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BY TOM RADEMACHER.

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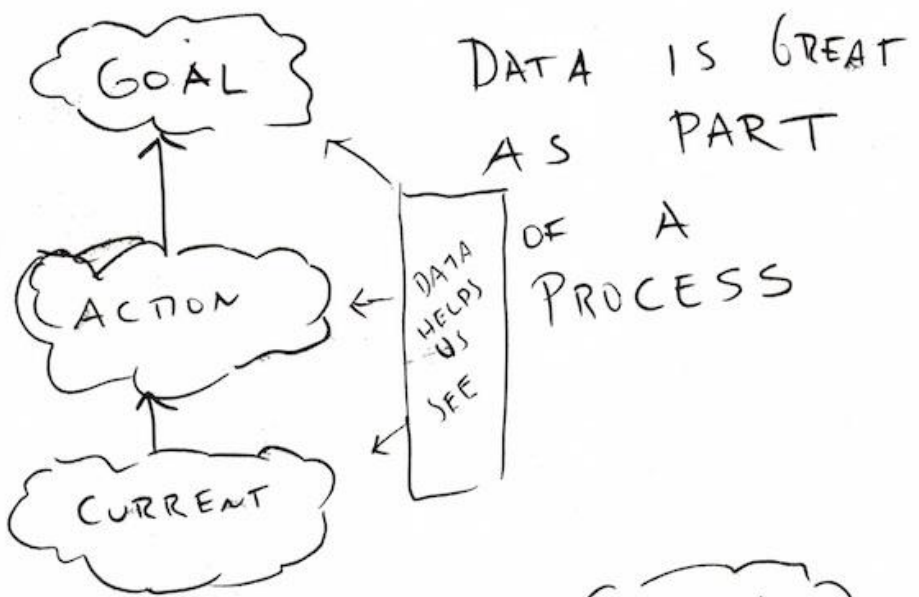
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THE LITTLE BOOK  
OF  
BIG  
DATA  
FALLACIES



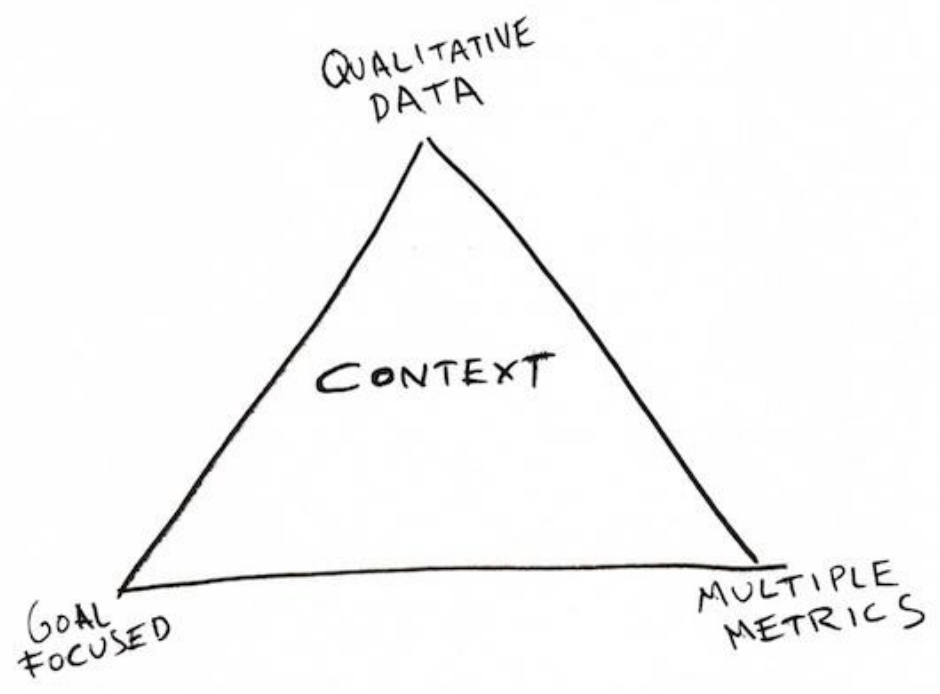
TOM RADEMACHER



UNFORTUNATELY,  
WHAT WE OFTEN  
SEE IS DATA

AS

THE GOAL,  
WHICH MESSES  
EVERYTHING UP.



THIS BOOKLET IS NOT A CALL FOR  
A VIBES-BASED WORLD; BUT FOR  
US TO STEP BACK FROM THE DATA  
WE USE FOR IMPORTANT WORK AND  
ASK WHAT STORIES ARE MISSING,  
WHAT QUESTIONS NEED ASKING,  
WHERE OUR REAL GOALS MAY BE  
FORGOTTEN IN THE NUMBERS.

## BACK TO THOSE MINDSETS:

### NUMBERS DON'T LIE:

DATA CAN BE POORLY GATHERED,  
SELECTIVELY SHARED, AND INCOMPLETE.  
NUMBERS LIE ALL THE TIME.

### NUMBERS TELL THE WHOLE STORY:

I THINK IT'S FAIR TO SAY THAT  
ANY NUMBER FEELS LIKE THE  
COMPLETE STORY OF A COMPLEX  
THING, THE LESS YOU KNOW ABOUT IT.

### NUMBERS DON'T HAVE FEELINGS:

THIS IS THE ACADEMIC EQUIVALENT OF  
INTERNET TROLLS WHO CLAIM TO ONLY  
USING "FACTS & LOGIC" WHILE MELTING  
DOWN. VERY BIG FEELINGS CAN BE  
SQUEEZED BETWEEN DATA & CONCLUSIONS.

BIAS, EMOTION, INTERESTS, EGO.

DATA

CONCLUSIONS

THERE'S A FEW PERVASIVE  
DATA FALLACIES THAT  
ARE REAL GOOD AT  
DISTRACTING US FROM  
OUR ACTUAL GOALS.

• NUMBERS  
DON'T LIE

• NUMBERS  
~~TELL~~ THE  
WHOLE STORY

• NUMBERS  
DON'T HAVE  
FEELINGS

A LOT OF THESE  
FALLACIES ARE  
ROOTED IN MINDSETS  
THAT ARE TOO  
EASILY ADOPTED  
BECAUSE THEY'RE  
JUST SO DARN  
APPEALING.

YES THEY DO, NO THEY DON'T, YES THEY DO.  
WANT PROOF? KEEP READING.

# THE McNAMARA FALLACY:

WHEN YOU CAN'T MEASURE WHAT IS IMPORTANT, YOU MAKE IMPORTANT WHAT YOU CAN COUNT

SEC. OF DEFENSE ROBERT McNAMARA TRIED TO REDUCE STRATEGY IN THE VIETNAM WAR TO ONLY QUANTIFIABLE METRICS.



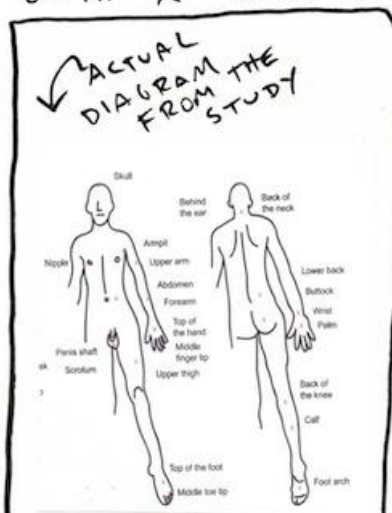
THIS IS NOT TO BE CONFUSED WITH THE McNAMARA FOLLY, ALSO NAMED FOR THE SAME DUDE. IF WE'RE TALKING QUANTIFIABLE METRICS, HOW ABOUT THE NUMBER BAD THINGS NAMED AFTER YOU?

# BEE S

# NUTS

TOM'S LAW:

TIME SPENT MAKING DATA TO JUSTIFY THE WORK YOU'RE ALREADY DOING IS LIKE STINGING YOURSELF IN THE TESTICLES WITH A BEE JUST TO SEE IF IT HURTS.



HERE'S THE PROBLEM:

- WITH A SAMPLE SIZE OF ONE (1), THESE RESULTS AREN'T USEFUL.
- WE CAN'T CONTROL BEES (SOURCE NEEDED) SO THIS ISN'T HELPFUL.
- WE DIDN'T NEED A STUDY TO KNOW THAT BEE STINGS IN OUR NOSE WOULD HURT.

IN 2014, SOCIAL INSECT BIOLOGIST MICHAEL SMITH STUNG HIMSELF REPEATEDLY IN 25 PLACES WITH BEES HE WAS HOLDING WITH FORCEPS TO DETERMINE WHICH SPOT HURT MOST.

I'M NOT KNOCKING SMITH, WHO HAS PUBLISHED A TON SINCE AND I LOVE WHEN SCIENTISTS DO WEIRD STUFF AND COULD TALK ABOUT THIS STUDY FOREVER.

SOMETIMES RESEARCH & DATA IS USEFUL AS META PHOR

# CAMPBELL \$ COBRAS

CAMPBELL'S LAW: THE MORE IMPORTANT A METRIC IS IN SOCIAL DECISION MAKING, THE MORE LIKELY IT IS TO BE MANIPULATED

CAMPBELL AND GOODWIN WORK TOGETHER WELL, AND ARE ILLUSTRATED WELL WITH WHAT ECONOMIST HORST SIEBERT CALLED 'THE COBRA EFFECT' WHICH I WILL SHOW HERE FOR NO REASON NEXT TO AN ILLUSTRATION OF HIGH-STAKES TESTING.

## COBRA EFFECT

FEWER DEADLY COBRAS IN THE AREA



## TESTING

MAKE SURE STUDENTS ARE LEARNING EFFECTIVELY IN SCHOOL

OFFER A BOUNTY ON DEAD COBRAS



INSTITUTE HIGH-STAKES STANDARDIZED TESTING

MORE DEAD COBRAS



CUMULATIVE TEST SCORES

PEOPLE BREEDING COBRAS IN ORDER TO COLLECT BOUNTY.

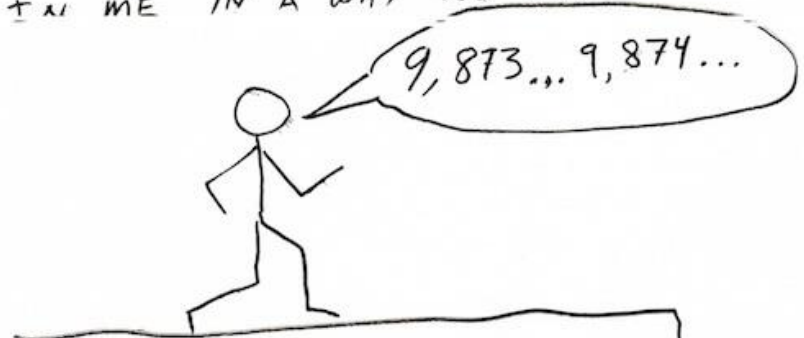


YOU TELL ME.

A SMALL ASSIGNMENT: GO ASK 100 PEOPLE WHO THEIR BEST TEACHER WAS, AND THEN ASK WHY. I'LL WAIT.

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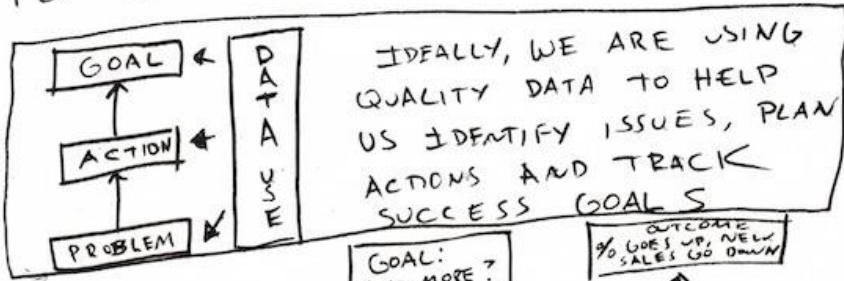
HOW MANY ANSWERS WERE EASILY MEASURABLE THINGS? WHERE DO WE PUT 'INSPIRED ME TO STUDY SPACE' ON A GRAPH. HOW MANY IS 'BELIEVED TALK TO ME IN A WAY NO ONE HAD?'



10,000 STEPS A DAY WILL MAKE YOU HEALTHIER.

# GOODHART'S LAW

WHEN A MEASURE BECOMES A TARGET, IT CEASES TO BE A GOOD MEASURE



I WAS IN A MEETING ONCE WITH A MARKETING DIRECTOR BRAGGING ABOUT HOW MUCH THEIR EMAIL 'HIT RATE PERCENTAGE' HAD GONE UP SINCE THEY STARTED CUTTING OUT POTENTIAL CUSTOMERS WHO HAD NOT YET BOUGHT ANYTHING. TEXTBOOK GOODHART, THE ACTUAL GOAL OF SELLING HAD BEEN FORGOTTEN IN THE QUEST FOR TARGET DATA.

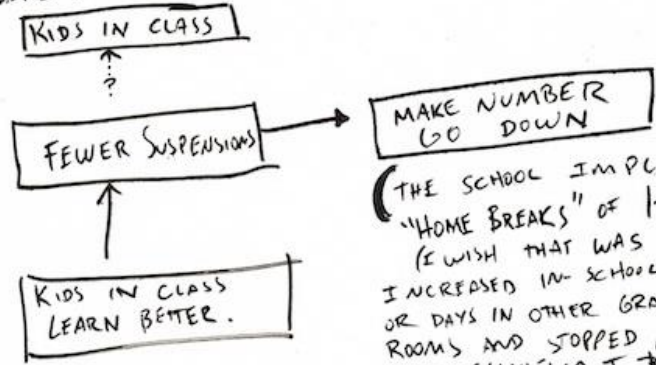


# GOODHART AT SCHOOL

IN A BUILDING I WORKED, THERE WAS A PUSH TO KEEP MORE STUDENTS IN CLASS AS OFTEN AS POSSIBLE, ESPECIALLY FOCUSING ON REDUCING SUSPENSIONS, WHICH WERE ALSO ILLUSTRATING A RACIAL BIAS IN HOW DISCIPLINE WAS APPLIED.

WE HAD A GOAL: KIDS IN CLASS  
 WE HAD A DATA POINT: SUSPENSION #S

BUT INSTEAD OF DOING WORK AND GIVING THE SUPPORT NEEDED TO GET AND KEEP KIDS LEARNING IN THEIR CLASSROOM, THE FOCUS WAS ON BRINGING SUSPENSION NUMBERS DOWN.



(THE SCHOOL IMPLEMENTED "HOME BREAKS" OF 1-3 DAYS (I WISH THAT WAS A JOKE) INCREASED IN-SCHOOL SUSPENSIONS OR DAYS IN OTHER GRADE-LEVEL ROOMS AND STOPPED ADDRESSING SOME SIGNIFICANT & DANGEROUS BEHAVIOR.)