

The second coffee

A short book about relying on caffeine to get through the
day and paying for it at night

unbry · Free to read, yours to keep

<https://unbry.com/read/the-second-coffee>

First edition

Written by AI with human guidance. It can
contain mistakes, which later editions correct.

Contents

1. Before you start
2. Tuesday, ten past three
3. Why the second coffee seems sensible
4. "I can't function without my morning coffee"
5. "It gives me energy"
6. "It helps me think"
7. "The three o'clock slump is just how afternoons are"
8. "It doesn't affect my sleep, I drop off fine"
9. "A coffee after dinner is just civilised"
10. "I'd get terrible headaches if I stopped"
11. "Coffee's good for you anyway"
12. "I only have three or four"
13. "It's only tea"
14. "I just love the taste"
15. "I need it because I sleep so badly"
16. "It's my break"
17. What the reliance costs
18. Counting, and the cut-off
19. Bringing it down
20. The afternoon without it
21. The decision

22. Shifts, energy drinks, pregnancy and the cup you're offered

23. Tuesday again

24. Notes

Before you start

This is a short book and you can read it in two or three sittings. It's about one habit. You drink coffee, or tea, or something with caffeine in it, to get through the day. The first cup is the one you can't do without. The second is the one at three, when the afternoon goes flat. There may be a third around five, to get you home. Then at eleven you're in bed and awake, and at half past six the alarm goes, and you're tired, and you have a coffee.

I'm going to argue three things. The first is that this makes sense from the inside. The cup does make you feel better, at once, every time, and it's pleasant, cheap and everywhere. The second is that most of what the cup gives you is the removal of something the previous cup caused. A regular drinker who's had their morning coffee is roughly as alert as someone who never drinks it. They aren't ahead. They've got back to level. What the afternoon cup takes away is a low that the morning cups helped to make, and what all of them take from the night is real and mostly invisible to you. The third is practical. You count what you actually have, you set a time after which you don't have any, you bring the total down gently over a couple of weeks, and you keep the coffee you like for the reason you like it. Chapters 17 to 20 cover how.

This book doesn't say that coffee is bad for you. The research says the opposite, for most people at ordinary amounts, and chapter 10 sets it out. It doesn't ask you to give up coffee. It asks you to stop using it as a tool for a job it can't do.

Three cautions.

If you're pregnant or breastfeeding, the NHS advises no more than 200 milligrams of caffeine a day, which is roughly two mugs of instant coffee. That's a medical limit and it comes before anything in this book.

If caffeine gives you a racing or irregular heartbeat, or you've been told to limit it because of a heart condition, blood pressure, anxiety, a stomach condition or a medicine you take, follow that advice. The people treating you know your case and I don't.

And if you're exhausted every day despite sleeping seven hours or more, or you snore loudly and stop breathing in your sleep, or your tiredness has come with low mood, weight change or other symptoms, the problem may not be caffeine at all. See a GP before you change anything, and don't let the coffee hide the question.

The notes at the back give my sources and their limits. Where I'm giving my own reasoning and not a finding, I'll say so.

Tuesday, ten past three

It's ten past three on a Tuesday afternoon. You've been looking at the same paragraph for a few minutes without reading it. Your eyes feel dry. There's a heaviness behind them and a slight fog in front of everything, and the meeting at four is going to need you sharp. So you get up and make a coffee, the third of the day, and stand by the kettle while it boils, and by twenty past you feel better. Not marvellous, but back. The paragraph makes sense again.

The day started at half past six with the alarm, and the first thing you did after switching it off was think about coffee. You had one at seven, standing up, before you could talk to anyone. You had a second at half past nine at your desk. If someone asked, you'd say you have two or three a day, and you wouldn't be counting the tea at eleven, or the cola with lunch.

At half past five, before the drive home, you have another, because the drive is forty minutes and you'd rather not do it foggy. In the evening you feel fine. At eleven you go to bed. At half past eleven you're still awake, not worried about anything in particular, just awake, with a mind that won't quite settle. You get to sleep at some point after midnight. At half past six the alarm goes and you're tired, and the first thing you think about is coffee.

You've noticed the shape of this. You may even have said it out loud. But the morning cup is the one thing in the day that works without fail, and giving it up, or even giving up the afternoon one, feels like choosing to be tired on purpose.

I'll use a few terms throughout. **The level** is how alert a person feels who doesn't drink caffeine at all, on an ordinary day after an ordinary night. It's the baseline. **The shortfall** is how far below the level you sit when the caffeine from your last cup has worn off. It's what you feel at half past six in the morning and at ten past three. **The pick-up** is what a cup gives you, which is the climb from the shortfall back towards the level. **The slump** is the afternoon low in particular, because it has more than one cause and it's worth its own name. **The cut-off** is the time of day after which you have no more caffeine. And **the night** is what you pay, which is the part of this you can't see.

The habit has some regular features. This list is my own observation and not a research finding.

The first cup is described as a need and not a pleasure. "I can't function" is the sentence.

The count is lower than the truth. Tea, cola, the coffee-shop cup that's twice the size of a mug, the square of dark chocolate. None of them are in the number you'd give.

The pick-up feels like a gain. It feels as though you've been lifted above where you were. Chapter 3 will suggest that you've been lifted back to where you'd have been anyway.

You don't connect the evening cup with the night. The night is blamed on stress, or a busy mind, or being a bad sleeper.

And you'd describe yourself as a tired person. Someone who needs more sleep than they get and needs coffee to cover the gap. I think that description is the habit talking, and the book will come back

to it.

Try one thing before reading on, and don't change anything yet. For a week, write down every drink or food with caffeine in it, and the time you had it. Every one, including tea, cola, energy drinks and chocolate. In the morning, write down roughly what time you fell asleep and how you feel out of ten. Don't change anything. You're finding out what's true.

Why the second coffee seems sensible

I don't want to start by telling you that caffeine is a drug. You know that, and it doesn't help, because so is paracetamol, and the word doesn't tell you what to do. There are good reasons why you drink coffee the way you do, and they deserve stating before anything is said against them.

It works. Twenty minutes after the cup, you feel better. This is not imagination, and any argument that begins by saying it is will lose you, rightly.

It's pleasant. Coffee smells good, tastes good, and comes with a small ritual of kettle and mug and a minute by the window. Tea is the same, with more of the ritual and less of the caffeine.

It's everywhere and it's allowed. There's no situation in ordinary life in which having a coffee is frowned on. It's the one drug you can take in a meeting.

It marks the day. The morning cup starts it, the afternoon cup breaks it, the after-dinner cup closes the meal. Take them away and the day loses some of its punctuation.

It's what everyone does. Most adults you know drink coffee, and most of them describe themselves as needing it. Being tired and reaching for a cup is one of the most normal things a person can do.

And the alternative seems to be being tired. If you're foggy at three and the meeting's at four, the coffee isn't a luxury. It's what gets you through.

I think the habit is trying to meet four needs, and this list is mine. You want to feel awake. You want a small pleasure and a pause. You want to get through the parts of the day that are hard. And you want not to feel like the tired person you've come to believe you are.

All four are reasonable. My argument is that the habit serves them badly. You don't feel awake. You feel less tired than you did twenty minutes ago, which isn't the same thing, and the tiredness you're escaping was partly made by yesterday's cups. The pleasure and the pause are real, and you can keep both without the reliance. The hard parts of the day are harder because of the night, and the night is where the coffee went. And you're not a tired person. You're a person who's been a little short of sleep for years and has a good explanation for it that isn't the right one.

"I can't function without my morning coffee"

Start with the morning, because that's where the habit feels most like a fact. At half past six you're foggy, slow and slightly low. At ten past seven, after the cup, you're a person. The cup did that. Nothing else in the day is as reliable.

I'd like to describe an experiment that I think changes what the morning cup is, and I'd ask you to read it slowly, because the finding is easy to slide past.

Peter Rogers and colleagues at the University of Bristol took three hundred and seventy-nine people. Some were regular caffeine drinkers, at medium to high levels. Some drank little or none. Everyone went without caffeine for sixteen hours, which is roughly an ordinary night plus a morning. Then, under double-blind conditions, they were given either caffeine, in two doses ninety minutes apart, or a placebo, and they rated their alertness, anxiety and headache before and after.

Three things came out. First, in the regular drinkers, placebo went with lower alertness and more headache. In other words, the regular drinkers who didn't get caffeine felt the shortfall. Second, in the low and non-drinkers, caffeine didn't increase alertness at all. Third, and this is the finding, when the regular drinkers got their caffeine, their alertness came back up to about the level of the non-drinkers who'd had nothing. The researchers' own summary is that with frequent use, no net benefit for alertness is gained. Going without caffeine reduces alertness, and having it merely returns it to baseline.

Look at what that means for half past six. The fog you feel isn't your natural morning state. It's the shortfall. It's what a regular caffeine drinker feels when the last dose has worn off overnight. The person next to you on the train who's never drunk coffee doesn't feel it. They woke up at the level. When you have your cup at seven, you climb up to join them. You don't pass them. You've spent twenty minutes and a coffee getting to where they started.

"I can't function without my morning coffee" is therefore true, and it's true because of the coffee. The cup relieves a state that the habit produces. That's not a criticism of you. It's what a daily dose of anything that the body adapts to will do. But it changes the arithmetic. You've been counting the morning cup as a gain of some amount. It's the repayment of a loss of the same amount, and the loss was incurred yesterday.

Jack James and Peter Rogers set this out in 2005 in a paper whose title makes the claim, that withdrawal reversal is the most plausible explanation for the effects of caffeine on performance and mood in regular users. I couldn't obtain a summary of that paper and I'm relying on its title, but the Bristol experiment is the evidence behind it, and it's enough.

There's an odd consequence that I'd ask you to notice. If the morning coffee only returns you to the level, then a person who doesn't drink coffee gets the morning coffee's effect every day, free, on waking. What they don't get is the shortfall, and the shortfall is the thing you've been calling being tired in the morning.

"It gives me energy"

The word most people use for the pick-up is energy. You're flagging and the coffee tops you up, as if you'd been running low on something and it was fuel.

Caffeine has no energy in it. A black coffee contains almost nothing your body can burn. What it does is act on a chemical signal in the brain, and it's worth knowing roughly how, because it explains where the tiredness goes.

Through the day, as you stay awake, a substance called adenosine builds up in the brain, and it's one of the signals that produces the feeling of sleepiness. The longer you've been awake, the more there is, and the sleepier you feel. Sleep clears it. Caffeine works by sitting in the places where adenosine would act, so that the signal is blocked. The adenosine is still there. The sleepiness it would produce isn't felt. That's the pick-up. Nothing has been added. A message has been muffled.

The message doesn't go away while it's muffled. Hans-Peter Landolt and colleagues in Zurich gave nine healthy men two hundred milligrams of caffeine at ten past seven in the morning, about two mugs' worth, and then measured their sleep that night, sixteen hours later. Compared with placebo, they slept less and their sleep was less efficient, and the deep, slow-wave part of sleep was reduced. Caffeine was still measurable in their saliva at eleven at night, at a low level. The authors suggest that either the low level was enough to affect sleep directly, or that having caffeine in the

system during the day had slowed the build-up of sleep pressure, so that there was less of it at bedtime. Either way, a morning dose changed the night.

So the pick-up is a loan. The sleepiness you'd have felt at three is deferred, not cancelled, and the deferral is paid for with a lighter, shorter night, which produces a bigger shortfall the next morning, which needs a bigger cup. That isn't a moral point. It's the mechanism, and it's the same for everyone who drinks the stuff regularly.

I'd add my own reading of why the word energy sticks. When you're sleepy, everything feels effortful. Remove the sleepiness and the effort drops, and it feels as if you've been given something. What's happened is that a brake has been taken off. The engine wasn't refuelled.

The honest version of "it gives me energy" is "it stops me feeling how tired I am". That's a useful thing on the odd occasion, before a long drive, say. As a daily arrangement it means you're never sure how tired you actually are, and so you never fix it.

"It helps me think"

Beyond feeling awake, you may feel that coffee makes you sharper. The meeting at four goes better with a cup at three. Ideas come. You're quicker.

There's a second Bristol experiment on this, and it deserves the same careful reading as the first. Rogers and colleagues had two hundred and twelve medium-to-high caffeine drinkers and a hundred and fifty-seven low-or-non drinkers go without caffeine overnight, then tested them through the day, before and after caffeine or placebo. The tests included how sleepy and alert people felt, simple and choice reaction time, a memory task and a tapping task.

The regular drinkers who got placebo got worse as the afternoon went on. Sleepier, less alert, slower reactions, poorer memory for what they'd seen. The shortfall grows through the day. Caffeine improved all of that in the regular drinkers, which is the pick-up. But in the low and non-drinkers, caffeine reduced sleepiness and did little else for mental performance, partly because it also made them jittery and anxious, and the jitters cancelled the benefit. One thing improved in both groups. Caffeine made people physically faster. Tapping speed went up, and so did the speed of simple reactions.

The authors' title is "Faster but not smarter". Their conclusion is that with regular use, tolerance builds to the effect on sleepiness, so that the daily cups don't improve mental alertness or

performance. They only restore what going without had taken away.

Put that beside your meeting at four. What the three o'clock cup does is lift your reactions and your alertness from the withdrawal low back to about where a non-drinker sits. It makes you faster. It doesn't make you think better than you'd think at the level. If the ideas come after coffee, it's because the fog has gone, and the fog was the shortfall. A person who wasn't in the shortfall would have had the ideas at three without the cup.

I'll grant that there are situations where faster is what's needed. Driving tired, for one, and there's a section on that in chapter 21. But the daily belief that you think better with coffee doesn't survive the experiment. You think normally with it. You think below normal without it, because you're a regular drinker, and that below-normal state is the thing to get rid of.

"The three o'clock slump is just how afternoons are"

You may accept all this about the morning and still feel that the afternoon is different. Everyone flags after lunch. It's biology. The coffee at three is just working with the grain of the day.

There's something in this, and I want to separate the two things that happen at three.

One is real and has nothing to do with caffeine. Most people have a dip in alertness in the early afternoon. It's part of the daily rhythm, and it's why some cultures built a rest into that hour. If you didn't drink coffee, you'd still notice that two to three is not your sharpest time. That's the slump's first cause, and no cup will fix it, because it isn't a shortfall.

The other is the shortfall. Go back to the second Bristol experiment. The regular drinkers who were kept off caffeine got steadily worse from the morning into the afternoon, and the worst effects showed in the later tests. Their morning cups had worn off. That's the same thing that happens to you every day between half past nine and three. The second cup was at half past nine. By three its effect is mostly gone, and you're sliding towards the shortfall, at the same hour as the natural dip. The two arrive together, and the result is the fog on the paragraph.

So the three o'clock slump, for a regular drinker, is a natural dip with a withdrawal low on top of it. The coffee at three removes the withdrawal part. It leaves the natural part, which is why the pick-

up at three never feels as complete as the one at seven.

This matters for what to do. If the afternoon low were pure biology, coffee would be a reasonable response to it and the book would have little to say. But a good part of it is a low that the morning cups made. Reduce the morning cups over a couple of weeks, as chapter 18 describes, and the withdrawal part of the slump shrinks, because there's less to withdraw from. What's left is the natural dip, and that's a smaller, gentler thing that chapter 19 will show you how to handle without a kettle.

I'd also ask you to notice the timing of the three o'clock cup in relation to the night. If you go to bed at eleven, three is eight hours before. Chapter 7 will look at how far a cup that far out reaches.

"It doesn't affect my sleep, I drop off fine"

This is the belief that lets the afternoon and evening cups happen, and it's held with real confidence. You put your head down at eleven and you're asleep within twenty minutes, most nights. Coffee clearly isn't keeping you up.

Two things are wrong with the test you're using. The first is that falling asleep isn't the only measure of a night. The second is that you're not in a position to judge the rest of it.

Ian Clark and Hans-Peter Landolt reviewed the trials and population studies on caffeine and sleep in 2017. Caffeine typically made people take longer to fall asleep, but it also reduced total sleep time, reduced sleep efficiency, which is the share of time in bed spent asleep, and worsened how people rated their sleep. Underneath, in the recordings of brain activity, the deep slow-wave sleep was reduced and the light stage-one sleep, wakefulness and arousals were increased. The dose mattered and the timing mattered. Older adults may be more sensitive than younger ones. And there were large differences between people, some of them genetic.

So the picture is of a night that's shallower and more broken and a little shorter, with less of the deep sleep that leaves you restored. You may drop off fine. What follows is a lighter night than you'd have had, and you can't feel the difference from the inside, because you were asleep. All you have is the morning, and in the morning you feel tired, and you've got an explanation for that already, which is that you're a tired person.

The timing is the part people underestimate most. Christopher Drake and colleagues gave people four hundred milligrams of caffeine, about four mugs of instant, either at bedtime, three hours before it, or six hours before it, and measured their sleep at home. All three disturbed sleep compared with placebo, including the dose six hours out. The authors concluded that caffeine six hours before bed has important effects and supports the advice to avoid it for at least that long. The NHS insomnia page says the same, not to drink tea or coffee for at least six hours before bed. Your half past five cup, for an eleven o'clock bedtime, is inside that window. Your three o'clock cup is only just outside it. And Landolt's morning dose, from chapter 4, was sixteen hours out and still changed the night.

There's a plain reason for all this. Caffeine leaves the body slowly. Several hours after a cup, a good fraction of it is still there. A cup at half past five is still partly present at eleven, doing at night exactly what it did in the afternoon, which is muffling the signal that says sleep.

I'd put it this way. You drop off fine because you're tired enough to drop off through the caffeine. That isn't evidence that the caffeine's doing nothing. It's evidence of how tired you are.

"A coffee after dinner is just civilised"

There's a cup that hasn't come up yet, and for many people it's the one that costs most. The coffee after dinner. The espresso at the end of a meal out. Or, more often and less noticed, the mug of tea at nine on the sofa, made to wind down.

Look at where that cup sits. Dinner is at seven, the coffee at eight, bed at eleven. Three hours. In Drake's study from chapter 7, caffeine three hours before bed disturbed sleep, and caffeine at bedtime disturbed it more. The nine o'clock tea is two hours out. These are the doses that the evidence is least equivocal about, and they're the ones most people never count, because a cup after dinner doesn't feel like caffeine. It feels like the end of the meal.

"To wind down" deserves a look on its own. A mug of tea at nine is warm, familiar and quiet, and everything about the ritual says rest. The contents say the opposite. Seventy-five milligrams of a substance whose job is to block the signal for sleep, taken two hours before you'd like to feel it. People tell me tea relaxes them, and I believe that the ritual does. The caffeine in it is doing what caffeine does, which is the reason you're awake at half past eleven with a mind that won't settle, and blaming the day.

What I'd keep is the ritual, entire. The kettle, the mug, the sofa, the ten minutes. Change what's in the mug. Decaf tea is close enough to tea that most people stop noticing within a week, and there are herbal teas that are pleasant in their own right rather than as

substitutes. The after-dinner coffee at home can be decaf and lose nothing that the moment was about, which was sitting down with something warm at the end of the meal.

The restaurant espresso is a separate case. If it's a special evening and you'd like one, have it, and know that you're trading it for a lighter night. That's a fair trade made knowingly, and it's fine. What isn't fine is the same espresso every Friday without noticing that Saturday morning has been foggy for a year.

I'd put the evening cup first on the list of things to change, before anything about the morning. It's the smallest change and the one the night notices soonest. Most people, in my observation, feel the difference within three or four nights.

"I'd get terrible headaches if I stopped"

You may have tried cutting down before, and you remember what happened. Within a day you had a headache like a band round your skull, you were foggy and flat and short-tempered, and by day three you'd concluded that your body needed coffee and gone back to it, feeling better within the hour.

Laura Juliano and Roland Griffiths reviewed sixty-six studies of caffeine withdrawal in 2004, and the picture they drew is worth having in full, because it's both worse and better than you think. Ten symptoms were well enough supported to count as real. Headache, fatigue, decreased energy, decreased alertness, drowsiness, decreased contentedness, depressed mood, difficulty concentrating, irritability, and feeling foggy. Flu-like symptoms, nausea and muscle stiffness were also likely. In the experimental studies, about half of people got a headache, and about one in eight had distress or impairment bad enough to interfere with their day. Symptoms typically began twelve to twenty-four hours after the last dose, peaked at twenty to fifty-one hours, and lasted between two and nine days. Going without doses as low as a hundred milligrams a day, which is one mug of instant, was enough to produce symptoms.

So you're right. If you stop, you'll probably feel worse for a few days, and there's a fair chance of a headache. That's not weakness and it's not imagination. The reviewers were clear that expectation isn't what drives it.

Now the other half. Two to nine days. Not weeks, not permanently. Your body doesn't need coffee. It has adapted to it and needs a few days to adapt back, and then the shortfall is gone, for good, and you wake at the level. What you experienced on day three of your last attempt wasn't proof of a permanent need. It was the peak of a short process that you stopped just before it ended.

The reviewers also say something that I think is the centre of this book. Avoiding withdrawal, they found, plays a central role in habitual caffeine consumption. People keep drinking coffee in large part to not feel what stopping feels like. The morning cup is taken at the moment the overnight withdrawal begins to bite. The afternoon cup is taken as the morning's dose wears off. The habit is arranged, without anyone deciding it, to keep the shortfall from ever being felt in full, and the price of that arrangement is the night.

There's also no rule that says you have to stop all at once. Chapter 18 describes bringing it down over two or three weeks, so that the shortfall never gets deep. Most of the headache is avoidable that way. And the destination isn't necessarily zero. It's whatever amount you choose to drink because you like it, taken early enough not to cost you the night.

"Coffee's good for you anyway"

You may have read that coffee is good for you, and you're right to bring it up, because a book that ignored it would be dishonest.

Robin Poole and colleagues at Southampton pulled together, in 2017, two hundred and one meta-analyses of observational studies of coffee and health, covering sixty-seven outcomes, along with seventeen meta-analyses of trials. Coffee drinking was more often associated with benefit than harm. The largest reductions in risk, for outcomes including death from any cause and heart disease, were at three to four cups a day compared with none. Higher consumption went with lower rates of several cancers and of liver, metabolic and neurological conditions. Most of the harmful associations disappeared once smoking was properly accounted for. The exceptions were in pregnancy, where higher intake went with low birth weight, preterm birth and pregnancy loss, and a link with fracture in women. The authors concluded that coffee seems generally safe at usual levels and more likely to benefit health than harm, while pointing out that these are associations and that trials are needed to know whether coffee causes the benefits.

The European Food Safety Authority, reviewing the safety of caffeine itself in 2015, put the amount that raises no safety concern for healthy adults at up to four hundred milligrams a day, with no more than two hundred in a single dose, and two hundred a day in pregnancy. For children and teenagers they found the evidence insufficient to set a figure.

So I'll say plainly what this book is not. It's not a case against coffee. If you like it and you're not pregnant, three or four cups a day is well within what the evidence calls safe and may well be doing you some good. Nothing here asks you to stop.

What the book is about is the pattern, and none of the research above is about the pattern. Poole's studies asked how many cups people drank, not when, or why, or what their nights were like. A person who has three coffees before ten in the morning and a person who has one at seven, one at three and one at half past five have the same count and very different days. The first wakes at the level after a proper night. The second lives in a cycle of shortfall, pick-up and a shallow night. The health associations may be identical. The experience isn't.

So keep coffee, if you like it. The argument is about using it as a prop for tiredness that it's helping to cause, and about where in the day it goes. The evidence that coffee is fine is also evidence that you can drink it for pleasure, at a good hour, without guilt, and that's the position the rest of the book is aiming for.

"I only have three or four"

Ask a regular drinker how much caffeine they have and they'll count coffees and stop there. The number is usually two or three. The truth is usually higher, and it's worth getting it right, because the plan in chapter 17 depends on it.

The NHS gives rough figures. About a hundred milligrams in a mug of instant coffee, and it notes that filter coffee and coffee from a coffee shop can contain more. About seventy-five in a mug of tea, black or green. About forty in a can of cola. About eighty in a small can of energy drink. Less than twenty-five in a fifty-gram bar of dark chocolate, and less than ten in milk.

Now go back to Tuesday. The seven o'clock instant, the half past nine instant, the tea at eleven, the cola with lunch, the coffee at three, the coffee at half past five. That's four hundred and fifteen milligrams by the NHS figures, before any chocolate, and before allowing for a coffee-shop cup, which can be double a mug. If the half past nine was a large one from the place by the station, the day is comfortably over five hundred. You'd have said three.

Two things get missed. Tea, because it's tea, and people think of it as the gentle option. It's three-quarters of a coffee by these figures, and a person who drinks five mugs of tea a day is at the level of nearly four coffees. And size, because a mug is not a cup, and a coffee-shop large is not a mug. Counting cups when the vessels vary is like counting glasses of wine without noticing that some are pints.

There's also the matter of what you'd call the cut-off. Chapter 7 gave six hours before bed as the line the evidence supports. On Tuesday the last caffeine was at half past five, for a bedtime of eleven. That's inside the line. The three o'clock cup is on it. Most regular drinkers, in my observation, have their last caffeine later than they think, because the count stops at coffee and the afternoon tea doesn't register.

I'm not going to give you a target number. The point of this chapter is that you can't decide anything about the habit until you know its size, and the week of notes from chapter 1 will tell you. Add it up, using the NHS figures, and be honest about the sizes. The total will be higher than you thought. That isn't a verdict. It's the starting point.

"It's only tea"

There's a reader who's been feeling exempt for eleven chapters, because they don't drink coffee. They drink tea. Five or six mugs a day, from the first one in bed to the last one at nine, and it has never once occurred to them that any of this applies.

It applies. The NHS puts about seventy-five milligrams in a mug of tea, black or green, against a hundred for instant coffee. Six mugs is four hundred and fifty milligrams, which is more than four coffees and above the amount the European review put as the level of no concern for adults. A strong brew, a big mug, or a pot that's been standing will push a mug higher. Green tea isn't the gentle exception people take it for. The NHS figure is the same.

The tea drinker's habit has the same shape as the coffee drinker's, and it's harder to see, because tea comes with a reputation. It's what you make for someone who's had a shock. It's what you have to calm down. It's the drink of comfort and of putting the kettle on, and so the caffeine in it hides behind the kindness. A person who'd never have a coffee at nine at night will have a tea at nine without a thought, and lie awake at half past eleven, and never connect the two.

Everything in this book applies with one change. The doses are smaller and there are more of them. That means the shortfall in the morning is real but often milder, the afternoon slump is fed by the eleven o'clock and the three o'clock mugs, and the night is paid by the one after dinner and the one on the sofa. It also means the taper is easier, because tea steps down naturally. A weaker brew. A

smaller mug. A decaf bag among the ordinary ones, then two, then all of them after two o'clock. Decaf tea is closer to tea than decaf coffee is to coffee, and most people can't tell in a mug with milk.

Count it, as chapter 11 asked. Include every mug. If you're a tea drinker who's tired in the mornings and slow at three, the count will probably surprise you, and the cut-off will probably fix more than you expect.

And keep the tea. The morning pot, made properly, drunk at the table, is not the habit. The sixth mug of the day at nine on the sofa is.

"I just love the taste"

This deserves a straight answer, because it's the most honest thing anyone says about coffee and it's often true.

Coffee is one of the great flavours. The smell of it, the bitterness, the warmth of the mug in the hands on a cold morning. Tea has its own version. I'd no more ask you to give that up than I'd ask you to give up bread. And the good news is that nothing in this book requires it.

But I'd separate the taste from the habit, because they've grown together and the habit hides behind the taste. Here's a test, and it's mine. Do you love the taste at ten past three, when you're standing by the kettle waiting for the fog to lift? Or do you love the pick-up, and drink whatever's in the cup to get it? If the three o'clock coffee is instant, in a chipped mug, drunk in four gulps at the desk, it's not the taste you're after.

A second test. Decaffeinated coffee tastes, these days, close enough to the real thing that many people can't tell in a blind tasting. If the thought of switching your three o'clock cup to decaf feels like being cheated, notice what you'd be missing. Not the taste. The taste is still there. What you'd be missing is the pick-up, and the pick-up, as chapters 3 and 5 argued, is the removal of the shortfall. The disappointment you'd feel is the disappointment of not being medicated.

So here's what I'd suggest, and it's the arrangement the rest of the book builds towards. Keep the coffee you drink for the taste. Have it in the morning, from good beans if you can, made properly, sat down, with attention. That's the coffee worth having. The three o'clock instant at the desk is a dose, and doses can be decaf, or tea with less in it, or a glass of water and a walk, without any loss to the person who loves coffee.

You'll find, I think, that once the afternoon doses are gone, the morning coffee tastes better. It's no longer the thing that stops you feeling terrible. It's just coffee, drunk by someone who's awake.

"I need it because I sleep so badly"

Some readers will say the order is wrong. The coffee isn't what's spoiling your sleep. You've always slept badly, and the coffee is how you cope with the days. Take it away and you'll be a bad sleeper without a crutch.

I want to take this seriously, because there are people for whom it's true, and the preface said so. Insomnia, sleep apnoea, pain, a baby, shift work and a good many other things ruin sleep on their own. If you have one of those, the coffee is downstream of it, and the thing to fix is the thing itself, with a GP if needed. This book will still help a little, because coffee makes any night worse, but it isn't the main answer.

For most readers, though, I'd question the order, and here's why. Go back to what the research says the coffee does to a night. It makes sleep shallower, more broken and shorter, and it reduces the deep part. It does this even from a morning dose, and much more from an afternoon or evening one. So a person who drinks coffee through the day is a person with a caffeine-damaged night, whatever else is going on. Their morning is a shortfall. Their afternoon is a slump. Their answer to both is more coffee, which damages the next night. That's a circle, and from inside the circle it feels exactly like being a bad sleeper who needs coffee.

You can't tell, from inside, which came first. What you can do is notice that the circle only has one place where you can put your hand on it. You can't decide to sleep more deeply. You can decide

when the last cup is. If the last cup moves to before two, the night gets a little better, and the shortfall the next morning is a little smaller, and the circle turns the other way.

There's a reasonable test, and it's the plan in chapters 17 and 18. Bring the caffeine down over two or three weeks, move the cut-off back, and watch the morning score from your notes. If it climbs, the coffee was part of the problem. If after a month at a lower level with an early cut-off you're sleeping just as badly and just as tired, then your bad sleep has another cause, and you've learned something worth taking to a GP, and you can go back to drinking coffee at any hour you like, since it wasn't the coffee.

I'd expect the first result for most people. Not because I doubt your sleep, but because the mechanism is well established and the cut-off you've been keeping is inside the window that the evidence says matters.

"It's my break"

Here's the last defence and I think it's the most human. The three o'clock coffee is a break. You stand up, go to the kitchen, boil the kettle, look out of the window, and for four minutes nobody wants anything. It's the coffee that gives you permission to stop. Take the coffee away and you'd sit at the desk until six.

I'd grant every part of that except the last sentence. The break is real and you need it. What follows is my reasoning.

The break is made of standing up, walking, the kettle and the window. The coffee is the excuse. If you made a decaf, or a peppermint tea, or a glass of water, and stood at the same window for the same four minutes, you'd have had the same break. What you'd have lost is the dose, and the dose isn't what's restful about it. Some people find this hard to believe until they try it, so try it. One afternoon this week, take the break with something else in the mug, and see whether the break was still a break.

The coffee also does something to the break that's worth noticing. It turns a rest into a stimulant. The point of a break at three, if you're flagging, is to let the system settle for a few minutes. What you're doing instead is settling for four minutes and then loading up. It works, in the pick-up sense. It's not rest.

There's another thing that some people get from coffee that isn't rest and isn't alertness, and that's a feeling of being keyed up in a way they enjoy. That's real too, and worth a word. In the Bristol experiments, caffeine raised anxiety and jitteriness in the people

who didn't normally drink it, and with regular use that effect largely wore off. So the buzz mostly belongs to people who drink little, and regular drinkers have traded it for tolerance. If what you notice from the three o'clock cup is a slightly tight, restless feeling that you've come to associate with getting things done, it may be worth asking whether it's helping or whether it's the feeling that's keeping you awake at half past eleven.

Keep the break. Keep the kettle and the window. Change what's in the mug, in the afternoon, and see what the break was made of.

What the reliance costs

You may think of the habit as costing a few pounds a week and a slightly dry mouth. I think it costs more, and most of this chapter is my own reckoning. I'll say where a study comes in.

The night. Every night, a little shallower, a little shorter, with less of the deep part. Clark and Landolt's review found that consistently. You don't feel it while it's happening. You feel it at half past six.

The morning shortfall. Every day begins below the level and stays there until the cup. That's an hour or so a day, over years, spent foggy, flat and slightly low, for no reason except yesterday's coffee. Rogers's experiment measured that state. You've been calling it waking up.

The afternoon slump, enlarged. A natural dip with a withdrawal low on top of it. The three o'clock fog is partly made by the half past nine cup.

Never knowing how tired you are. With a signal muffled all day, you can't tell whether you need more sleep, less work, or a holiday. The coffee answers the question before it's asked. This is my own point and I think it's the biggest one. People run years on a shortfall they'd fix in a fortnight if they could feel it.

The tired person. Somewhere along the way you decided you were someone who needs more sleep than they get and can't function without coffee. That belief shapes how you plan, what you take on,

and how you think of yourself. It's a description of the habit, not of you.

The jitters and the heart. For some people, caffeine brings a tight chest, a racing heart or a low anxious hum, and in the Bristol work it raised anxiety in people who didn't normally take it. If you've got that hum and you've never connected it with the cups, the count from chapter 11 is worth a look.

Money. Small, but a daily coffee-shop cup is a substantial sum over a year, and it's being bought, on the argument of this book, to fix a problem it causes.

The evening. The half past five cup that gets you home is still in you at eleven, and the settled, drowsy end of the evening that other people get is one you rarely have. You're alert until you're suddenly not.

In return for all that, you've had the pick-up, three or four times a day, and each one has felt like a gift. It was a repayment. That's the trade, laid out. I'd take the other side of it.

Counting, and the cut-off

The first practical step is to know the number and to set the time. Everything in this chapter is my own method, built on the research earlier in the book.

Add up the week. Take the notes from chapter 1 and price each item with the NHS figures. A hundred for a mug of instant, more for filter or coffee-shop, seventy-five for tea, forty for a can of cola, eighty for a small energy drink, and a bit for dark chocolate. Get a daily total for each day and an average. This is the size of the habit. Most people are surprised, and the surprise is useful, because it makes the afternoon cups visible as caffeine rather than as coffee.

Find your last dose. For each day, note the time of the last caffeine of any kind. Compare it with your bedtime. Six hours is the line the evidence supports, and I'd treat it as the minimum. If your last dose is inside that window on most days, that's the first thing to change, and it's the change that pays soonest.

Set the cut-off. Pick a time after which you have no caffeine at all. Not a target to aim at, a line. For an eleven o'clock bedtime, six hours gives five o'clock, and I'd go earlier, because the evidence in chapter 7 was for a fixed dose and your afternoon may have more than one. Two o'clock is a good line for most people. After it, decaf, herbal tea, or water. Tea counts. Cola counts.

Move the cut-off first, before anything else. Don't reduce the morning cups yet. Just move the last dose back to before the line. This is the smallest change with the largest effect on the night, and

it costs you nothing in the morning, where the pick-up feels most needed. Do it for a week and watch the morning score.

Keep the notes going. Time of each dose, time you fell asleep, morning score out of ten. The score is your evidence. In my experience of people who do this, the morning score starts to move within the first week of the cut-off alone, before any reduction in the total, and that's the moment the habit stops looking like a fact of your nature and starts looking like a schedule.

Two cautions. If moving the cut-off leaves you with a big afternoon shortfall, because a lot of your caffeine was in the afternoon, you'll feel it for a few days, and chapter 19 is about that. And if you're one of the people the preface described, with pregnancy, a heart condition, or a medicine that interacts, the limits you've been given come first.

Bringing it down

Once the cut-off is in place and has held for a week, the second step is to bring the total down. This is where people expect suffering, and most of it is avoidable. This is my own method, and the reasoning is in chapter 9.

Decide where you're going. Not necessarily zero. The evidence in chapter 10 is that moderate coffee is fine and may be good for you, and the argument of this book is against the pattern, not the drink. A reasonable destination for many people is one or two cups in the morning, drunk because they like them, with nothing after the cut-off. Some will want none, for the pleasure of waking at the level with no cup at all. Either is fine. Decide before you start, so that the taper has an end.

Go slowly. Withdrawal symptoms rise with the size of the drop. Cut by roughly a cup's worth every three or four days, and let each step settle before the next. A taper from five hundred milligrams to two hundred over three weeks will have a few flat afternoons in it. A jump from five hundred to nothing on a Monday will have a headache and a bad week and will probably fail on Thursday.

Use decaf and dilution. Swap the afternoon cup for decaf first, since the cut-off has already removed it. Then make the morning cups half decaf. Then replace the second cup with tea, and the tea with a weaker tea. Mixing decaf into ground coffee, or using one caffeinated tea bag among decaf ones, lets you step down in small amounts without changing the ritual at all.

Drink water. Some of the headache of withdrawal is worsened by the loss of the fluid you were drinking. Replace each removed cup with a glass of water or a decaf.

Expect a few flat days. Two to nine, on the review's figures, with the worst around the second day after each step. A mild headache, a foggy afternoon, some irritability. If you get a headache, a painkiller is fine, and so is a slower step. What you shouldn't do is treat the flat day as evidence that you need coffee. It's evidence that you're adapting, and it ends.

Pick a quiet fortnight. Don't start the week of a big deadline or a long drive. Give the taper a stretch when a foggy afternoon costs little.

Keep the morning cup last. It's the one you value most and the one that does the most for the shortfall. Bring everything else down first. When only the morning cups are left, the shortfall is small, because there's less in the system to withdraw from, and you may find you want one rather than two.

I'd expect, and this is my expectation and not a finding, that about three weeks after you start, the morning score will be higher than it's been in years, the afternoon slump will have shrunk to the natural dip, and the coffee you've kept will taste better than it did.

The afternoon without it

You've moved the cut-off, and the afternoon now has no dose in it. Ten past three arrives, and there's a natural dip, and possibly a leftover shortfall while the taper works through. This chapter is about what to do with that hour. It's my own list.

First, know what it is. For the first couple of weeks it's partly withdrawal, and it passes. After that it's the natural dip, and it's smaller than you've been used to, because it isn't sitting on a shortfall any more. Naming it helps. "That's the dip" is a different experience from "I can't function".

Take the break anyway. Stand up, walk to the kitchen, put the kettle on, and stand at the window. Decaf, herbal tea or water in the mug. Chapter 15 argued that the break was made of the walk and the window, and this is where you find out.

Go outside. Ten minutes of daylight and movement does more for an afternoon dip than anything in a cup, in my experience. Round the block, to the postbox, to the end of the car park. Daylight in particular, because the afternoon dip is partly a matter of the body clock and light is what the clock listens to.

Drink water. A surprising share of afternoon fog is mild thirst, and a regular coffee drinker who's cut down is often drinking less fluid than before. A glass of water at three, on its own, is worth trying.

Eat lunch properly. A skipped or tiny lunch makes the dip worse. So does a very large one. Something ordinary, eaten sitting down, in the middle of the day.

Do the dull job in the dip. Don't schedule the meeting that needs you sharp for three o'clock if you can help it. Put the filing there, or the emails that don't need thought. Put the hard thinking at ten in the morning, which for most people is the best hour of the day, and which you'll now be awake for.

Fix the night. This is the real answer and everything above is the interim one. The afternoon dip is much smaller after a proper night, and the proper night is what the cut-off and the taper are giving you. If after a month the afternoon is still a struggle, look at how much sleep you're actually getting, because the coffee may have been hiding a shortfall that's simply hours in bed.

And if you're driving a long way at half past five and you're tired, have the coffee. One cup, for a real reason, on a day that needs it, is not the habit. It's a tool. What makes it the habit is having it every day whether or not the drive is long.

The decision

This chapter asks you to decide something. It comes late because at the start it would have sounded like the advice you've always been given, which is to drink less coffee. By now you've seen why that advice never landed, which is that the morning cup really does work, and why it's right anyway. The cup returns you to a level that a non-drinker wakes up at. The afternoon low is partly made by the morning cups. The night is paid whether or not you drop off quickly. Withdrawal is real and lasts days, not weeks. Coffee is fine for most people, and the argument is about the pattern.

Here's the rule I'd suggest. Put it in your own words if you like.

I drink coffee because I like it, before the cut-off, and I don't use it to get through the day.

It has five parts, and each answers a chapter.

I count everything. Tea, cola, energy drinks, the coffee-shop large. I know the size of the habit in milligrams, not in cups.

I keep the cut-off. Two o'clock, or whatever line I've set, and nothing with caffeine in it after that. Decaf and water instead.

I bring it down slowly. A cup's worth every few days, with the morning cup last, to a level I chose because I like it.

I answer the dip without a dose. The break, the window, daylight, water, the dull job. And a proper night, which is what the dip was asking for.

I keep the coffee I love. In the morning, made well, sat down. That coffee isn't the habit.

It helps to plan for the moments when the habit will try to restart. Peter Gollwitzer and Paschal Sheeran pooled ninety-four tests of plans in the form "when X happens, I'll do Y" and found that they make people more likely to follow through. A plan like this works because you've decided what to do before the moment comes. Three are worth writing down.

When I feel the fog at three and start towards the kettle, I'll make a decaf and stand at the window for the same four minutes.

When someone offers me a coffee after the cut-off, I'll say "I'd love a decaf if you've got one, or a tea," and not explain further.

When I catch the sentence "I can't function without it," I'll remember that the fog is the shortfall, and that it ends when the shortfall does.

I'll be honest about what to expect, and this is my expectation and not a finding. The first week of the cut-off will have some flat afternoons, and you'll feel the loss of the half past five cup on the drive home. The taper will bring a few days each step where you're foggier than you'd like and possibly a headache. Somebody will call you a convert, and you'll mind it slightly, and you'll say you still drink coffee, which is true.

Against that, the morning score should start moving within the first week or two. You should notice, somewhere in the third week, that you woke up before the alarm and felt fine, and that the coffee at seven was a pleasure and not a rescue. The afternoon should

shrink to a dip you can walk off. And the evening should acquire an end, a drowsy hour before bed that you haven't had in years, which was there all along, under the caffeine.

Shifts, energy drinks, pregnancy and the cup you're offered

When you work nights or rotating shifts. The cut-off still applies, but it's six hours before whenever you sleep, not before eleven. Caffeine early in a night shift and none in the second half is the arrangement that fits the evidence. Shift work damages sleep on its own, and if you're struggling, that's a conversation with a GP or an occupational health service, not a matter of coffee alone.

When it's energy drinks. The NHS figure is about eighty milligrams in a small can, and larger cans hold more. They're usually cold, sweet and drunk fast, so they're easy to have several of without noticing. Count them, apply the cut-off, and taper them like anything else. The European Food Safety Authority found no safety figure could be set for children and teenagers, so they aren't for them.

When you're pregnant or breastfeeding. The NHS says no more than two hundred milligrams a day, and the EFSA review says the same. That's a medical limit, not a suggestion, and it takes precedence over any destination you'd have chosen from chapter 18.

When you have a heart condition, high blood pressure, anxiety, or a medicine that interacts. Follow what you've been told. If nobody has told you anything and you're unsure, ask a pharmacist. If caffeine gives you palpitations, a GP should know.

When you're tired despite the taper. If a month at a low level with an early cut-off leaves you as tired as ever, the coffee wasn't the cause, and you should see a GP. Loud snoring with pauses in breathing, tiredness that doesn't lift with sleep, or tiredness with low mood or weight change all need looking at. The coffee may have been hiding it.

When you're driving tired. Have the coffee. A single cup before a long drive when you're tired is the right use of caffeine. Better still, don't drive tired, and if you're sleepy at the wheel, stop. Coffee reduces sleepiness for a while. It doesn't make a tired driver safe.

When you're offered a cup. People offer coffee as a kindness, all day, and after the cut-off you'll need a sentence. "I'd love a decaf, or a tea if not" is one, and needs no explanation. If there's no decaf, a glass of water is a complete answer.

When the office runs on it. Some workplaces have a coffee culture that's hard to stand outside. You don't have to stand outside it. Have the morning ones with everyone else. Have a decaf at three. Nobody can tell what's in the mug.

When you're on holiday or it's a special occasion. An espresso after dinner in a restaurant on holiday is a pleasure, and if you're happy to pay for it with a lighter night, that's a fair trade made knowingly. What makes it the habit is having it every night without noticing the bill.

When it's a deadline week. A stretch of late nights on a big piece of work is the one time the habit looks like sense, and for a few days it can be, if you decide it. Have the afternoon cup, know what it costs,

and stop when the deadline passes. What turns it into the habit is the week after, when the deadline has gone and the three o'clock cup hasn't.

When your partner keeps making you one. Some households run on the offered cup, and the person who makes it means well. Tell them once. "I'm not having caffeine after two, so make mine a decaf, and I'll keep some in." Most people are glad to know, and it's a good deal easier than refusing a mug already in front of you.

When you slip. You'll have a bad afternoon and reach for the real thing, or a late cup at a friend's. You'll sleep worse and feel it in the morning. That's information, not failure. Go back to the cut-off the next day. There's no need to start the taper again, because one cup doesn't undo three weeks of adaptation.

Tuesday again

It's ten past three on a Tuesday afternoon, some weeks on. The paragraph in front of you is a bit dull, and there's the beginning of the dip, a slight heaviness that you recognise now and can name. You get up, put the kettle on, make a decaf, and stand at the window for four minutes watching a van try to reverse into a space. You go back and the paragraph is fine. It was the paragraph.

The day started at twenty past six, before the alarm, which still surprises you. You lay for a few minutes and then got up, and the fog wasn't there. You made a coffee at seven, from the good beans, and drank it sitting down, and it was the best thing in the morning rather than the thing that made the morning possible. There was a second one at nine. That's the count for the day, and there's no tea at eleven now, because the tea was a dose, and you didn't miss it.

At half past five you drive home without a cup, and the drive is fine. At half past nine you notice you're drowsy, which used to happen never, and at half past ten you go up. You're asleep in the way that people describe, which is not knowing when it happened.

It wasn't always like this. The first week, moving the cut-off alone, the drive home was flat and you resented it. The second week you halved the morning cups and had two days with a headache and a foul temper, and on the second of them you nearly stopped. The third week the morning score in the notebook went from fives to sevens and stayed there, and that was the week you stopped calling yourself a tired person.

There have been slips. A late espresso at a birthday dinner, and a bad night, and a Wednesday that felt like the old days. A week of a big project when you had a three o'clock coffee every day, on purpose, knowing what it would cost, and then stopped again.

You still drink coffee. You'd say two a day if asked, and it would be true, and you'd know it was two hundred milligrams and that the last one was at nine. You still like it. You like it more, because it's not doing a job any more. It's just coffee, drunk by someone who's awake.

If you've read this far and changed nothing yet, try one thing. This week, keep everything as it is except the last dose. Move it to before two o'clock. Then see what the mornings do.

Notes

This book gives general information about an everyday habit. It isn't medical advice, and it's no substitute for a doctor or pharmacist who knows your case. The NHS guidance and figures I mention are for England as I found them in September 2026.

I've kept sources out of the chapters where I could so they read easily. Here they are by chapter, with the limits I'm aware of. Unless I say otherwise, I read the published summary of each paper and not the full text. I checked each paper for a retraction or correction notice in September 2026. Poole and colleagues has a published correction, which I haven't read. Where a chapter isn't listed, it rests on my own reasoning. That includes chapters 1, 2, 13, 14, 17, 18, 19 and 22. The Tuesday, the paragraph, the meeting at four, the drive home and everything else in the running example are invented.

Before you start. The pregnancy limit of 200 milligrams a day is from the NHS page "Foods to avoid in pregnancy", which also lists the caffeine content of common drinks used in chapter 11. The advice about tiredness, snoring and low mood is general and the NHS pages on sleep apnoea and depression describe the symptoms.

Chapter 3. Rogers, Hohoff, Heatherley, Mullings, Maxfield, Evershed, Deckert and Nutt, "Association of the anxiogenic and alerting effects of caffeine with ADORA2A and ADORA1 polymorphisms and habitual level of caffeine consumption", *Neuropsychopharmacology* 35, 2010, pages 1973 to 1983. One

hundred and sixty-two non-or-low and 217 medium-or-high consumers, 16 hours' abstinence, 100 then 150 milligrams or placebo. The study's main purpose was genetic, and the alertness finding is from its secondary results. The sentence about no net benefit is close to the authors' own wording. James and Rogers, "Effects of caffeine on performance and mood: withdrawal reversal is the most plausible explanation", *Psychopharmacology* 182, 2005, pages 1 to 8. I couldn't obtain a summary and have relied on the title, as the chapter says. The comparison with the person on the train is mine.

Chapter 4. Landolt, Werth, Borbély and Dijk, "Caffeine intake (200 mg) in the morning affects human sleep and EEG power spectra at night", *Brain Research* 675, 1995, pages 67 to 74. Nine healthy men. The description of adenosine and caffeine is from general knowledge of the pharmacology, and the Landolt abstract refers to adenosine's role. The account of the pick-up as a muffled message and a loan is mine.

Chapter 5. Rogers, Heatherley, Mullings and Smith, "Faster but not smarter: effects of caffeine and caffeine withdrawal on alertness and performance", *Psychopharmacology* 226, 2013, pages 229 to 240. Two hundred and twelve medium-to-high and 157 non-or-low consumers, overnight abstinence, 100 then 150 milligrams or placebo, tested until mid-afternoon. The application to the meeting at four is mine.

Chapter 6. Rogers and colleagues 2013 as above, for the worsening of withdrawal effects into the afternoon. The early afternoon dip in alertness is general knowledge of circadian rhythms and I haven't

cited a specific source. The division of the slump into two causes is my reading.

Chapter 7. Clark and Landolt, "Coffee, caffeine, and sleep: a systematic review of epidemiological studies and randomized controlled trials", *Sleep Medicine Reviews* 31, 2017, pages 70 to 78. The authors note that most studies were in male adults in Western countries. Drake, Roehrs, Shambroom and Roth, "Caffeine effects on sleep taken 0, 3, or 6 hours before going to bed", *Journal of Clinical Sleep Medicine* 9, 2013, pages 1195 to 1200. Four hundred milligrams, measured at home by self-report and a portable monitor. The NHS insomnia page says not to drink tea or coffee for at least six hours before bed. That caffeine leaves the body slowly over several hours is general pharmacology, and Landolt's saliva measurement is the nearest cited evidence.

Chapter 8. Drake and colleagues as above, for the effects at bedtime and three hours before it. The claim that people feel the difference within a few nights is my observation.

Chapter 9. Juliano and Griffiths, "A critical review of caffeine withdrawal: empirical validation of symptoms and signs, incidence, severity, and associated features", *Psychopharmacology* 176, 2004, pages 1 to 29. Fifty-seven experimental and nine survey studies. The 50 per cent headache figure and the 13 per cent figure for significant distress are from experimental studies.

Chapter 10. Poole, Kennedy, Roderick, Fallowfield, Hayes and Parkes, "Coffee consumption and health: umbrella review of meta-analyses of multiple health outcomes", *BMJ* 359, 2017, j5024. Observational associations, which the authors say need trials to

establish cause. EFSA Panel on Dietetic Products, Nutrition and Allergies, "Scientific Opinion on the safety of caffeine", EFSA Journal 13, 2015, 4102. The point that none of this research is about timing or pattern is mine.

Chapter 11. Caffeine figures from the NHS page as above. The arithmetic for the Tuesday example is mine and uses the NHS figures. The observation that most drinkers have their last caffeine later than they think is mine.

Chapter 12. The tea and green tea figures are from the NHS page as above, and the adult figure of no concern is from the EFSA opinion cited under chapter 10. The arithmetic and the observation about tea's reputation are mine.

Chapter 15. Rogers and colleagues 2010 and 2013 as above, for the anxiety and jitteriness findings in low consumers and tolerance in regular ones.

Chapter 16. Clark and Landolt, and Rogers 2010, as above. Everything else is my reckoning.

Chapter 20. Gollwitzer and Sheeran, "Implementation intentions and goal achievement: a meta-analysis of effects and processes", *Advances in Experimental Social Psychology* 38, 2006, pages 69 to 119. The rule and its parts haven't been tested together, and what I say to expect is my expectation and not a finding.

Chapter 21. NHS pregnancy figure and EFSA as above. The EFSA opinion says the information available is insufficient to derive a safe intake for children and adolescents. Everything else in the chapter is my own suggestion.