, by $472 when they agreed well. In a real control group, the worst scorers gained eight points with no help. Five checks and a card help decide what a change really did.

Stiven Janaqi EDITOR · STIVEN CATALYST

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HOW TO READ THIS ISSUE

Figure
Every figure has its source and year at the foot of its page.

Our reading
Where the editor interprets rather than the research, it says so.

Practice
The steps and the card are proposals to try, not research results.

COVER STORY

Praise, then a worse landing

As a young lecturer in Jerusalem, Daniel Kahneman was teaching the instructors of an air force flight school that praise works better than punishment. One of the most seasoned instructors objected.

Cadets he praised for a clean manoeuvre, he said, usually did worse the next time; cadets he screamed at usually did better. Kahneman saw that the observation was right and the conclusion wrong. Instructors praise after an unusually good attempt and shout after an unusually bad one, and the next attempt tends to lie closer to the cadet's usual level either way.

> “We are statistically punished for rewarding others and rewarded for punishing them.”

On the spot he had each participant toss two coins at a target behind his back, with no feedback. Those who did best the first time mostly did worse the second, and the other way round.

OUR READING

On a shift floor the same pattern looks like proof that pressure works. It proves only that extremes do not last.

Source: Daniel Kahneman, Les Prix Nobel 2002, Nobel Foundation, 2002

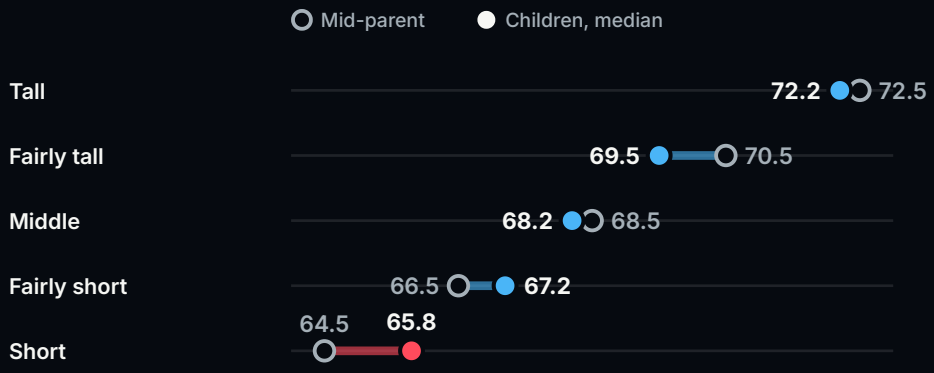
Kahneman's own account in his Nobel autobiography (2002), which gives no year for it. The quote is shortened; the translations are ours. Feedback that changes behaviour is in No. 19.

THE NUMBERS

Tall parents, shorter children

In 1886 Francis Galton published the heights of 930 adult children and of their parents, 205 couples, gathered through prizes for family records. He averaged each couple into a “mid-parent”, with women's heights multiplied by 1.08.

HEIGHT IN INCHES, BY GROUP OF MID-PARENTS (1886)



Galton's rule: a child's distance from the average is, on average, two-thirds of the mid-parent's. Read the other way, the most probable mid-parent of a man is only a third as far from the average as he is. The pull works in both directions.

OUR READING

Nobody pushed the heights back. Selecting the extremes was enough to make them look as if they had moved.

Sources: Francis Galton, Journal of the Anthropological Institute of Great Britain and Ireland 15, 1886; Veronica Morton & David J. Torgerson, BMJ 326(7398), 2003

Medians from Galton's Table I (928 children in its totals), five of the nine rows with a median; heights in inches. Galton explained the pull by heredity; it appears in any two measurements that agree only loosely.

THE MODEL

Why the extremes come back

The effect appears whenever a group is picked for an extreme value and measured again, and the two measurements are imperfectly correlated. The weaker the correlation and the more extreme the pick, the larger the drift.

FALL IN THE COST OF THE COSTLIEST FIFTH WITH NO PROGRAMME, BY CORRELATION BETWEEN YEARS (SIMULATION, 2013)



Ariel Linden simulated 10,000 people whose yearly costs averaged $5,000, with a standard deviation of $1,350. Those above about $6,136 in the first year, the costliest fifth, cost less in the second although nothing was done. The better the two years agreed, the smaller the fall.

OUR READING

A shift's result is part pattern and part luck. Pick the worst, and you pick bad luck too; it rarely repeats.

Sources: Veronica Morton & David J. Torgerson, BMJ 326(7398), 2003; Ariel Linden, BMC Medical Research Methodology 13, 2013

The conditions are Morton & Torgerson's (2003). The bars are the mean fall in a simulation, not real patients; ρ is the correlation between the two years. Noise is in No. 20.

WHAT THE RESEARCH SAYS

Improvement nobody made

Linden also looked at a real control group: 118 people in a health-coaching study who received no coaching. They answered the same physical-health questionnaire twice, three months apart.

+8.3
points for the 34 who started below the high-risk cut-off; the rest stayed level

>80%
of women whose bone density fell in the first year of treatment gained in the second, with no change in treatment

Morton and Torgerson draw the lesson for managers. Give the hospitals at the bottom of a league table extra resources, and most will climb; reward those at the top, and they will fall. Any intervention aimed at a group far from the average will appear to succeed. Because the effect works on groups, a single unit may still move the other way.

OUR READING

The worst shift of the month is the easiest to turn around. That is why its turnaround proves the least.

Sources: Ariel Linden, BMC Medical Research Methodology 13, 2013; Veronica Morton & David J. Torgerson, BMJ 326(7398), 2003

Control group: mean score 36.7, then 44.9 (2013). Bone density as Morton & Torgerson (2003) report it from a 2000 study we did not see. Read in the full text of both articles.

HOW IT IS MEASURED

Before the fix gets the credit

The remedies in the literature are few and plain. A team can apply most of them to its own numbers before it credits a change.

01	**A comparison**	Units chosen the same way that did not get the change; at random if possible.
02	**An average, not one value**	Pick the target on several periods before, not on one bad one.
03	**The expected drift**	Group's distance from the average × (1 – correlation between periods).
04	**The whole group**	The effect works on groups; one unit can move either way.
05	**The run, not two points**	Before and after over many periods, against the usual variation.

HYPOTHETICAL EXAMPLE, THE WORST OF EIGHT SHIFTS

Shift C, month 1	4.1% late, the worst
After coaching	3.0%
Shift C, ten months before	2.9% on average

Shift C came back to its usual level. The figures are made up.

Sources: Ariel Linden, BMC Medical Research Methodology 13, 2013; Veronica Morton & David J. Torgerson, BMJ 326(7398), 2003

Rows 1 to 4 after Linden (2013) and Morton & Torgerson (2003); the drift formula holds for normal data and underestimates it in skewed data. Row 5 and the example are the editors'. Control charts are in No. 25.

More in the essay A bad day or a problem?

TOOL OF THE ISSUE

The before-and-after card

One card for any result about to be credited to a change. A control chart shows whether the period after sits outside the usual variation of the period before.

01 The change and the claim what was done, and what it is said to have improved

02 How the target was chosen one bad value, or an average over several periods?

03 Before the measure over many periods, and the average of all units

04 Comparison units without the change, chosen the same way, over the same weeks

05 Expected drift distance from the average × (1 – correlation), if known

06 Verdict change beyond the drift and the comparison? keep, test again or drop; date of the next look

Sources: Ariel Linden, BMC Medical Research Methodology 13, 2013; Veronica Morton & David J. Torgerson, BMJ 326(7398), 2003

A card the editors propose, after the remedies in Linden (2013) and Morton & Torgerson (2003).

Open the tool: Sigma & Control Chart stivencatalyst.com/tools/sigma-control-chart/

SOURCES AND METHOD

Every figure has a source.

The figures in this issue come from the sources below. The year shows how recent each one is.

Daniel Kahneman – Biographical
Daniel Kahneman, Les Prix Nobel 2002, Nobel Foundation, 2002
https://www.nobelprize.org/prizes/economic-sciences/2002/kahneman/biographical/

Regression towards Mediocrity in Hereditary Stature
Francis Galton, Journal of the Anthropological Institute of Great Britain and Ireland 15, 1886
https://galton.org/essays/1880-1889/galton-1886-jaigi-regression-stature.pdf

Effect of regression to the mean on decision making in health care
Veronica Morton & David J. Torgerson, BMJ 326(7398), 2003
https://doi.org/10.1136/bmj.326.7398.1083

Assessing regression to the mean effects in health care initiatives
Ariel Linden, BMC Medical Research Methodology 13, 2013
https://doi.org/10.1186/1471-2288-13-119

EDITORIAL METHOD

Each figure was checked for its year, its publisher and what it measures, in the full text where it could be opened. A source read only in a summary, an abstract or excerpts is marked “via”. A figure not confirmed in what was read is marked so on its page, or left out. The editor's interpretation is marked “Our reading”.



MANAGEMENT REVIEW

Management without theatre.

Every issue, one management question, checked against the best research.

ALL ISSUES

stivencatalyst.com/magazine/management-review.html

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Edited by Stiven Janaqi, who answers for it; “the editors” in this publication means him. Its texts, translations, layout and the checking of figures against their sources are done in working sessions with Claude, an AI model by Anthropic.
stivencatalyst.com/how-this-is-made.html