SCHOLARLY CRITICISM: JORDAN PETERSON'S SLOPPY CITE (IN 12 RULES FOR LIFE)

By Elliot Temple

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YouTube video with audio commentary:

https://www.youtube.com/watch?v=Dx1mJNQHSD8&index=3&list=PLKx6lO5Rmaes3wx4m8f7mxbpCtJIqEO46

QUOTE (12 RULES)

The ancient part of your brain specialized for assessing dominance watches how you are treated by other people. On that evidence, it renders a determination of your value and assigns you a status. If you are judged by your peers as of little worth, the counter restricts **serotonin** availability.

…

[The ancient counter] will render you **impulsive**,[20]

COMMENT

Jordan Peterson (JP) claims that your brain recognizes low status and restricts serotonin. JP says an effect of low serotonin is to make people "impulsive".

I checked the citation and found serious problems, which I will explain.

Source: *12 Rules for Life: An Antidote to Chaos*, by Jordan Peterson, Rule 1.

QUOTE (12 RULES)

20. Crockett, M. J., Clark, L., Tabibnia, G., Lieberman, M. D., & Robbins, T. W. (2008). “Serotonin modulates behavioral reactions to unfairness.” Science, 320, 1739.

COMMENT

The paper is freely available online. It’s divided into a one-page PDF and a seven-page word doc with extra info. Quotes (bold emphasis is mine) from “Serotonin Modulates Behavioral Reactions to Unfairness” are from either of those documents (links in the YouTube description):

http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.640.1067&rep=rep1&type=pdf

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2504725/bin/NIHMS2026-supplement-SOM_Text.doc

Source: *12 Rules for Life: An Antidote to Chaos*, by Jordan Peterson, Endnotes.

Serotonin Modulates Behavioral Reactions to Unfairness

Molly J. Crockett,[1,2]* Luke Clark,[1,2] Golnaz Tabibnia,[3] Matthew D. Lieberman,[3] Trevor W. Robbins[1,2]

One of the first social rules we learn as children is the golden one: Treat others as you wish to be treated. Unfortunately, our peers do not always deserve gold stars for their behavior, which tempts us to retaliate. Resisting aggressive impulses may be difficult, but successfully navigating social life sometimes requires self-regulation in the face of perceived injustice.

Serotonin (5-HT) has long been implicated in social behavior, including impulsive aggression, but its precise involvement in impulse control is controversial (*1*). Because social interactions can evoke strong emotions, it is plausible that 5-HT modulates impulsivity via emotion regulation mechanisms. Emotion regulation during social interactions has been studied with the ultimatum game (UG), in which one player (the proposer) proposes a way to split a sum of money with another player (the responder). If the responder accepts the offer, both players are paid accordingly. If the responder rejects the offer, neither player is paid. Responders tend to reject offers less than 20 to 30% of the total stake, despite the fact that such retaliation is costly (*2*), and rejection decisions are predicted by the intensity of the aversive response to the unfair offer (*3*, *4*).

We investigated the effects of manipulating 5-HT function on rejection behavior in the UG. We used a double-blind, placebo-controlled acute tryptophan depletion (ATD) procedure to temporarily lower 5-HT levels in 20 healthy volunteers (*5*). Once after ATD and once after placebo, participants played the role of responder during several one-shot UGs (Fig. 1A) (*5*). Offers fell into one of three fairness categories: 45% of stake (fair), 30% of stake (unfair), or 20% of stake (most unfair). We independently manipulated social reward (fairness) and basic monetary reward (offer size) by varying both the offer amount and the stake size across trials (Fig. 1B) (*5*).

Rejection rates (% of offers rejected) were calculated for each subject at each level of fairness during ATD and placebo treatments. Repeated-measures analysis of variance revealed a highly significant interaction between treatment and fairness ($F = 6.891$, $P = 0.003$). Compared with placebo, ATD significantly increased rejection rates, and this effect was restricted to unfair offers (Fig. 1C). In contrast, ATD did not interact significantly with offer size ($F = 1.164$, $P = 0.294$). Controlling for fairness, participants tended to reject low offers more frequently than high offers, regardless of treatment (*5*).

The increased rejection of unfair offers after ATD cannot easily be attributed to changes in mood, fairness judgment, or basic response inhibition. As found previously (*1*), there was no effect of ATD on self-reported mood (*5*). On each session, we asked participants to indicate the size of a fair offer for each stake, and ATD did not affect these judgments ($F = 0.648$, $P = 0.431$). Lastly, consistent with past research (*1*), we found no effect of ATD on go/no-go performance, a standard test of response inhibition (*5*) (SOM text).

These results show that manipulating 5-HT function can selectively alter reactions to unfairness in a laboratory model of self-regulation. Temporarily lowering 5-HT levels increased retaliation to perceived unfairness without affecting mood, fairness judgment, basic reward processing, or response inhibition. Our results illuminate the neural mechanisms underlying emotion regulation in the UG. Neuroimaging studies of the UG have implicated both dorsolateral prefrontal cortex (DLPFC) and ventral PFC (VPFC) in regulating reactions to unfair offers (*3*, *4*). Although disrupting DLPFC function with transcranial magnetic stimulation leads to decreased rejection of unfair offers (*6*), patients with VPFC damage reject a higher proportion of unfair offers than control participants do (*7*). The present effects of ATD mirror those of VPFC lesions and are consistent with other data (*8*) indicating a critical neuromodulatory role for 5-HT in this region.

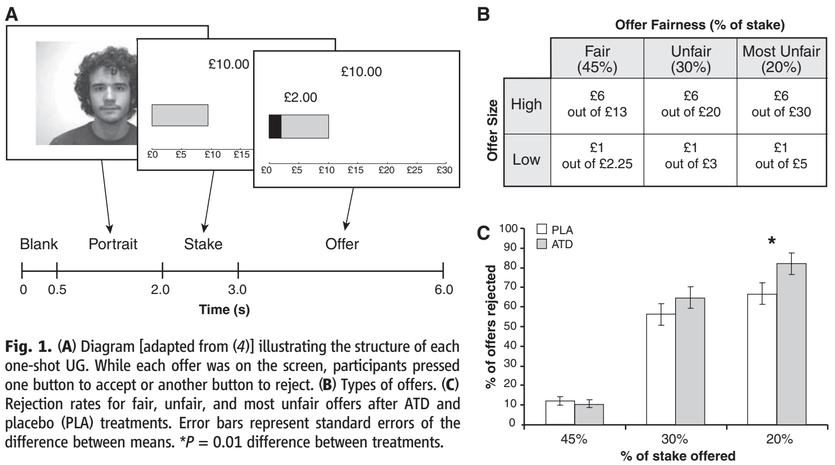

Fig. 1. (**A**) Diagram [adapted from (*4*)] illustrating the structure of each one-shot UG. While each offer was on the screen, participants pressed one button to accept or another button to reject. (**B**) Types of offers. (**C**) Rejection rates for fair, unfair, and most unfair offers after ATD and placebo (PLA) treatments. Error bars represent standard errors of the difference between means. *$P = 0.01$ difference between treatments.

References and Notes

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9. This work was completed within the University of Cambridge Behavioral and Clinical Neuroscience Institute and funded by a joint award from the Medical Research Council and the Wellcome Trust.

Supporting Online Material

www.sciencemag.org/cgi/content/full/1155577/DC1
Materials and Methods
References

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QUOTE

Serotonin (5-HT) has long been **implicated** in social behavior and impulsivity, but the mechanisms through which it modulates self-control remain **unclear**.

Source: Serotonin Modulates Behavioral Reactions to Unfairness

COMMENT

"Implicated" here means ***correlated*** with.

What's actually going on – the causal mechanism – is ***unclear*** according to JP's cite.

QUOTE

We observed the effects of manipulating 5-HT function on behavior in the ultimatum game, where players must decide whether to accept or reject fair or unfair monetary offers from another player. Participants with depleted 5-HT levels rejected a greater proportion of unfair offers, but not fair offers, **without showing changes in mood** … Our results suggest that 5-HT plays a critical role in **regulating emotion** during social decision-making.

Source: Serotonin Modulates Behavioral Reactions to Unfairness

COMMENT

This doesn't claim low serotonin makes people **impulsive**, as JP cited it for.

This says they found a correlation between serotonin levels and certain decisions being made. They've guessed the mechanism involves emotional regulation for some unclear reason, even though they admitted they don't know the mechanism.

They're saying somehow serotonin affects emotions but not mood, which seems contradictory.

There are many reasons someone could make a particular play in the ultimatum game **other than impulsivity**. E.g. anger, sadness, resentment, trolling, carelessness, boredom, trying to do what the researchers want (or screw them), their interpretation of the Bible on justice, trying to be a certain type of person (e.g. a “good person”), or mathematical misconceptions.

QUOTE (12 RULES)

Low serotonin means **less happiness**, more pain and **anxiety**, more illness, and a shorter lifespan

…

If you are judged by your peers as of little worth, the counter restricts serotonin availability. That makes you much **more** physically and psychologically **reactive** to any circumstance or event that might **produce emotion**, particularly if it is negative.

…

Encourage the serotonin to flow plentifully through the neural pathways desperate for its **calming** influence.

Source: *12 Rules for Life: An Antidote to Chaos*, by Jordan Peterson, Rule 1.

COMMENT

JP claims serotonin affects mood. The paper he cites says it doesn't. This was mentioned earlier and is on the next slide.

QUOTE

The increased rejection of unfair offers after ATD [a drug that lowers serotonin levels] **cannot** easily be attributed to changes in **mood**, fairness judgment, or basic response inhibition. As found previously (1), there was **no effect of ATD on self-reported mood** (5).

Source: Serotonin Modulates Behavioral Reactions to Unfairness

COMMENT

I don't think self-reported mood is a scientific way to measure mood. I don't think it's accurate. But JP thinks this study is good enough to cite, and it contradicts his book.

The difficulties with measuring mood are explained in *The Beginning of Infinity* by David Deutsch, a book I helped edit, in chapter 12. I'll give some quotes.

QUOTE (BEGINNING OF INFINITY)

how can we measure whether different people's ratings of their own psychological state are **commensurable**? That is to say, some proportion of the people claiming to have **happiness level 8** might be quite **unhappy but also so pessimistic** that they cannot imagine anything much better. And some of the people who claim only **level 3** might in fact be **happier than most, but** have succumbed to a craze that promises extreme future happiness to those who can learn to chant in a certain way.

Source: *The Beginning of Infinity*, by David Deutsch, ch. 12.

COMMENT

This is a severe problem with studies that try to use self-reporting on questionnaires to measure happiness, mood, or similar quantities.

QUOTE (BEGINNING OF INFINITY)

if we were to find that people with a particular gene tend to rate themselves happier than people without it, how can we tell whether the gene is coding for happiness? Perhaps it is coding for less reluctance to *quantify* one's happiness. Perhaps the gene in question does not affect the brain at all, but only how a person looks, and perhaps better-looking people are happier on average because they are treated better by others. There is an infinity of possible explanations. But the study is not seeking explanations.

Source: *The Beginning of Infinity*, by David Deutsch, ch. 12.

COMMENT

The same arguments about correlations with genes also applies to correlations with other things like serotonin levels.

The chapter criticizes science that focuses on correlations instead of explanations.

QUOTE (BEGINNING OF INFINITY)

So how does explanation-free science address the issue? First, one explains that one is **not measuring happiness directly**, but only a **proxy** such as the behaviour of marking checkboxes on a scale **called** 'happiness'. All scientific measurements use chains of proxies. But, as I explained in Chapters 2 and 3, each link in the chain is an **additional source of error**, and we can avoid fooling ourselves only by criticizing the theory of each link – which is impossible unless an explanatory theory links the proxies to the quantities of interest. That is why, in genuine science, one can claim to have measured a quantity only when one has an **explanatory theory** of how and why the measurement procedure should reveal its **value**, and with what **accuracy**.

Source: *The Beginning of Infinity*, by David Deutsch, ch. 12.

COMMENT

The study uses people marking checkboxes on a survey, or something similar (they don't specify), as a proxy for mood. It does not address what errors this proxy may cause, why the proxy will work, and what accuracy the proxy will work with.

Similarly, the study measures ***game playing actions*** and uses them as a proxy for how people react to unfairness. The fact that it's a ***proxy*** is ignored.

Failure to discuss and address the proxy issue invalidates the study (and many other psychology studies). It's not up to the standards required for science to work.

QUOTE (PREVIOUS STUDY)

RESULTS: ATD [which lowers **serotonin**] significantly lowered plasma tryptophan but **did not affect mood** and cognitive performance.

…

CONCLUSIONS: This study provides more evidence for the suggested role of 5-HT [**serotonin**] in performance monitoring. Because ATD **studies have revealed inconsistent effects** of ATD on performance and on brain activation, it was suggested that gender and personality traits are important variables to take into account for future research.

Source: The effect of acute tryptophan depletion on the BOLD response during performance monitoring and response inhibition in healthy male volunteers. https://www.ncbi.nlm.nih.gov/pubmed/16710715

COMMENT

The Ultimatum Game study cited a prior study about serotonin and mood. I checked it. It may be invalid for the reasons explained by *The Beginning of Infinity*, but it's the kind of study JP accepts and cites. So it's notable that it contradicts JP on mood and serotonin.

It says that studies of this topic have gotten ***inconsistent results*** and further research considering other factors is needed. So why has JP reached a conclusion?

So far, we've seen:

- JP's cite doesn't support his claim about impulsivity which he cited it for.
- It (and another paper) contradict JP about serotonin and mood.
- It's unscientific and invalid anyway.

Next I will go through detail errors in the paper. There are tons more problems with it.

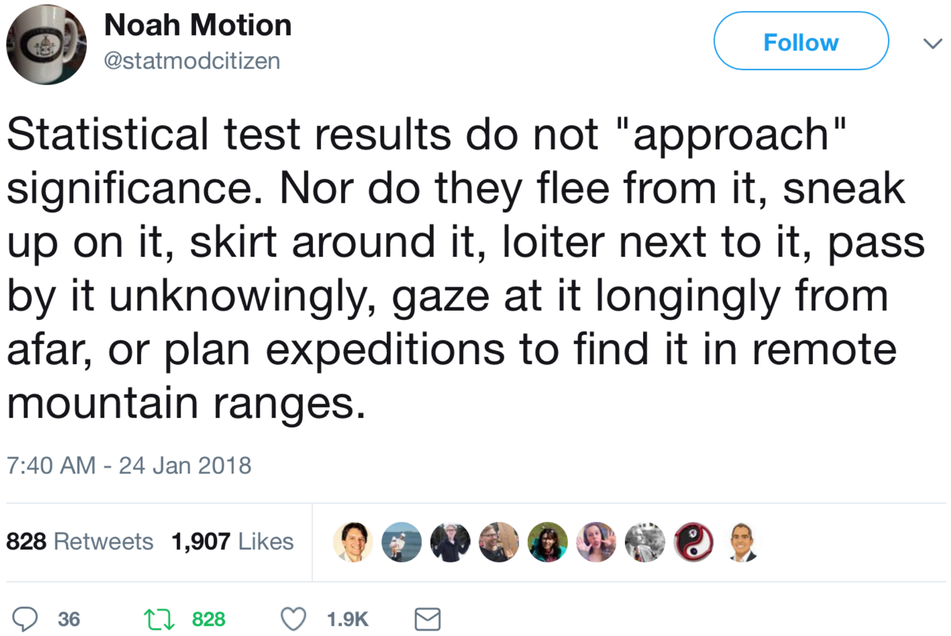
Then I'll briefly cover the myth that low serotonin causes depression.

Then I'll conclude by wondering whether JP read the paper before citing it. Did he miss all the flaws, or does he trust *and cite* study conclusions without checking their quality?

QUOTE

The main effect of treatment also **approached significance** (F=3.510, P=0.077).

Source: Serotonin Modulates Behavioral Reactions to Unfairness



COMMENT

This means the effect ***was not significant***. Period!

Effects don't approach significance. If it's insignificant, it's insignificant. Trying to hedge and lower the standards for significance is an unscientific, unscholarly approach.

QUOTE

Although there was **no formal assessment of subjects' blindness to treatment**, the experimenter noted during the debriefing whether subjects noticed any differences in how they felt on either study day, and did not find any evidence that subjects were not blind to treatment condition.

COMMENT

The study wasn't adequately blinded.

Rather than present the problem as a major "source of error", the study attempts to downplay the problem. In science, it's crucial to make a serious effort to avoid bias, rather than to try to bend conclusions in your favor.

Source: Serotonin Modulates Behavioral Reactions to Unfairness

QUOTE

Twenty healthy subjects (six males; mean age 25.6) were screened for neurological and psychiatric disorders and gave written informed consent before participating.

Source: Serotonin Modulates Behavioral Reactions to Unfairness

COMMENT

This is ***not a random sample*** and doesn't provide adequate information about the sampling. Maybe they were all psych majors who have played the ultimatum game before, and that affected the results.

The sample is small.

Screening makes the sample less random. It uses an unstated proxy – presumably how people answer survey questions. Then the study's sample only represents people who answer those survey questions in that way. Men like Richard Feynman have failed screenings like these.

QUOTE (FEYNMAN)

“Do you think people talk about you?” [the psychiatrist] asks, in a low, serious tone. I light up and say, “Sure! When I go home, my mother often tells me how she was telling her friends about me.” He isn’t listening to the explanation; instead, he’s writing something down on my paper.

Source: *Surely You're Joking, Mr. Feynman!* by Richard Feynman and Ralph Leighton

COMMENT

In “Uncle Sam Doesn’t Need You!”, Feynman (a top tier scientist and thinker) explains how the U.S. military rejected him for failing their psychiatric screening. He said he’s heard voices in his head, sometimes talks to himself or his dead wife, and has an aunt in an insane asylum. He’s not crazy, he’s just giving truthful answers. Feynman was going to explain the two times he heard voices (he’s written about hallucinating while falling asleep and in a sensory deprivation tank, maybe it was then), but the psychiatrist didn’t listen.

QUOTE (FEYNMAN)

“Do you think people stare at you?” I’m all ready to say no, when he says, “For instance, do you think any of the boys waiting on the benches are staring at you now?” While I had been waiting to talk to the psychiatrist, I had noticed there were about twelve guys on the benches waiting for the three psychiatrists, and they’ve got nothing else to look at, so I divide twelve by three—that makes four each—but I’m conservative, so I say, “Yeah, maybe two of them are looking at us.” He says, “Well just turn around and look”—and he’s not even bothering to look himself! So I turn around, and sure enough, two guys are looking. So I point to them and I say, “Yeah—there’s that guy, and that guy over there looking at us.” Of course, when I’m turned around and pointing like that, other guys start to look at us, so I say, “Now him, and those two over there—and now the whole bunch.” He still doesn’t look up to check. He’s busy writing more things on my paper.

Source: *Surely You're Joking, Mr. Feynman!* by Richard Feynman and Ralph Leighton

COMMENT

This is the funniest part of Feynman’s failed psychiatric screening and gives you a sense of how silly it is.

QUOTE

A closer look at the marginal means shows higher rejection rates for low unfair offers (e.g., **£1 out of £4**), compared to high unfair offers (e.g., **£5 out of £20**), but no difference in rejection rates between high and low fair offers.

COMMENT

Those amounts of money were not used in the study. Why use fake examples instead of real numbers from the study?

Source: Serotonin Modulates Behavioral Reactions to Unfairness

QUOTE

Participants were told that they would receive the financial outcomes from two trials that would be randomly selected at the end of the game.

COMMENT

- It doesn't say whether they were actually paid.
- Participants played the game 96 times and only 2 counted, so they may not have cared about their gameplay.
- The stakes (pennies each time) were low enough people may not have cared about their gameplay.
- Many people don't think logically about ***gambling***, so introducing gambling is significant factor which could have changed the results.

Source: Serotonin Modulates Behavioral Reactions to Unfairness

QUOTE

Participants were told that they would receive the financial outcomes from two trials that would be randomly selected at the end of the game.

Source: Serotonin Modulates Behavioral Reactions to Unfairness

COMMENT

Participants may not have known whether they'd be paid two of the offers they accepted in the game, or could be paid £0 due to rejecting offers. Confusion about this could have incentivized participants to reject low offers.

The study doesn't provide the raw data, which I think is unreasonable but common. If we saw actual data points, we might see that some individuals rejected almost all the low offers (possibly trying to get paid more), and this skewed the averages. If this happened, the "significant" increase in rejections of low offers by the low serotonin group could easily have been due to a single person with this misunderstanding. (I'm guessing it's a misunderstanding but maybe it's actually correct!)

QUOTE

To enhance the credibility of the [ultimatum game] task, participants were told that they were part of a large ongoing study in which they would be playing the role of responder with volunteers who had submitted their offers previously. In addition, they were told they would have the opportunity to play the role of proposer with volunteers who would participate in the future, if they would allow their photograph to be taken and used in future sessions, and submit proposals for 12 different stake sizes. […] In reality, there were no actual proposers, and participants' proposals were not used beyond their function as a cover story.

Source: Serotonin Modulates Behavioral Reactions to Unfairness

COMMENT

What did they tell people the ongoing study was about? What participants think they're being tested for is important and omitted.

Letting them play both roles is problematic because they don't get paid from the proposer role, which reveals it's a fake role. Part of the game is supposed to be that you can punish a real human being (via denying them money) by rejecting an unfair offer.

It's unclear if they were even supposed to believe the "volunteers" who made proposals in the past were actually going to be paid, or not, based on their own gameplay.

QUOTE

There were 16 fair proposals, ranging from 40-50% of the stake; 16 unfair proposals, ranging from 27-33% of the stake; and 16 very unfair proposals, ranging from 18-22% of the stake.

COMMENT

Everywhere else they refer to the proposals as being 20%, 30%, and 45%. All those other statements are misleading because the proposals actually varied in ranges near those values. For example the paper says:

Offers fell into one of three fairness categories: 45% of stake (fair), 30% of stake (unfair), or 20% of stake (most unfair).

That statement from the main paper is imprecise, and the accurate details are only mentioned in the supplemental material.

Source: Serotonin Modulates Behavioral Reactions to Unfairness

It’s unclear to me that 20% is an unfair offer in the single-iteration ultimatum game. I can see game theory arguments that it’s unnecessarily generous!

The **myth of low serotonin causing depression** is widespread because it helps sell serotonin-increasing drugs by providing a story about why they will work.

Actually, low serotonin isn't even correlated with depression.

QUOTE (12 RULES)

The drugs prescribed to depressed human beings, which are selective serotonin reuptake inhibitors, have much the same chemical and behavioural effect.

…

Low serotonin means less happiness

COMMENT

JP doesn’t say that low serotonin causes (or even correlates with) depression, but he comes close.

Source: *12 Rules for Life: An Antidote to Chaos*, by Jordan Peterson, Rule 1.

QUOTE (DEPRESSION PAPER)

The “serotonin hypothesis” of clinical depression is almost 50 years old. At its simplest, the hypothesis proposes that diminished activity of serotonin pathways plays a causal role in the pathophysiology of depression.…

In such an **undeveloped field** this approach, though **logically precarious**, has been a useful **heuristic** … the **serotonin hypothesis of depression has not been clearly substantiated**. Indeed, dogged by **unreliable clinical biochemical findings** and the difficulty of relating changes in serotonin activity to mood state, the serotonin hypothesis eventually achieved **“conspiracy theory”** status, whose avowed purpose was to **enable industry to market selective serotonin reuptake inhibitors (SSRIs) to a gullible public** (3).

Source: What has serotonin to do with depression? https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4471964/

COMMENT

What has serotonin to do with depression? was published in *World Psychiatry* in 2015. It concludes, “**Simple biochemical theories that link low levels of serotonin with depressed mood are no longer tenable.**” That means they aren’t even ***correlated*** (which was never a reasonable reason to assume a ***causal*** relationship).

Summary

JP cited a study to say that low serotonin makes people impulsive. The study:

1. Doesn't say that.
2. Contradicts other claims JP makes about serotonin.
3. Has numerous flaws.

Did JP read the study he cited? I don’t know which is worse: if JP read it and didn’t see anything wrong with it, or JP cites things without reading them.

Be wary of believing things you read, even in books with cites or in academic papers. The problems I've criticized aren't especially bad. They're pretty typical.

I’m a philosopher. Check out my other videos, essays and blog!

www.elliottemple.com