THE MARKET ALCHEMISTS

The Trader Curriculum

November 8th, 2026

Strong Enough to Stop

Sources, experiments and further reading

This supplement is for those who want to go deeper. For each study cited in this week's LEARN section, you'll find who was studied, what the researchers actually did, what they found, and why it matters at your trading desk. It ends with additional findings that didn't fit in the newsletter and a short list of books for deeper reading.

A note on reading research: no single study proves anything on its own. What gives these ideas weight is that they come from different fields (neuroscience, behavioural finance, social psychology) and different methods (brain imaging, hormone sampling, real brokerage accounts, controlled experiments), yet they point in the same direction.

I. THE BRAIN UNDER AROUSAL

Why your rules feel far away on a bad day

Stress takes the prefrontal cortex offline

Arnsten, A. F. T. (2009). Stress signalling pathways that impair prefrontal cortex structure and function. Nature Reviews Neuroscience, 10(6), 410–422.

Type of study	Major review of animal and human research on how stress affects the brain's executive control centre.
What it shows	At moderate levels, noradrenaline and dopamine help the prefrontal cortex work well. Under acute, uncontrollable stress, high levels of these chemicals disrupt the networks that hold goals and rules in mind, while strengthening the amygdala and habit-based circuits. Control shifts from slow, reflective thinking to fast, reflexive responding. With chronic stress, prefrontal neurons can even lose dendrites, while amygdala neurons grow more.
Key nuance	The sense of being out of control is itself a driver. The same stressor is less damaging when people feel they have control over it.
For traders	On a red day, your rules haven't disappeared, but the brain region that holds them is literally less available. That's why rules must be decided before the session, and why simple, automatic actions (closing the platform) beat in-the-moment reasoning.

Traders' bodies react to the market in real time

Lo, A. W., & Repin, D. V. (2002). The psychophysiology of real-time financial risk processing. Journal of Cognitive Neuroscience, 14(3), 323–339.

Participants	Ten professional traders at a major financial institution, trading foreign exchange and interest-rate derivatives during live sessions.
Method	Researchers recorded skin conductance, heart rate, blood volume pulse, respiration, muscle activity and body temperature while the traders worked, then matched the signals to market events.
Findings	Physiological responses rose significantly during market events such as periods of higher volatility and trend reversals. Even seasoned professionals showed emotional arousal, and less experienced traders tended to show stronger reactions to some events.
For traders	Emotion is not a beginner's problem you outgrow. It is part of how the brain processes financial risk. The skill is not eliminating it, but recognising it.

Emotional intensity and performance

Lo, A. W., Repin, D. V., & Steenbarger, B. N. (2005). Fear and greed in financial markets: A clinical study of day-traders. American Economic Review, 95(2), 352–359.

Participants	Day traders enrolled in an online trading-skills program run by Brett Steenbarger.
Method	Traders completed emotional-state questionnaires before and after each trading day over several weeks, alongside their daily profit-and-loss records.
Findings	Traders whose emotional reactions to gains and losses were more intense tended to have worse trading results. Standard personality traits did not clearly predict who would succeed.
Limits	Small sample with dropout over the study. The link is a correlation: it does not prove emotion causes poor results, but it fits the pattern seen elsewhere.
For traders	The goal is not to stop feeling. It is to keep the reaction to each win or loss proportional, so that one trade doesn't take over the next.

Hormones on a London trading floor

Coates, J. M., & Herbert, J. (2008). Endogenous steroids and financial risk taking on a London trading floor. PNAS, 105(16), 6167–6172.

Participants	Seventeen male traders on a London trading floor.
Method	Saliva samples were taken twice a day (morning and afternoon) over eight consecutive business days, and compared with each trader's profit-and-loss and with market volatility.
Findings	Morning testosterone was higher on days when traders went on to make above-average profits. Cortisol, the stress hormone, rose with the variability of traders' results and with market volatility.

For traders	Your biology tracks your P&L and the market's volatility. A chaotic tape and a red day are not just in your head; they shift your body chemistry, which shifts your risk-taking.

II. LOSS AVERSION & THE REFERENCE POINT

Why zero becomes the enemy

Prospect theory

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. Econometrica, 47(2), 263–291.

Method	Participants (mainly university students and faculty) answered a series of hypothetical choice problems involving gains and losses.
Classic result	Offered a sure gain of 3,000 or an 80% chance of 4,000, 80% chose the sure gain. Flip it to losses — a sure loss of 3,000 or an 80% chance of losing 4,000 — and 92% chose the gamble. This is the reflection effect: cautious with gains, risk-seeking with losses.
Key ideas	People judge outcomes as gains or losses relative to a reference point, not by final wealth. Losses hurt more than equal gains feel good.
For traders	When you're green you want to lock it in; when you're red you want to gamble your way back. That is not a character flaw. It is the default human value function, which is exactly why it needs a rule.

How much more do losses hurt?

Tversky, A., & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. Journal of Risk and Uncertainty, 5(4), 297–323.

Method	Participants priced many gambles involving gains and losses so that the shape of their value function could be estimated.
Findings	The median "loss aversion coefficient" was about 2.25: a loss carried roughly twice the psychological weight of a gain of the same size.
For traders	A −$500 day feels like roughly a +$1,000 day feels in reverse. That imbalance is the fuel behind revenge trading.

The break-even effect

Thaler, R. H., & Johnson, E. J. (1990). Gambling with the house money and trying to break even. Management Science, 36(6), 643–660.

Method	A series of experiments, some with real money, in which participants who had just won or lost chose between sure outcomes and gambles.
Findings	After a gain, people took more risk (the "house money" effect). After a loss, people were generally more cautious, except when a gamble offered a chance to get back to even. Then they jumped at it.

Related evidence	At the racetrack, bettors tend to shift toward long shots in the last race of the day, when a single win could erase the day's losses (McGlothlin, 1956).
For traders	The most dangerous trade of a bad day is the one that promises to bring you back to zero. Your brain overvalues it.

Holding losers, cutting winners

Shefrin, H., & Statman, M. (1985). The disposition to sell winners too early and ride losers too long. Journal of Finance, 40(3), 777–790. · Odean, T. (1998). Are investors reluctant to realize their losses? Journal of Finance, 53(5), 1775–1798.

Theory	Shefrin and Statman combined prospect theory, mental accounting and regret aversion to predict that investors would sell winners too quickly and hold losers too long. They named it the disposition effect.
Real-world data	Odean analysed about 10,000 accounts at a large US discount brokerage from 1987 to 1993. Investors realised a much higher share of their paper gains (about 15%) than of their paper losses (about 10%).
The cost	The winners investors sold went on to outperform the losers they kept by about 3.4 percentage points over the following year.
For traders	Staying in a losing position to avoid 'making it real' is persistence aimed at the wrong target. The loss already exists; closing it only acknowledges it.

III. NEGATIVE REINFORCEMENT

Why the click is rewarded by relief

The principle

Skinner, B. F. (1953). Science and Human Behavior. Macmillan.

Concept	Negative reinforcement: any behaviour that removes or reduces something unpleasant becomes more likely to happen again. (It is not punishment. It is reward through relief.)
For traders	Placing an order can briefly relieve tension, boredom, helplessness or the sting of being down. The relief arrives instantly; the consequences arrive later. That timing is what makes the habit so strong.

We'd rather be shocked than sit still

Wilson, T. D., Reinhard, D. A., Westgate, E. C., Gilbert, D. T., Ellerbeck, N., Hahn, C., Brown, C. L., & Shaked, A. (2014). Just think: The challenges of the disengaged mind. Science, 345(6192), 75–77.

Method	Across 11 studies, participants spent 6 to 15 minutes alone in a bare room, or at home, with nothing to do but think.

Findings	Most found it unpleasant and hard to concentrate. In the best-known study, participants first experienced a mild electric shock and many said they would pay to avoid it. Then, left alone for 15 minutes, 67% of men (12 of 18) and 25% of women (6 of 24) chose to shock themselves at least once. One participant did it 190 times.
For traders	Sitting on your hands while the chart moves is genuinely aversive. Part of the urge to trade is simply the urge to escape stillness.

When you feel bad, you act

Tice, D. M., Bratslavsky, E., & Baumeister, R. F. (2001). Emotional distress regulation takes precedence over impulse control: If you feel bad, do it! Journal of Personality and Social Psychology, 80(1), 53–67.

Method	Participants were put in a bad mood, then given chances to give in to impulses such as eating snacks or procrastinating. Some were told (falsely) that a pill had "frozen" their mood, so nothing they did would change how they felt.
Findings	Distressed people gave in to impulses more, but not when they believed their mood couldn't be changed. The impulsive behaviour was a strategy to feel better.
For traders	On a rough day, the next trade is often an attempt to repair your mood rather than a response to a setup. Ask: "Am I trading the chart, or my feelings?"

IV. ACTION BIAS, GRIT & THE COST OF ACTIVITY

When the warrior fights the wrong battle

Goalkeepers who can't stand still

Bar-Eli, M., Azar, O. H., Ritov, I., Keidar-Levin, Y., & Schein, G. (2007). Action bias among elite soccer goalkeepers: The case of penalty kicks. Journal of Economic Psychology, 28(5), 606–621.

Method	Analysis of 286 penalty kicks in top leagues and championships worldwide, plus a survey of professional goalkeepers.
Findings	Goalkeepers dove left or right on about 94% of kicks. Yet given where kicks actually went, staying in the centre gave the best chance of a save.
Explanation	Norm theory: because diving is the norm, conceding a goal while standing still feels worse and attracts more blame than conceding while diving.
For traders	"At least I did something" is not a strategy. The best play on a bad day is often the least visible one: no trade.

Grit can cost you

Lucas, G. M., Gratch, J., Cheng, L., & Marsella, S. (2015). When the going gets tough: Grit predicts costly perseverance. Journal of Research in Personality, 59, 15–22.

Method	Several studies measured participants' grit, then gave them tasks where quitting was the better choice, including unsolvable problems and tasks with money at stake.

Findings	Grittier participants persisted longer on unsolvable problems and kept going even when persistence lowered their earnings.
For traders	Grit is valuable over months and years of learning to trade. Inside a single bad session, the same trait can keep you fighting a market that has already given its answer.

Trading is hazardous to your wealth

Barber, B. M., & Odean, T. (2000). Trading is hazardous to your wealth: The common stock investment performance of individual investors. Journal of Finance, 55(2), 773–806.

Data	66,465 households with accounts at a large US discount broker, 1991–1996.
Findings	The average household earned 16.4% a year, versus 17.9% for the market. The households that traded the most (turnover above 250% a year) earned just 11.4% after costs.
Explanation	The authors attribute the gap to overconfidence and the costs of frequent trading.
For traders	Activity and productivity are not the same thing. More trades usually means more costs and more low-quality decisions.

V. REDEFINING THE BATTLE

How to intervene before the urge becomes an order

Letting go is a skill

Wrosch, C., Scheier, M. F., Miller, G. E., Schulz, R., & Carver, C. S. (2003). Adaptive self-regulation of unattainable goals: Goal disengagement, goal reengagement, and subjective well-being. Personality and Social Psychology Bulletin, 29(12), 1494–1508.

Method	Three studies, including university students and parents of children with cancer, measuring how easily people could let go of unreachable goals and commit to new ones.
Findings	People who could disengage from unattainable goals reported higher well-being, less perceived stress and fewer intrusive thoughts. The benefit was strongest when they also re-engaged with a new, meaningful goal.
For traders	Don’t just stop; redirect. Swap “win today” for “protect my capital and review my day”. That is still a battle, and it is one you can win.

If-then plans work

Gollwitzer, P. M., & Sheeran, P. (2006). Implementation intentions and goal achievement: A meta-analysis of effects and processes. Advances in Experimental Social Psychology, 38, 69–119.

Method	Meta-analysis of 94 independent tests involving more than 8,000 participants.
Findings	Forming “if situation X, then I will do Y” plans had a medium-to-large effect on goal attainment (d = 0.65) compared with simply intending to reach the goal.

Why it works	The plan creates a direct link between a cue and a response, so the action happens more automatically, with less need for willpower in the moment.
For traders	Willpower is weakest exactly when you need it. An if-then plan written before the open does the work for you.

Name it to tame it

Lieberman, M. D., Eisenberger, N. I., Crockett, M. J., Tom, S. M., Pfeifer, J. H., & Way, B. M. (2007). Putting feelings into words: Affect labeling disrupts amygdala activity in response to affective stimuli. Psychological Science, 18(5), 421–428.

Method	Thirty participants in an fMRI scanner viewed emotional faces and either labelled the emotion (“angry”, “scared”), labelled the gender, or simply watched.
Findings	Labelling the emotion reduced amygdala activity and increased activity in the right ventrolateral prefrontal cortex, a region involved in inhibition. The two were inversely related.
For traders	Saying “this is the urge to get even” is not just a nice idea. It recruits the brain’s braking system.

Surfing the urge

Bowen, S., & Marlatt, A. (2009). Surfing the urge: Brief mindfulness-based intervention for college student smokers. Psychology of Addictive Behaviors, 23(4), 666–671.

Method	123 college student smokers were randomly assigned to a brief mindfulness instruction (observe cravings as sensations that rise, peak and pass, without acting on them) or a control condition.
Findings	Seven days later, the mindfulness group was smoking significantly fewer cigarettes. Interestingly, their urges weren’t weaker; they simply acted on them less.
For traders	You don’t have to wait until the urge disappears. You only have to stop obeying it. Urges peak and pass within minutes if you don’t feed them.

Accept the loss before you enter

Douglas, M. (2000). Trading in the Zone. New York Institute of Finance.

Core idea	Douglas argues that most traders believe they accept risk but don’t. True acceptance means being at peace with the loss before the trade is placed, so that losing doesn’t trigger emotional pain or the need to get even.
For traders	When the first question for every trade is “What can this cost me, and can I afford it?”, a daily stop becomes just another risk parameter, not a verdict on who you are.

VI. ADDITIONAL FINDINGS

More evidence for the curious

The brain predicts your risky mistakes. Kuhnen and Knutson (2005) scanned participants during an investment task. Activity in the nucleus accumbens (a reward region) came before risky choices and risk-seeking mistakes, while activity in the anterior insula (linked to anxiety and discomfort) came before overly cautious mistakes. Different emotional systems push you toward different errors.

Better emotion regulators make better traders. Fenton-O'Creevy, Soane, Nicholson and Willman (2011) interviewed 118 traders and managers across four investment banks in London. Higher-performing traders were not less emotional. They were more skilled at noticing and regulating their emotions, while less successful traders tended to avoid or suppress them.

Buying and selling too often. Odean (1999) found that, in a large set of brokerage accounts, the stocks investors bought went on to underperform the stocks they sold, even before trading costs. The trades themselves were, on average, a mistake.

Almost no one wins by trading more. Barber, Lee, Liu and Odean (2014) studied day traders in Taiwan over many years and found that fewer than 1% were able to predictably earn profits after fees. Discipline and selectivity, not activity, separate the few from the many.

Grit is about the long game. Duckworth, Peterson, Matthews and Kelly (2007) defined grit as perseverance and passion for long-term goals. Notice the word long-term: grit belongs to your multi-year development as a trader, not to the next trade on a bad afternoon.

VII. FOR DEEPER READING

Books worth your time

- ***Quit*** — Annie Duke (2022). Quitting as a decision skill: kill criteria, quitting coaches, and why we stay too long.
- ***The Mental Game of Trading*** — Jared Tendler (2021). A practical system for tilt, fear, greed and overtrading.
- ***Trading in the Zone*** — Mark Douglas (2000). The classic on accepting risk and thinking in probabilities.
- ***The Hour Between Dog and Wolf*** — John Coates (2012). A former trader turned neuroscientist on how biology drives risk-taking.
- ***Thinking, Fast and Slow*** — Daniel Kahneman (2011). Loss aversion, reference points and the two systems of thought, from the source.
- ***The Psychology of Trading*** — Brett Steenbarger (2003). A trading psychologist's case studies on emotional patterns and change.

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