



# Does my total evidence support that I'm a Boltzmann Brain?

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**Abstract** A Boltzmann Brain, haphazardly formed through the unlikely but still possible random assembly of physical particles, is a conscious brain having experiences just like an ordinary person. The skeptical possibility of being a Boltzmann Brain is an especially gripping one: scientific evidence suggests our actual universe's full history may ultimately contain countless short-lived Boltzmann Brains with experiences just like yours or mine. I propose a solution to the skeptical challenge posed by these countless actual Boltzmann Brains. My key idea is roughly this: the skeptical argument that you're one of the Boltzmann Brains requires you to make a statistical inference (most Fs are Gs, this is an F, so it's probably a G), but the Principle of Total Evidence blocks us from making the inference (because I also know this F is an FH, and most FHs are not Gs). I discuss how my solution contrasts with a recent suggestion, made by Sean Carroll and David Chalmers, for how to address the skeptical challenge posed by Boltzmann Brains. And I discuss how my solution handles certain relevant concerns about what to do when we have higher-order evidence indicating that our first-order evidence is misleading.

**Keywords** Skepticism · Boltzmann Brain · Statistical inference · Principle of total evidence · Higher-order evidence

## 1 The skeptical challenge from Boltzmann Brains

It's possible the universe continues forever in duration or in space. If it does, it's also true that, at any time and place, even in the dead of space, there's always a slim chance that particles will randomly come together to briefly form a conscious brain,

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maybe even one having a brief stream of experience that is exactly like my current experience (apparent memories of my past included). If so, then it's a near certainty that the universe's full history will contain zillions of short-lived brains with experiences just like my current experience, brains that pop into existence and quickly die out after having this experience. However confident we might be that the universe will be infinite in this way, then, we should be likewise confident that a randomly chosen brain, out of all the brains that ever exist, would be one of these so-called "Boltzmann Brains".<sup>1</sup>

Am I one of these brains, a brain that thinks it's a normal adult human, but in fact exists only for a few seconds in an otherwise empty void of space? This is the Boltzmann Brain Skeptical Scenario (BBSS).

The skepticism it threatens us with is powerful. The traditional skeptic argues only from the claim that skeptical scenarios (the demon, the mad scientist, the Matrix, etc.) are *possibilities*. The BBSS is gripping because contemporary science does lead us to think there's a good chance that the universe is infinite in the right way, and that means many *actual* minds really are in such a skeptical scenario. Only the dreaming skeptical scenario shares this kind of powerful basis in actuality.

One common way of trying to rule out the dreaming scenario is to observe that waking experience includes a detectable kind of clarity and coherence that actual dreams usually lack. To then shift to a dreaming scenario that stipulates perfect clarity and coherence would then be to give up the strongly felt connection to actuality. A similarly common way of addressing the BBSS is to say that most Boltzmann Brains (BBs) have incoherent streams of experience, unlike our actual experience. But this reply to the BBSS has a problem, one that the similar reply to dreaming doesn't have. While most BBs have incoherent experiences, the worrisome evidence is that most coherent streams of experiences are had by BBs, and that last fact is the worrying one.

We need a better way to free ourselves from the grip of the worry that we're in the BBSS. Here I offer a different proposal.

## 2 My proposed solution

We can understand the worry that we're in the BBSS as a two-part skeptical argument. Part 1: there is decent scientific evidence that the actual universe, over its history, hosts zillions of minds that have experiences exactly like mine, all of these but mine being BBs. Part 2: if the vast majority of the zillions of existing Fs are Gs, and a given individual is an F, then the rational confidence that it's a G is extremely high.

My diagnosis of the problem with this argument is that we're not in a position to rationally perform the reasoning outlined in part 2. That reasoning is a simple form of statistical inference (also called statistical syllogism, also called direct inference; David Lewis's Principal Principle is a famous version of inference in this general

<sup>1</sup> See Kotzen ([forthcoming](#)) for a useful general discussion and further references.

category). As is well known, any such statistical inference is highly defeasible: when you have extra evidence that this F is also an H, and that most FHs are *not* Gs, then you need not think this F is a G. You could now have low confidence this F is a G. This is an instance of the so-called Principle of Total Evidence, which is the (admittedly somewhat vague but still) very plausible idea that a rational thinker must respect their total evidence, not just some subset of it.

I say that we are in just such an “FH” situation with the BBSS. How do we learn that most minds like mine are BBs? We learn this only via acquiring a huge batch of scientific evidence. That batch includes in it lots that says we're in ordinary human bodies, on ordinary earth, which has existed and circled the sun for billions of years, and so on and so on. We are FHs, who see (through scientific reasoning) that there are (going to be) lots of Fs in the universe that are Gs. But that is not evidence that we are a G. We are not a G, i.e. not a BB. That is, on our *total* evidence, it's not rational to make the statistical inference that we're BBs.

That is my proposed solution to the skeptical worry that we're BBs.

(My solution here is not meant to address the traditional skeptical worry that is based in the mere *possibility* that you are a deceived disembodied brain. It remains true that the possibility exists, and epistemologists need to explain why the mere possibility does not lead to skepticism. My response here is aimed at addressing the worry generated by the evidence of many actual minds being deceived disembodied brains.)

### 3 Relating my proposal to the Albert–Carroll–Chalmers proposal

It's not my view that it is *never* reasonable to use statistical inference in the course of a skeptical argument. Sometimes it's reasonable. For example, if I knowingly participate in an experiment where 10% of subjects get a placebo and the other 90% are given a drug that will now induce a hallucination as of an apple on a table, and I now have a perceptual experience as of an apple on a table, then I must conclude by statistical inference that my experience is probably a hallucination. I must accept this (mildly) skeptical conclusion, even if I'm in fact in the 10% and I'm veridically perceiving an apple. I may *not* treat the fact that I see an apple as good evidence that I'm having a veridical experience and am therefore in the 10%.

Our situation with the BBSS is, I claim, different. How is it different? How come I *can't* treat a genuine perception of an apple as good evidence that I'm in the 10%, but I *should* treat my observations that I'm on earth (and so on) as good evidence that I'm not a BB? How come I *can't* resist making a statistical inference to (mild) skepticism in the drug case, but I *should* resist making a statistical inference to the skeptical conclusion that I'm a BB? Something should explain the difference between those two sorts of cases here.

A preliminary point is that it at no time entered into my total evidence that there's an apple I see here, but it at one time was (and now remains) a part of my total evidence that I'm on earth and in an ordinary body (and so on). But that cannot be the whole explanation, because that suggests that *timing* prevents or allows certain facts to enter into my evidence, and that's not plausibly the explanation here. I could

have started out believing, even knowing, that there's an apple I see here, and then I later learned that I've been participating in a drug experiment as described above. Then, of course, I would *lose* possession of the evidence that there's an apple I see here. I can't resist the statistical inference that I'm probably hallucinating. Why, then, are things different with the BBSS? I start out knowing I'm not a BB, and then I learn that the universe contains zillions of BBs, but (I claim) I *don't lose* my knowledge that I'm not a BB. I've now made the timing of the introduction of the skeptical worry parallel in the two cases. So, we still need to explain why I should not make the statistical inference that I'm a BB. Can we point to any relevant difference in the cases now to explain the epistemic difference concerning what's kept or what's lost in my evidence?

Yes, even after arranging those parallels in timing, I think we can still point to an important and relevant epistemic difference in the cases. There are different facts about *basing and epistemic dependence* in the two cases. And these differences can, I suggest, explain why it must remain in my total evidence that I'm in an ordinary body on earth, even though it gets kicked out of my evidence that there's an apple I'm seeing.

Here is the difference in basing and epistemic dependence. In the drug case, my knowledge that I'm participating in the drug trial, and my belief that I'm hallucinating, are *in no part* based on, or dependent for their justification on, my views about whether or not there's an apple on the table. By contrast, my belief that I'm a BB would have to be *entirely* based on, and epistemically dependent for its justification on, the ordinary scientific evidence that the universe hosts zillions of BBs. This means that no matter how hard I try to take on the belief that I'm a BB, I cannot rationally do so while kicking away my beliefs in ordinary science, *for those beliefs in science were the basis for the conclusion that I'm a BB!* I cannot infer I'm probably a BB while lacking the evidence of ordinary science, because the conclusion that I'm probably a BB is epistemically dependent on the evidence of ordinary science. This, I suggest, explains why, in the BB case, the ordinary scientific evidence must remain a part of my total evidence, even though in the drug case I may not similarly hold on to the evidence that there is an apple on the table.

This epistemic feature of the BB case that I've just highlighted has also been gestured at in a different way by other authors who've addressed the topic. Carroll (2016, p. 92) and Chalmers (2018, p. 658) each make the brief suggestion that the belief that I'm in the BBSS is, in an epistemic sense, an "unstable" belief. (Carroll says he borrows the idea from David Albert but doesn't cite where, so I infer it may have been a personal conversation; see Albert (2000) for discussion of Boltzmann though no specific discussion of the BBSS.) Carroll and Chalmers do not develop the suggestion at great length (each only giving it one paragraph, Chalmers doing so in a footnote), but one way to understand this "instability" is to see it as arising from the epistemic dependence I've just pointed to in the BB case but which we've found missing from the drug case. In the drug example, if I have an experience as of an apple and I believe that it's a hallucination, that *does not undermine* my knowledge that I'm participating in this drug experiment where 90% of people are drugged and will hallucinate an apple. By contrast, the belief that I am a BB *does undermine* my belief, based on the ordinary scientific evidence, that the universe

contains zillions of BBs. So, I *can* rationally believe that I'm participating in this weird drug experiment and infer, by statistical inference, I'm probably hallucinating. By contrast, I *can't* rationally believe that the scientific evidence makes it likely there are zillions of BBs and infer, by statistical inference, I'm probably a BB. If I infer I'm a BB, then I shouldn't believe any of that scientific evidence, but I needed that evidence as the basis of my inference—the inference would create an epistemically self-undermining, or “unstable”, package.

I agree then, with Carroll and Chalmers, that believing the BBSS is, in the sense just explained, “unstable”. However, I am not bringing up instability so that I can point to it and say—as Carroll and Chalmers do want to say—that it is the instability of the BBSS that sufficiently explains why it should be rejected. Rather, I'm bringing it up because I want some special explanation for why my total evidence in the drug case kicks out the fact that there's an apple, but my total evidence never kicks out the ordinary scientific evidence even when I entertain the BBSS. Saying that the BBSS is unstable was *not* my proposed solution to the skeptical challenge posed by the BBSS. In his critique of Carroll, Kotzen rightly says that pointing out its instability is not itself an adequate solution to the skeptical worry posed by the BBSS. Kotzen rightly says, “Cognitive instability, all by itself, is not a sufficient reason to reject a hypothesis”. I agree. My proposed solution to the skeptical worry posed by the BBSS is not to simply say (as Carroll and Chalmers did): the BBSS is unstable and *therefore* it is false or improbable. Rather, my solution was to say: when we take into account our total evidence, we see that it strongly supports the hypothesis that I'm in an ordinary body on earth and it gives no support to the BBSS (in particular no support via the statistical inference that would be required but is blocked). So, my proposed solution to the skeptical problem of the BBSS involves saying something distinct from and well beyond what Carroll and Chalmers said.

(I have not provided a *general* theory that explains when evidence you once genuinely possessed later gets kicked out or must be “bracketed” or treated as “independent”—to use some of the terms found in the literature on peer disagreement and higher order evidence. Epistemologists like David Christensen desire some general principle that governs when higher-order skeptical doubts trigger the “bracketing” or the “independence” of first-order evidence, but Christensen ([forthcoming](#)) acknowledges that the task is difficult and has not been conclusively achieved yet. What I have tried to do in this section is only to give a compelling sufficient explanation for why we cannot bracket ordinary scientific evidence in the face of the BBSS.)

#### 4 Response to an objection

My proposed solution to the problem of the BBSS may still seem as if it leaves room for the following skeptical doubt. What about all those zillions of actual BBs I've conceded may exist? Don't they and I share the same total evidence? And doesn't that mean they and I cannot rationally discriminate our scenarios? I cannot rationally think things are different with me, because I have no better evidence.

I will grant an assumption of this objection. I grant that we, the BBs and I, do all share the same evidence. The objection assumes some form of internalism about evidence: the objection claims the BBs and I share the same evidence because we are phenomenal duplicates. I'll allow, for example, the view that our shared empirical evidence, and the ultimate basis of our scientific world views, consists of propositions we represent in experience, including false and (thus) unknown propositions. (I can thus allow a view like dogmatism (Pryor 2000), and I will reject the view that our evidence consists just of known propositions (Williamson 2000)).

Nevertheless, what I say in reply to the objection is that my above main argument—that your evidence supports high confidence that you're an ordinary mind, not a BB—still applies to *all of us*. We should all conclude, me and the BBs, that we are in the good case. All of the zillions of BBs should think they are not BBs. I will be right, they will be wrong, and we'll all be rational.

What I've just said can still sound unsettling: if I'm recommending all these BBs think something false, aren't I suggesting I'm in a scenario where my total evidence is almost always misleading? Isn't that bad?!

I agree there is something viscerally unsettling about this, something hard to shake. But what causes us to feel unsettled is just our temptation to make another statistical inference that we must resist. We are powerfully tempted to reason as follows: most people who have just my total evidence have misleading total evidence, therefore I have misleading total evidence. This is the same tempting error all over again, the same inference that this F is a G while forgetting this is also an FH. The rational way to respond to having my total evidence requires doing more than *just* asking if most people with this as their total evidence are misled. The rational way to respect the evidence requires doing more than that. And the way to respect the evidence we have (and that we share with the BBs), is to respect it as evidence that, among other things, we are on ordinary earth, in ordinary bodies, in a universe we share with zillions of Boltzmann Brains.

What I said just now is reminiscent of part of Thomas Kelly's critique of the equal weight view about peer disagreement (see, e.g., Kelly 2010, esp. pp. 122–4; 2013, esp. p. 46). The equal weight view says that when you've reasoned to P from evidence E, and your peer has reasoned to  $\sim P$ , and you know that your peer is right in cases like this about half the time, then bracket E itself from your reasoning, and just take into account the higher-order evidence that you'd be right about P just half the time (as Christensen's desired principle would explain). Kelly objected that bracketing E amounts to throwing away some perfectly good evidence (a violation of the Principle of Total Evidence). What I've said is also reminiscent of Lasonen-Aarnio's (2014) related view that I can maintain beliefs that are based on first-order evidence E while I also possess higher-order evidence to the effect that E is misleading.

I'm saying something similar, but only similar, to such views. I don't think I'm committing to Kelly's and Lasonen-Aarnio's positions in the debates over peer disagreement or higher-order evidence—for, I can allow that bracketing E might become rational when I have higher-order evidence that *my own* reasoning with E would be unreliable. (The drug case from above is one case that illustrates this, though I believe Kelly and Lasonen-Aarnio want to say the sensible thing about this

case too.) But I claim that the evidence of Boltzmann Brains is *not* evidence of the unreliability of *my own* reasoning with my total evidence. The known existence of other minds, BBs, who reason unreliably with E is *not* a reason for *me* to bracket E. Again, if *all* I knew is that I am a member of a class of people most of whom are misled into holding false beliefs, *then* I should feel pressured to think that I'm misled. But if I further know that I am in a particular sub-class that is not misled, then I should fully resist the conclusion that I'm misled. This is the situation I'm in when I know that, out of the class containing me and the BBs, most of us will be misled, but I also have all that ordinary evidence that leads me to rationally believe (and know) that I am a person on earth, not one of those misled BBs.

It's odd and viscerally disturbing that rationality requires the BBs to think the same thing and be wrong, but that is part of why these skeptical problems are so hard to shake even when their irrationality has been demonstrated.

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