Cognitive Bias and Medical Decision-Making

R' Mordechai Torczyner – torczyner@torontotorah.com

YESHIVA UNIVERSITY
TORAH MITZION
BEIT MIDRASH

Introduction

1. Guthrie, Rachlinski & Wistrich, *Inside the Judicial Mind*, 86 Cornell L. Rev. 778 (2000-2001)

In one early study of anchoring, Professors Amos Tversky and Daniel Kahneman asked participants to estimate the percentage of African countries in the United Nations. Before asking for this estimate, they informed the participants that the number was either higher or lower than a numerical value identified by the spin of a "wheel of fortune." Tversky and Kahneman had secretly rigged this "wheel of fortune" to stop either on ten or sixty-five. When the wheel landed on ten, participants provided a median estimate of 25%; when the wheel landed on sixty-five, participants provided a median estimate of 45%. Even though the initial values were clearly irrelevant to the correct answer, the initial values had a pronounced impact on the participants' responses.

2. Rabbi Daniel Z. Feldman, *False Facts and True Rumors*, pg. 68

This [anchoring] effect is blamed for all kinds of irrational impacts on thinking. For example, participants in a wine auction who were asked to write down the last two digits of their Social Security numbers before bidding were found to bid higher numbers if the Social Security numbers were higher.

3. Clay Jones, *Outcome Bias in Clinical Decision-Making*, Science-Based Medicine Dec. '14

Most doctors have their own personal lucky catch or "great call" story, or at least can easily recount one that was passed down to them at some point in their career. A patient presents with an unusual symptom or syndrome, and in a seeming flash of inspiration a particular lab or imaging modality is requested that reveals the rare or unlikely diagnosis. What tends to follow is some degree of awe at the clinical acumen of the ordering physician, and in some cases more than a bit of hindsight bias. ("Well of course that's what the guy had! The clues were right in front of them the whole time.")

In reality, medical mystery-type lucky catches like this are the exception rather than the norm. The much more common version, but one less likely to achieve legend status in a physician's personal narrative, tends to occur when we've dusted off the diagnostic shotgun. Shotguns disperse multiple pellets in a wide pattern in order to increase the likelihood of making contact with the target. So does an ordering physician when they request a large number of tests thoughtlessly.

4. Professor Daniel Kahneman, *Thinking, Fast and Slow*, pp. 41-43

A series of surprising experiments by the psychologist Roy Baumeister and his colleagues has shown conclusively that all variants of voluntary effort - cognitive, emotional, or physical - draw at least partly on a shared pool of mental energy. Their experiments involve successive rather than simultaneous tasks….

The most surprising discovery made by Baumeister's group shows, as he puts it, that the idea of mental energy is more than a mere metaphor. The nervous system consumes more glucose than most other parts of the body, and effortful mental activity appears to be especially expensive in the currency of glucose. When you are actively involved in difficult cognitive reasoning or engaged in a task that requires self-control, your blood glucose level drops.

Questions

- What sorts of cognitive biases imperil the judgment of medical professionals and patients?
- Dr. Jameson, an experienced ER physician, senses that her mistakes in a few recent cases involved rushed judgment which was vulnerable to the sorts of cognitive biases identified in Kahneman's work. What can she do to avoid these biases?
- Dr. Smith, a cardiologist, is treating David for arrhythmia. Dr. Smith thinks David should try medicine rather than surgical ablation, due to risks involved in the surgery, but he knows that David has a high tolerance for risk. May Dr. Smith present medicine as the default, to take advantage of default bias?

Cognitive Biases: Medical Professionals and Patients

5. Clay Jones, *Outcome Bias in Clinical Decision-Making*, Science-Based Medicine Dec. '14

Outcome bias kicks in when we look back at the decisions that occurred prior to the lucky catch or positive outcome and judge them more positively, even when the care in question was of poor quality. We often forget or even fail to

acknowledge when a test or treatment had an unfavorable risk versus benefit ratio. This bias can reinforce the drive to perform more unnecessary testing in the future, not only by the directly-involved parties but also by any impressionable learners hearing the tale in the years to come.

6. Rabbi Yisrael Meir Kagan (19th-20th century Poland), Chafetz Chaim, Laws of Lashon HaRa 9:1

המספר בשבחו של חבירו בפני שונאיו גם כן בכלל אבק לשון הרע הוא, דזה גורם להם שיספרו בגנותו.

One who praises another in front of his enemies is guilty of "dust of harmful speech", because this causes them to speak degradingly of him.

7. Dr. Jesse Pines, *Confirmation Bias in Emergency Medicine*, Academic Emergency Medicine 2006; 13:90-94

Mr. W is a 51-year-old diabetic male who presents to the emergency department (ED) with a seven-day history of lumbar lower back pain that occurred immediately after lifting a heavy box at work. He is triaged at 2:00 AM and is seen by Dr. J at 2:45 AM. He reports radiation of pain down the front of his leg and denies trauma, and bowel or bladder abnormalities. He has been using high-dose Motrin (600 mg every 6 hours) to relieve the pain. He reports a pain severity of 10/10. He has no other medical problems, smokes marijuana occasionally, and has a distant history of IV drug abuse. Triage vitals are as follows: blood pressure, 150/91; heart rate, 105 beats per minute; temperature, 100.5ºF; and respiratory rate, 16 respirations per minute. He took 600 mg of Motrin 1 hour before ED arrival. He reports that he has been unable to work all week and needs a written excuse for his boss.

The nurse approaches the emergency physician (EP) and states, ''Mr.W is here again. He is here all the time requesting pain medicine and work excuses for lower back pain. He was even here yesterday and was seen by your colleague, Dr. S, [was] diagnosed as having a muscle strain or a herniated disk, [was] given two Percocet orally, and [was] told to follow up with his primary physician. Let's get him out of here.''…

In the case presentation, an initial biased approach may be for Dr. J to confirm Dr. S' diagnosis of musculoskeletal back pain without further in-depth examination and investigation. Certain elements in the history confirm his judgment. The natural inclination of a busy EP is to sort patients quickly by categorizing them by diagnostic or treatment strategy. In this case, the EP may accentuate the historical elements confirming the diagnosis of musculoskeletal back pain (preceded by injury, previous diagnosis, and history of many ED visits) and not investigate further pertinent historical elements (e.g., when pressed, Mr. W admitted to recent intravenous drug abuse).

8. Talmud, Bava Kama 50a

כל האומר הקב"ה ותרן הוא יותרו חייו

Anyone who said G-d is forgiving – his life will be 'forgiven'.

9. Ian Weinstein, *Don't Believe Everything You Think*, 8 Clinical L. Rev. 783 (2002-2003)

The problem of egocentric bias is our tendency to think many of our own common, ordinary skills and experiences are exceptional. When we last left Mr. Worth, he had also expressed his belief that the jury would not convict him.

I had replied, "I'm not sure the jury will see it that way, but there is still a lot we don't know about the evidence."

"I know," he responded, smiling, "But I know myself. People like me. No jury will convict me. They don't convict people they like, do they?"

"You're exactly right about that." I told him, "If someone likes you, they believe you and they will try to think of reasons why you are right. But we will have to think long and hard about how to let the jury get to know you. A trial is very different from a social event and even liking some people isn't enough to get over strong evidence."

"They'll like me." Mr. Worth said to himself, as much as to me, "They won't convict me."

10. Guthrie, Rachlinski & Wistrich, *Inside the Judicial Mind*, 86 Cornell L. Rev. 778 (2000-2001)

Framing also has influenced the development of legal doctrine. When ownership of a commodity is in doubt, the courts traditionally favor those who hold possession of the good–even when possession is arbitrary. For example, if a seller contracts to sell a car to two different buyers, courts will often award permanent ownership to the party holding possession at the time the suit is brought.

11. Dr. Alvan R. Feinstein, *The 'Chagrin Factor' and Qualitative Decision Analysis*, *Arch Intern Med.* 1985;145(7):1257
The combination of the selected option and the ensuing outcome produces a *result*, which will then be used, in retrospect, to classify the original decision as right or wrong. No problems will arise if the result is interpreted as showing a right choice for the selected option, but chagrin will occur if the decision is regarded as wrong. Since the relative magnitudes of chagrin will differ for different types of wrong results, a customary clinical strategy is to choose the option whose wrong result will cause the least chagrin.

12. Cohen & Knetsch, *Judicial Choice*, Osgoode Hall Law J. 30:3 (1992)
A further illustration of the differing valuations of gains and losses is provided by responses to recent automobile insurance legislation in two American states. In both jurisdictions people are given a choice between cheaper policies, which limit rights to subsequent recovery of further damages, and a more expensive policy permitting such actions. Importantly, the default option differs: the reduced rights policy is offered in New Jersey unless it is given up; and full rights policy is given in Pennsylvania unless the less expensive option is specified. Given the minimal costs in both states of choosing either option and the large amounts of money at issue, the results have been dramatic. At last count over 70 per cent of New Jersey automobile owners have adopted the reduced rights policy, but fewer than 25 per cent of Pennsylvanians have done so.

13. Pirkei Avot 2

ואל תאמר לכשאפנה אשנה, שמא לא תפנה

And don't say, "When I am free I will learn," lest you never become free.

<u>How can we reduce the influence of cognitive bias?</u>
14. Rabbi Daniel Z. Feldman, *False Facts and True Rumors*, pg. 77
Attempting to correct for these biases, while a necessary first step, is only helpful to a point. Another frailty of the human psyche is the lack of awareness as to when these biases are present, even those that are theoretically known. Our awareness is itself blinded by bias, known, appropriately, as "bias bias." In the words of Dr. Robert A. Burton, "Our mental limitations prevent us from accepting our mental limitations."

15. Lederman and Hrung, *Do Attorneys Do Their Clients Justice?*, Articles by Maurer Faculty. Paper 483. (2006)
Litigants do not always-or perhaps even typically-make decisions as the rational actors contemplated by the basic economic model of suit and settlement. Korobkin & Guthrie, supra note 21, at 79-81; Jeffrey J. Rachlinski, Gains, Losses, and the Psychology of Litigation, 70 S. CAL. L. REV. 113, 116-18 (1996); see also Larry T. Garvin, Adequate Assurance of Performance: Of Risk, Duress, and Cognition, 69 U. COLO. L. REV. 71, 145 (1998) ("Cognitive psychology and experimental economics have found a smorgasbord of cognitive errors, which collectively falsify most of the axioms of rational choice theory.").

16. Dr. Pat Croskerry, *Diagnostic Failure: A Cognitive and Affective Approach*, pg. 249
The top half of the table includes particular cognitive strategies that can undo biases—the "cognitive pills for cognitive ills." Principle among them is the strategy of metacognition. This involves being able to step back from the immediate pull of the situation to momentarily reflect on what is going on. In human development, it is a feature of mental maturation, and once adulthood is attained, it is the ability to disengage, reflect, and reconsider before action.

17. Pirkei Avot, Chapter 2

והוי מחשב הפסד מצוה כנגד שכרה ושכר עבירה כנגד הפסדה

And calculate the loss incurred for a mitzvah opposite its reward, and the reward of a sin opposite its loss.

18. Dr. Pat Croskerry, *Diagnostic Failure: A Cognitive and Affective Approach*, pg. 248
The brain functions at its best when it is well rested. Fatigue may occur independently of sleep deprivation and sleep debt, but these invariably lead to fatigue. Optimal perception, attention, vigilance, memory, and reasoning all depend on being well-rested and having an adequate amount of sleep. Yet, long hours of work, sleep deprivation, and

an accumulated sleep debt are common in the medical workplace. Generally, the longer people stay awake, the sleepier they become, and the more their cognitive and psychomotor performance is impaired. Clinical decisionmaking reaches its nadir at about 3–4 a.m.; cognitive performance at this time is equivalent to being legally intoxicated.

19. Rambam (12th century Egypt), Mishneh Torah, Hilchot Deiot 4:1
הואיל והיות הגוף בריא ושלם מדרכי ד' הוא, שהרי אי אפשר שיבין או ידע דבר מידיעת הבורא והוא חולה, לפיכך צריך להרחיק אדם עצמו מדברים המאבדין את הגוף, ולהנהיג עצמו בדברים המברין והמחלימים...
Having a healthy, whole body is from the paths of Gd, as one can neither understand nor know anything about Gd when ill. Therefore, one must distance himself from anything which damages the body, and one must accustom himself to behaviours which increase health and strength…

20. Dr. Pat Croskerry, *Diagnostic Failure: A Cognitive and Affective Approach*, pp. 250-251
[P]erform a cognitive and affective autopsy, a form of cognitive and affective root cause analysis, as soon as possible after the event. The physician should perform this autopsy when well-rested and after having an adequate amount of sleep. There is usually a rapid decay of detail—especially when the event has been an unpleasant experience—and, therefore, it is important to go through a process of active recall of every possible aspect of the case, however trivial they might appear…

21. Dr. Pat Croskerry, *Diagnostic Failure: A Cognitive and Affective Approach*, pg. 250
Develop mental rehearsal, "cognitive walkthrough" strategies for specific clinical scenarios to allow CDRs and ADRs to be made and their consequences to be observed. Construct new scenarios or clinical training videos contrasting incorrect (biased) approaches with the correct (debiased) approach.

22. Alan Jacobs, *The Value of Making Reading Hard*, The Atlantic Feb. '12
I think about the value of cognitive strain, or as I sometimes call it cognitive *friction*, when I'm annotating texts. As many people have noted, today's e-ink readers allow annotation – highlighting and commenting – but in a pretty kludgy fashion. It can take a good many clicks to get a simple job of highlighting done. By contrast, touch-sensitive tablets like the iPad and the Kindle Fire make highlighting very easy: you just draw your finger across the text you want to highlight, and there: you're done. Nice. But I prefer the kludge. Why? Because I remember what I'm reading better if the process of highlighting is a tad slow.

23. Danziger, Levav, Avnaim-Pesso, *Extraneous Factors in Judicial Decisions*, Proc Natl Acad Sci U S A. 2011 Apr 26;108(17):6889-92
We test the common caricature of realism that justice is "what the judge ate for breakfast" in sequential parole decisions made by experienced judges. We record the judges' two daily food breaks, which result in segmenting the deliberations of the day into three distinct "decision sessions." We find that the percentage of favorable rulings drops gradually from 65% to nearly zero within each decision session and returns abruptly to 65% after a break.

<u>Taking advantage of a patient's cognitive biases</u>
24. Rabbi Yaakov Emden (18th century Germany), Mor uKetziah Orach Chaim 328 **וכן אם רופא אמר**
בחולי ומכה שבגלוי שיש לרופא ידיעה ודאית והכרה ברורה בהם, ועוסק בתרופה בדוקה וגמורה, ודאי לעולם כופין לחולה המסרב במקום סכנה
With an illness or visible wound, for which has a doctor has certain knowledge and clear understanding, and he prescribes a tested, complete treatment, we certainly compel a recalcitrant patient, if the alternative would be dangerous.

25. Rabbi Dr. Judah L. Goldberg, *Towards a Jewish Bioethic: The Case of Truth-Telling*, Tradition 43:2 (2010)
One only begins to recognize how subjective a business medicine can be when several different consultants weigh in on a given case, each with a different area of specialization, and provide fundamentally discordant accounts of what is wrong and how to fix it.

26. Canadian Medical Association Code of Ethics (1868), Articles 1:1, 2:6
1:1 - Physicians should unite tenderness with firmness, and condescension with authority, and thus inspire their patients with gratitude, respect and confidence.
2:6 - The obedience of a patient to the prescriptions of his physician should be prompt and implicit. He should never permit his own crude opinions as to their fitness to influence his attention to them. A failure in one particular may render an otherwise judicious treatment dangerous, and even fatal. This remark is equally applicable to diet, drink and exercise. As patients become convalescent they are very apt to suppose that the rules prescribed for them may be disregarded, and the consequence, but too often, is a relapse.

27. CPSO Policy #4-05 (https://www.cpso.on.ca/uploadedFiles/policies/policies/policyitems/Consent.pdf)
Respect for the autonomy and personal dignity of the patient is central to the provision of ethically sound patient care. Through the translation of these ethical principles to law, the Supreme Court of Canada has confirmed the fundamental right of the individual to decide which medical interventions will be accepted and which will not.

28. Jonathan F. Will, *A Brief Historical and Theoretical Perspective*, Chest 139:6 pg. 1493
While physicians did develop a more consistent practice of obtaining patient consent in the early 20th century, the medical literature indicates that the practice was fueled more by a desire to respond to lawsuits than by a moral imperative to respect patient autonomy. In a 1911 article, physician George W. Gay suggested that "careful and explicit explanations of the nature of serious cases, together with the complications liable to arise and their probable termination,… be given to the patient … for our own protection."…
In *Schloendorff v Society of New York Hospitals*, Justice Cardozo planted the seed for what would become the informed consent doctrine when he wrote, "Every human being of adult years and sound mind has a right to determine what shall be done with his own body; and a surgeon who performs an operation without his patient's consent commits an assault, for which he is liable in damages."

29. Dr. Christopher Meyers, *Autonomy and Critical Care Decision-Making,* Bioethics 18:2 (2004) pp. 111-112
This socialisation into heteronomy would be problematic enough were there no other autonomy-threatening conditions in medical decision-making. But of course, there are. Beyond the obvious threats of immature age, mental illness and trauma-induced incapacitation, healthcare also brings reduced competency due to disease, fear, power asymmetries, physician bias, physician denial, family conflict, pressures related to economic or managed care considerations, the complexities of medical decisions, and the bureaucratic structures of medical institutions.

30. Mishnah Sanhedrin 4:1 (32a)

דיני נפשות מתחילין מן הצד.

In capital cases, the judges begin to vote from the side.

31. Dr. Christopher Meyers, *Autonomy and Critical Care Decision-Making,* Bioethics 18:2 (2004) pg. 110
In my experience, many clinicians see the assent standard as being sufficient for autonomous consent. So long as the patient has expressed a 'willingness to accept the proposed care', she has autonomously chosen. Surely, though, this is false. Assent requires merely that the patient *agree to* the recommendations of others, whereas autonomous consent requires a rich evaluation of information, of the full range of options, and of whether likely outcomes
are consistent with life plans, along with the intentional selection of preferred alternatives. With assent, the patient *gives permission*; with consent, the patient *chooses*. With assent, the patient *accedes* to treatment; with consent, the patient *takes ownership* of or *identifies* with the choice made.

32. Ben Chu, *What is 'nudge theory' and why should we care?*, The Independent Oct. 9 '17
In order to increase worryingly low pension saving rates among private sector workers the Government mandated employers to establish an "automatic enrolment" scheme in 2012. This meant that workers would be automatically placed into a firm's scheme, and contributions would be deducted from their pay packet, unless they formally requested to be exempted. The theory was that many people actually wanted to put more money aside for retirement but they were

put off from doing so by the need to make what they feared would be complicated decisions. The idea was that auto enrolment would make saving the default for employees, and thus make it easier for them to do what they really wanted to do and push up savings rates.
Has it worked? Very much so. Since auto enrolment was introduced by the Government in 2012, active membership of private sector pension schemes has jumped from 2.7 million to 7.7 million in 2016.
Organ donation is another example of an area where nudge policy is seen to have worked. Spain operates an opt-out system, whereby all citizens are automatically registered for organ donation unless they choose to state otherwise. This is different from the UK where donors have to opt in. The Spanish opt-out system is one of the reasons Spain is a world leader in organ donation…

33. Ramban (13th century Spain), Torat ha'Adam, Shaar haMeichush, Inyan haSakkanah
במנין שוה ברופאים הולכין אחר חכמה ובקיאות... מיהו אחד במקום שנים, כיון שכולן רופאים ויודעים במלאכה זו אין דבריו של יחיד במקום שנים, מ"מ במופלג מהם בחכמה חוששין לדבריו להחמיר אפילו במקום רבים...
Where the doctors are of equal numbers, we follow the more wise and expert… But where it is two versus one, since all of them are doctors and they know this craft, the position of one is nothing against the two. But where he is greater in wisdom, we are concerned for his words to be strict even against a majority…

34. Rabbi Moshe Feinstein (20th century USA), Igrot Moshe Choshen Mishpat 2:73:5
אם הוא מחמת שאינו מאמין לרופאים אלו צריכין למצא רופא שמאמין בו, ואם ליכא רופא כזה ואי אפשר לפניו מצד המחלה לחכות עד שיבין שהוא לטובתו וגם לא לשלחו כשרוצה בבית חולים וברופאים שהם בעיר אחרת מוכרחין הרופאים שבכאן לעשות בעל כורחיה אם כל הרופאים שבבית חולים זה סוברים שזהו רפואתו, וגם יהיה באופן שלא יתבעת מזה שאם יתבעת מזה אפילו שהוא ענין שטות אין לעשות כי הביעתותא אפשר שיזיקהו וגם ימיתהו ויהיה זה כהמיתוהו בידים...
If a patient's refusal is because he does not trust the doctors, then they must find a doctor he trusts.
If there is no such doctor, and the disease is such that we cannot wait for him to understand that this is for his own good, and we cannot send him to another hospital and doctors in another town, then the doctors here must treat him against his will, if all of the doctors in this hospital believe that this is the way to cure him.
This should be done in such a way that he is not frightened, even if his fright is foolish, for the fright could harm him, even fatally, and that would be like actively killing him…

Potentially helpful links
- Papers on cognitive error in medical practice - https://www.improvediagnosis.org/?CognitiveError
- Meta-study of cognitive error in medical practice - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5093937/
- Diagnostic Failure: A Cognitive and Affective Approach - https://www.ncbi.nlm.nih.gov/books/NBK20487
- Cognitive Bias and the practice of law - http://www.yutorah.org/lectures/lecture.cfm/875234