Chapter 11. The role of chance

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Table of Contents

Table of Contents

The Tendency to Try to Explain Chance Events

Chance and Randomness

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- Our brains have evolved in such a way that they engage in a relentless search for patterns in the world.
- Nevertheless, this extremely adaptive aspect of human cognition sometimes backfires on us.

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- When we say that something is due to chance, we do not necessarily mean that it is indeterminate, only that it is currently indeterminable.

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- The outcome of a toss is not in principle indeterminate, just currently indeterminable.

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- Many events in the world are not entirely explainable in terms of systematic factors, at least not currently.
- Often, however, when no systematic explanation of a particular phenomenon is currently available, our conceptualizing apparatus still grinds away, imposing meaningless theories on data that are inherently random.

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- However, the researcher actually assigns the stimuli to classes randomly. Thus, there is no rule except randomness.
- The subjects, however, rarely venture randomness as a guess. Instead, they often concoct extremely elaborate and complicated theories to explain how the stimuli are being assigned.

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- It is common for financial analysts to concoct elaborate explanations for every little fluctuation in stock market prices.
- In fact, much of this variability is simply random fluctuation.

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- Where the darts land will define that monkey's stock picks for the year. How will they do a year later?
- How many will beat the Standard and Poor's 500 Index? You guessed it. Roughly half of the monkeys.
- Would you be interested in paying the 50 percent of the monkeys who beat the index a commission to make your picks for you next year?

Financial predictions

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Explaining Chance: Illusory Correlation and the Illusion of Control

The Tendency to Try to Explain Chance Events

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- When people believe that two types of events should commonly occur together, they tend to think that they are seeing co-occurrences with great frequency, even when the two critical events are occurring randomly and, thus, do not co-occur more frequently than any other combination of events.
- In short, people tend to see their expected correlation even in random events. They see structure where there is none.

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- Rorschach test.

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- The blind date that leads to marriage, the canceled appointment that causes the loss of a job, the missed bus that leads to a meeting with an old high school friend.

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- The blind date that leads to marriage, the canceled appointment that causes the loss of a job, the missed bus that leads to a meeting with an old high school friend.
- It is a mistake to think that each chance event of our lives requires an elaborate explanation. But when essentially chance events lead to important consequences, it is difficult to avoid constructing complicated theories to explain them.

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- Psychologists have studied what has been termed the "illusion of control," that is, the tendency to believe that personal skill can affect outcomes determined by chance.

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- We long to believe that good things happen to good people and that bad things happen to the bad.
- Chance, though, is completely unbiased—it does not operate to favor "good people."
- The incorrect belief that blind people are "blessed" with supersensitive hearing, a folk myth probably perpetuated because people desire to see a correlation that "evens things out."

Table of Contents

Coincidence

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- Legitimate psychologists admit that their theories account for a portion of the variability in human behavior but not for all of it. They openly acknowledge the chance factor.
- True scientists are not afraid to admit what they do not know.
- In short, another consumer rule for evaluating psychological claims is this: Before accepting a complicated explanation of an event, consider what part chance may have played in its occurrence.

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- Many people think that coincidences need special explanation.
- They do not understand that coincidences are bound to occur even if nothing other than chance is operating. Coincidences need no special explanation.

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- A coincidence is merely an occurrence of related events that is due to chance. Unfortunately, this is not how many people interpret what is meant by coincidence.
- The tendency to seek patterns and meanings in events, combined with the "remarkable" aspect of coincidences, leads many to overlook chance as an explanation.

The Tendency to Try to Explain Chance Events

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- On any given day, most of us probably think about several different distant people. How often do these people call us after we think of them? Almost never. Thus, during a year, we probably think about hundreds of people who do not call.

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- Eventually, in the course of these hundreds of "negative trials," which we never recognize as such, someone is going to call after we think of her or him.
- The event is rare, but rare events do happen—purely by chance. No other explanation is necessary.

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- If you flipped 5 coins all at once and they all came up heads, you would probably consider this result an oddmatch, an unlikely event. You would be right. The probability of this happening in any one flip of 5 coins is 1/32 or 0.03. But if you flipped the 5 coins 100 times and asked how likely it is that in at least 1 of those 100 trials the coins would all come up heads, the answer would be 0.96. That is, in 100 trials, this rare event, this oddmatch, is very likely to happen.

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- Such an outcome often provokes howls of protest from the public, who interpret the outcome as proof that the lottery is rigged or “crooked.”
- If lotteries go on long enough, consecutive identical winning numbers are bound to be drawn eventually.

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- The Air Force wanted Kahneman to investigate whether there were factors specific to the different squadrons that were correlated with the outcome.
- “I reasoned that luck was the most likely answer”

Personal Coincidences

Chance and Randomness

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- Oddmatches that happen in our personal lives often have special meaning to us and, thus, we are especially prone not to attribute them to chance.

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- Birth problem: In a class of 23 people, what is the probability that 2 of them will have their birthday on the same day? What is the probability in a class of 35 people?

Birth problem

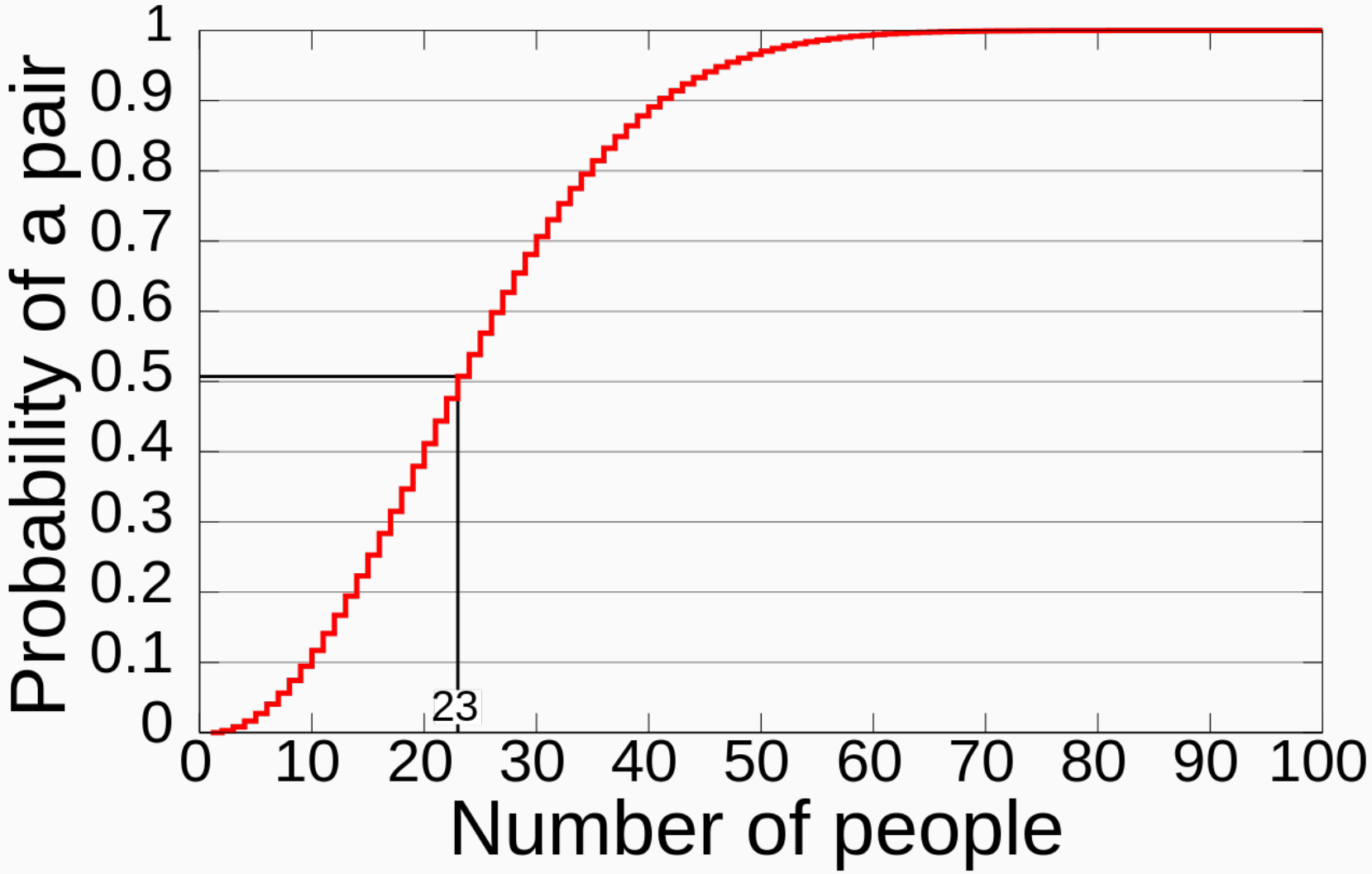

Table of Contents

Actuarial versus clinical prediction

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- But interestingly, acknowledging that our predictions will be less than 100 percent accurate can actually help us to increase our overall predictive accuracy.

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- Acknowledging the role of chance in determining outcomes in a domain means that we must accept the fact that our predictions will never be 100 percent accurate, that we will always make some errors in our predictions.
- But interestingly, acknowledging that our predictions will be less than 100 percent accurate can actually help us to increase our overall predictive accuracy.
- It may seem paradoxical, but it is true that we must accept error in order to reduce error

Match vs optimal

Match vs optimal

- The subject sits in front of two lights (one red and one blue) and is told that she or he is to predict which of the lights will be flashed on each trial and that there will be several dozen such trials (subjects are often paid money for correct predictions).

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- The subject sits in front of two lights (one red and one blue) and is told that she or he is to predict which of the lights will be flashed on each trial and that there will be several dozen such trials (subjects are often paid money for correct predictions).
- The experimenter has actually programmed the lights to flash randomly, with the provision that the red light will flash 70 percent of the time and the blue light 30 percent of the time.

Match vs optimal

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- Subjects do quickly pick up the fact that the red light is flashing more, and they predict that it will flash on more trials than they predict that the blue light will flash. In fact, they predict that the red light will flash approximately 70 percent of the time.

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Match vs optimal

- Subjects do quickly pick up the fact that the red light is flashing more, and they predict that it will flash on more trials than they predict that the blue light will flash. In fact, they predict that the red light will flash approximately 70 percent of the time.
- However, as discussed earlier in this chapter, subjects come to believe that there is a pattern in the light flashes and almost never think that the sequence is random.
- Instead, they switch back and forth from red to blue, predicting the red light roughly 70 percent of the time and the blue light roughly 30 percent of the time.

Match vs optimal

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- Subjects rarely realize that—despite the fact that the blue light is coming on 30 percent of the time—if they stopped switching back and forth and predicted the red light every time, they would actually do better! How can this be?

Match vs optimal

- Subjects rarely realize that—despite the fact that the blue light is coming on 30 percent of the time—if they stopped switching back and forth and predicted the red light every time, they would actually do better! How can this be?
- In short, we must accept the blue errors in order to make fewer errors overall.

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Actuarial versus clinical prediction

- Actuarial prediction refers to predictions based on group trends derived from statistical records.
- A simple actuarial prediction is one that predicts the same outcome for all individuals sharing a certain characteristic.
- Statistics don't apply to the single case.
- Clinical or case prediction claim to be able to go beyond group predictions and to make accurate predictions of the outcomes of particular individuals.

Accepting Error in Order to Reduce Error

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Accepting Error in Order to Reduce Error

- Clinical prediction would seem to be a very useful addition to actuarial prediction.
- There is just one problem, however. Clinical prediction doesn't work.
- In just about every clinical prediction domain that has ever been examined actuarial prediction has been found to be superior to clinical prediction.

Accepting Error in Order to Reduce Error

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- A final type of test in the clinical—actuarial prediction literature involves actually giving the clinician the predictions from the actuarial equation and asking the clinician to adjust the predictions based on his or her personal experience with the clients.

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- A final type of test in the clinical—actuarial prediction literature involves actually giving the clinician the predictions from the actuarial equation and asking the clinician to adjust the predictions based on his or her personal experience with the clients.
- When the clinician makes adjustments in the actuarial predictions, the adjustments actually decrease the accuracy of the predictions.

Accepting Error in Order to Reduce Error

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- Would you rather have your operation done by a surgeon A, who is practiced in that type of surgery and has a low failure probability, or by surgeon B, who is unpracticed in that type of surgery and has a high failure probability?

Accepting Error in Order to Reduce Error

- Would you rather have your operation done by a surgeon A, who is practiced in that type of surgery and has a low failure probability, or by surgeon B, who is unpracticed in that type of surgery and has a high failure probability?
- If you believe that "probabilities don't apply to the single case," you shouldn't mind having your surgery done by the unpracticed surgeon.

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Accepting Error in Order to Reduce Error

- A common anti-actuarial argument, or misconception, is that group statistics do not apply to single individuals or events. The argument abuses basic principles of probability....
- An advocate of this anti-actuarial position would have to maintain, for the sake of logical consistency, that if one is forced to play Russian roulette a single time and is allowed to select a gun with one or five bullets in the chamber, the uniqueness of the event makes the choice arbitrary.

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- In fact, the field, and society, would benefit if we developed the habit of "accepting error in order to reduce error."
- In attempting to find unique explanations of every single unusual case (unique explanations that simply may not be possible given the present state of our knowledge), we often lose predictive accuracy in the more mundane cases.

Accepting Error in Order to Reduce Error

Accepting Error in Order to Reduce Error

- “I am different, I drive safely.”

Accepting Error in Order to Reduce Error

- “I am different, I drive safely.”
- “statistics don’t apply to the single case”

Accepting Error in Order to Reduce Error

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- Of course, this discussion of the literature on clinical versus actuarial prediction is not meant to imply that there is not a role for the case study in psychology.

Accepting Error in Order to Reduce Error

- Of course, this discussion of the literature on clinical versus actuarial prediction is not meant to imply that there is not a role for the case study in psychology.
- Keep in mind that we have been speaking about the specific situation of the prediction of behavior.

Accepting Error in Order to Reduce Error

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- Case information is highly useful in drawing attention to variables that are important and that need to be measured.

Accepting Error in Order to Reduce Error

- Case information is highly useful in drawing attention to variables that are important and that need to be measured.
- Once the relevant variables have been determined and we want to use them to predict behavior, measuring them and using a statistical equation to determine the predictions constitute the best procedure.

Accepting Error in Order to Reduce Error

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- First, we get more accurate predictions by using the actuarial approach. Second, the actuarial approach has an advantage over clinical prediction in that an actuarial equation is public knowledge—open for all to use, modify, criticize, or dispute.

Accepting Error in Order to Reduce Error

- First, we get more accurate predictions by using the actuarial approach. Second, the actuarial approach has an advantage over clinical prediction in that an actuarial equation is public knowledge—open for all to use, modify, criticize, or dispute.
- In contrast, the use of clinical prediction amounts to reliance on an authority whose assessments—precisely because these judgments are claimed to be singular and idiosyncratic—are not subject to public criticism.

Questions?