Heresy
April 2022

One of the most surprising things I've witnessed in my lifetime is the rebirth of the concept of heresy.

In his excellent biography of Newton, Richard Westfall writes about the moment when he was elected a fellow of Trinity College:

> Supported comfortably, Newton was free to devote himself wholly to whatever he chose. To remain on, he had only to avoid the three unforgivable sins: crime, heresy, and marriage. [1]

The first time I read that, in the 1990s, it sounded amusingly medieval. How strange, to have to avoid committing heresy. But when I reread it 20 years later it sounded like a description of contemporary employment.

There are an ever-increasing number of opinions you can be fired for. Those doing the firing don't use the word "heresy" to describe them, but structurally they're equivalent. Structurally there are two distinctive things about heresy: (1) that it takes priority over the question of truth or falsity, and (2) that it outweighs everything else the speaker has done.

For example, when someone calls a statement "x-ist," they're also implicitly saying that this is the end of the discussion. They do not, having said this, go on to consider whether the statement is true or not. Using such labels is the conversational equivalent of signalling an exception. That's one of the reasons they're used: to end a discussion.

If you find yourself talking to someone who uses these labels a lot, it might be worthwhile to ask them explicitly if they believe any babies are being thrown out with the bathwater. Can a statement be x-ist, for whatever value of x, and also true? If the answer is yes, then they're admitting to banning the truth. That's obvious enough that I'd guess most would answer no. But if they answer no, it's easy to show that they're mistaken, and that in practice such labels are applied to statements regardless of their truth or falsity.

The clearest evidence of this is that whether a statement is considered x-ist often depends on who said it. Truth doesn't work that way. The same statement can't be true when one person says it, but x-ist, and therefore false, when another person does. [2]

The other distinctive thing about heresies, compared to ordinary opinions, is that the public expression of them outweighs everything else the speaker has done. In ordinary matters, like knowledge of history, or taste in music, you're judged by the average of your opinions. A heresy is qualitatively different. It's like dropping a chunk of uranium onto the scale.

Back in the day (and still, in some places) the punishment for heresy was death. You could have led a life of exemplary goodness, but if you publicly doubted, say, the divinity of Christ, you were going to burn. Nowadays, in civilized countries, heretics only get fired in the metaphorical sense, by losing their jobs. But the structure of the situation is the same: the heresy outweighs everything else. You could have spent the last ten years saving children's lives, but if you express certain opinions, you're automatically fired.

It's much the same as if you committed a crime. No matter how virtuously you've lived, if you commit a crime, you must still suffer the penalty of the law. Having lived a previously blameless life might mitigate the punishment, but it doesn't affect whether you're guilty or not.

A heresy is an opinion whose expression is treated like a crime â€” one that makes some people feel not merely that you're mistaken, but that you should be punished. Indeed, their desire to see you punished is often stronger than it would be if you'd committed an actual crime. There are many on the far left who believe strongly in the reintegration of felons (as I do myself), and yet seem to feel that anyone guilty of certain heresies should never work again.

There are always some heresies â€” some opinions you'd be punished for expressing. But there are a lot more now than there were a few decades ago, and even those who are happy about this would have to agree that it's so.

Why? Why has this antiquated-sounding religious concept come back in a secular form? And why now?

You need two ingredients for a wave of intolerance: intolerant people, and an ideology to guide them. The intolerant people are always there. They exist in every sufficiently large society. That's why waves of intolerance can arise so suddenly; all they need is something to set them off.

I've already written an essay describing the aggressively conventional-minded. The short version is that people can be classified in two dimensions according to (1) how independent- or conventional-minded they are, and (2) how aggressive they are about it. The aggressively conventional-minded are the enforcers of orthodoxy.

Normally they're only locally visible. They're the grumpy, censorious people in a group â€” the ones who are always first to complain when something violates the current rules of propriety. But occasionally, like a vector field whose elements become aligned, a large number of aggressively conventional-minded people unite behind some ideology all at once. Then they become much more of a problem, because a mob dynamic takes over, where the enthusiasm of each participant is increased by the enthusiasm of the others.

The most notorious 20th century case may have been the Cultural Revolution. Though initiated by Mao to undermine his rivals, the Cultural Revolution was otherwise mostly a grass-roots phenomenon. Mao said in essence: There are heretics among us. Seek them out and punish them. And that's all the aggressively conventional-minded ever need to hear. They went at it with the delight of dogs chasing squirrels.

To unite the conventional-minded, an ideology must have many of the features of a religion. In particular it must have strict and arbitrary rules that adherents can demonstrate their purity by obeying, and its adherents must believe that anyone who obeys these rules is ipso facto morally superior to anyone who doesn't. [3]

In the late 1980s a new ideology of this type appeared in US universities. It had a very strong component of moral purity, and the aggressively conventional-minded seized upon it with their usual eagerness â€” all the more because the relaxation of social norms in the preceding decades meant there had been less and less to forbid. The resulting wave of intolerance has been eerily similar in form to the Cultural Revolution, though fortunately much smaller in magnitude. [4]

I've deliberately avoided mentioning any specific heresies here. Partly because one of the universal tactics of heretic hunters, now as in the past, is to accuse those who disapprove of the way in which they suppress ideas of being heretics themselves. Indeed, this tactic is so consistent that you could use it as a way of detecting witch hunts in any era.

And that's the second reason I've avoided mentioning any specific heresies. I want this essay to work in the future, not just now. And unfortunately it probably will. The aggressively conventional-minded will always be among us, looking for things to forbid. All they need is an ideology to tell them what. And it's unlikely the current one will be the last.

There are aggressively conventional-minded people on both the right and the left. The reason the current wave of intolerance comes from the left is simply because the new unifying ideology happened to come from the left. The next one might come from the right. Imagine what that would be like.

Fortunately in western countries the suppression of heresies is nothing like as bad as it used to be. Though the window of opinions you can express publicly has narrowed in the last decade, it's still much wider than it was a few hundred years ago. The problem is the derivative. Up till about 1985 the window had been growing ever wider. Anyone looking into the future in 1985 would have expected freedom of expression to continue to increase. Instead it has decreased. [5]

The situation is similar to what's happened with infectious diseases like measles. Anyone looking into the future in 2010 would have expected the number of measles cases in the US to continue to decrease. Instead, thanks to anti-vaxxers, it has increased. The absolute number is still not that high. The problem is the derivative. [6]

In both cases it's hard to know how much to worry. Is it really dangerous to society as a whole if a handful of extremists refuse to get their kids vaccinated, or shout down speakers at universities? The point to start worrying is presumably when their efforts start to spill over into everyone else's lives. And in both cases that does seem to be happening.

So it's probably worth spending some amount of effort on pushing back to keep open the window of free expression. My hope is that this essay will help form social antibodies not just against current efforts to suppress ideas, but against the concept of heresy in general. That's the real prize. How do you disable the concept of heresy? Since the Enlightenment, western societies have discovered many techniques for doing that, but there are surely more to be discovered.

Overall I'm optimistic. Though the trend in freedom of expression has been bad over the last decade, it's been good over the longer term. And there are signs that the current wave of intolerance is peaking. Independent-minded people I talk to seem more confident than they did a few years ago. On the other side, even some of the leaders are starting to wonder if things have gone too far. And popular culture among the young has already moved on. All we have to do is keep pushing back, and the wave collapses. And then we'll be net ahead, because as well as having defeated this wave, we'll also have developed new tactics for resisting the next one.

Notes

[1] Or more accurately, biographies of Newton, since Westfall wrote two: a long version called *Never at Rest* , and a shorter one called *The Life of Isaac Newton* . Both are great. The short version moves faster, but the long one is full of interesting and often very funny details. This passage is the same in both.

[2] Another more subtle but equally damning bit of evidence is that claims of x-ism are never qualified. You never hear anyone say that a statement is "probably x-ist" or "almost certainly y-ist." If claims of x-ism were actually claims about truth, you'd expect to see "probably" in front of "x-ist" as often as you see it in front of "fallacious."

[3] The rules must be strict, but they need not be demanding. So the most effective type of rules are those about superficial matters, like doctrinal minutiae, or the precise words adherents must use. Such rules can be made extremely complicated, and yet don't repel potential converts by requiring significant sacrifice.

The superficial demands of orthodoxy make it an inexpensive substitute for virtue. And that in turn is one of the reasons orthodoxy is so attractive to bad people. You could be a horrible person, and yet as long as you're orthodox, you're better than everyone who isn't.

[4] Arguably there were two. The first had died down somewhat by 2000, but was followed by a second in the 2010s, probably caused by social media.

[5] Fortunately most of those trying to suppress ideas today still respect Enlightenment principles enough to pay lip service to them. They know they're not supposed to ban ideas per se, so they have to recast the ideas as causing "harm," which sounds like something that can be banned. The more extreme try to claim speech itself is violence, or even that silence is. But strange as it may sound, such gymnastics are a good sign. We'll know we're really in trouble when they stop bothering to invent pretenses for banning ideas â€" when, like the medieval church, they say "Damn right we're banning ideas, and in fact here's a list of them."

[6] People only have the luxury of ignoring the medical consensus about vaccines because vaccines have worked so well. If we didn't have any vaccines at all, the mortality rate would be so high that most current anti-vaxxers would be begging for them. And the situation with freedom of expression is similar. It's only because they live in a world created by the Enlightenment that kids from the suburbs can play at banning ideas.

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Putting Ideas into Words

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Writing about something, even something you know well, usually shows you that you didn't know it as well as you thought. Putting ideas into words is a severe test. The first words you choose are usually wrong; you have to rewrite sentences over and over to get them exactly right. And your ideas won't just be imprecise, but incomplete too. Half the ideas that end up in an essay will be ones you thought of while you were writing it. Indeed, that's why I write them.

Once you publish something, the convention is that whatever you wrote was what you thought before you wrote it. These were your ideas, and now you've expressed them. But you know this isn't true. You know that putting your ideas into words changed them. And not just the ideas you published. Presumably there were others that turned out to be too broken to fix, and those you discarded instead.

It's not just having to commit your ideas to specific words that makes writing so exacting. The real test is reading what you've written. You have to pretend to be a neutral reader who knows nothing of what's in your head, only what you wrote. When he reads what you wrote, does it seem correct? Does it seem complete? If you make an effort, you can read your writing as if you were a complete stranger, and when you do the news is usually bad. It takes me many cycles before I can get an essay past the stranger. But the stranger is rational, so you always can, if you ask him what he needs. If he's not satisfied because you failed to mention x or didn't qualify some sentence sufficiently, then you mention x or add more qualifications. Happy now? It may cost you some nice sentences, but you have to resign yourself to that. You just have to make them as good as you can and still satisfy the stranger.

This much, I assume, won't be that controversial. I think it will accord with the experience of anyone who has tried to write about anything nontrivial. There may exist people whose thoughts are so perfectly formed that they just flow straight into words. But I've never known anyone who could do this, and if I met someone who said they could, it would seem evidence of their limitations rather than their ability. Indeed, this is a trope in movies: the guy who claims to have a plan for doing some difficult thing, and who when questioned further, taps his head and says "It's all up here." Everyone watching the movie knows what that means. At best the plan is vague and incomplete. Very likely there's some undiscovered flaw that invalidates it completely. At best it's a plan for a plan.

In precisely defined domains it's possible to form complete ideas in your head. People can play chess in their heads, for example. And mathematicians can do some amount of math in their heads, though they don't seem to feel sure of a proof over a certain length till they write it down. But this only seems possible with ideas you can express in a formal language. [1] Arguably what such people are doing is putting ideas into words in their heads. I can to some extent write essays in my head. I'll sometimes think of a paragraph while walking or lying in bed that survives nearly unchanged in the final version. But really I'm writing when I do this. I'm doing the mental part of writing; my fingers just aren't moving as I do it. [2]

You can know a great deal about something without writing about it. Can you ever know so much that you wouldn't learn more from trying to explain what you know? I don't think so. I've written about at least two subjects I know well â€” Lisp hacking and startups â€” and in both cases I learned a lot from writing about them. In both cases there were things I didn't consciously realize till I had to explain them. And I don't think my experience was anomalous. A great deal of knowledge is unconscious, and experts have if anything a higher proportion of unconscious knowledge than beginners.

I'm not saying that writing is the best way to explore all ideas. If you have ideas about architecture, presumably the best way to explore them is to build actual buildings. What I'm saying is that however much you learn from exploring ideas in other ways, you'll still learn new things from writing about them.

Putting ideas into words doesn't have to mean writing, of course. You can also do it the old way, by talking. But in my experience, writing is the stricter test. You have to commit to a single, optimal sequence of words. Less can go unsaid when you don't have tone of voice to carry meaning. And you can focus in a way that would seem excessive in conversation. I'll often spend 2 weeks on an essay and reread drafts 50 times. If you did that in conversation it would seem evidence of some kind of mental disorder. If you're lazy, of course, writing and talking are equally useless. But if you want to push yourself to get things right, writing is the steeper hill. [3]

The reason I've spent so long establishing this rather obvious point is that it leads to another that many people will find shocking. If writing down your ideas always makes them more precise and more complete, then no one who hasn't written about a topic has fully formed ideas about it. And someone who never writes has no fully formed ideas about anything nontrivial.

It feels to them as if they do, especially if they're not in the habit of critically examining their own thinking. Ideas can feel complete. It's only when you try to put them into words that you discover they're not. So if you never subject your ideas to that test, you'll not only never have fully formed ideas, but also never realize it.

Putting ideas into words is certainly no guarantee that they'll be right. Far from it. But though it's not a sufficient condition, it is a necessary one.

Notes

[1] Machinery and circuits are formal languages.

[2] I thought of this sentence as I was walking down the street in Palo Alto.

[3] There are two senses of talking to someone: a strict sense in which the conversation is verbal, and a more general sense in which it can take any form, including writing. In the limit case (e.g. Seneca's letters), conversation in the latter sense becomes essay writing.

It can be very useful to talk (in either sense) with other people as you're writing something. But a verbal conversation will never be

more exacting than when you're talking about something you're writing.

Thanks to Trevor Blackwell, Patrick Collison, and Robert Morris for reading drafts of this.

Is There Such a Thing as Good Taste?

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(This essay is derived from a talk at the Cambridge Union.)

When I was a kid, I'd have said there wasn't. My father told me so. Some people like some things, and other people like other things, and who's to say who's right?

It seemed so obvious that there was no such thing as good taste that it was only through indirect evidence that I realized my father was wrong. And that's what I'm going to give you here: a proof by reductio ad absurdum. If we start from the premise that there's no such thing as good taste, we end up with conclusions that are obviously false, and therefore the premise must be wrong.

We'd better start by saying what good taste is. There's a narrow sense in which it refers to aesthetic judgements and a broader one in which it refers to preferences of any kind. The strongest proof would be to show that taste exists in the narrowest sense, so I'm going to talk about taste in art. You have better taste than me if the art you like is better than the art I like.

If there's no such thing as good taste, then there's no such thing as good art . Because if there is such a thing as good art, it's easy to tell which of two people has better taste. Show them a lot of works by artists they've never seen before and ask them to choose the best, and whoever chooses the better art has better taste.

So if you want to discard the concept of good taste, you also have to discard the concept of good art. And that means you have to discard the possibility of people being good at making it. Which means there's no way for artists to be good at their jobs. And not just visual artists, but anyone who is in any sense an artist. You can't have good actors, or novelists, or composers, or dancers either. You can have popular novelists, but not good ones.

We don't realize how far we'd have to go if we discarded the concept of good taste, because we don't even debate the most obvious cases. But it doesn't just mean we can't say which of two famous painters is better. It means we can't say that any painter is better than a randomly chosen eight year old.

That was how I realized my father was wrong. I started studying painting. And it was just like other kinds of work I'd done: you could do it well, or badly, and if you tried hard, you could get better at it. And it was obvious that Leonardo and Bellini were much better at it than me. That gap between us was not imaginary. They were so good. And if they could be good, then art could be good, and there was such a thing as good taste after all.

Now that I've explained how to show there is such a thing as good taste, I should also explain why people think there isn't. There are two reasons. One is that there's always so much disagreement about taste. Most people's response to art is a tangle of unexamined impulses. Is the artist famous? Is the subject attractive? Is this the sort of art they're supposed to like? Is it hanging in a famous museum, or reproduced in a big, expensive book? In practice most people's response to art is dominated by such extraneous factors.

And the people who do claim to have good taste are so often mistaken. The paintings admired by the so-called experts in one generation are often so different from those admired a few generations later. It's easy to conclude there's nothing real there at all. It's only when you isolate this force, for example by trying to paint and comparing your work to Bellini's, that you can see that it does in fact exist.

The other reason people doubt that art can be good is that there doesn't seem to be any room in the art for this goodness. The argument goes like this. Imagine several people looking at a work of art and judging how good it is. If being good art really is a property of objects, it should be in the object somehow. But it doesn't seem to be; it seems to be something happening in the heads of each of the observers. And if they disagree, how do you choose between them?

The solution to this puzzle is to realize that the purpose of art is to work on its human audience, and humans have a lot in common. And to the extent the things an object acts upon respond in the same way, that's arguably what it means for the object to have the corresponding property. If everything a particle interacts with behaves as if the particle had a mass of m , then it has a mass of m . So the distinction between "objective" and "subjective" is not binary, but a matter of degree, depending on how much the subjects have in common. Particles interacting with one another are at one pole, but people interacting with art are not all the way at the other; their reactions aren't *random* .

Because people's responses to art aren't random, art can be designed to operate on people, and be good or bad depending on how effectively it does so. Much as a vaccine can be. If someone were talking about the ability of a vaccine to confer immunity, it would seem very frivolous to object that conferring immunity wasn't really a property of vaccines, because acquiring immunity is something that happens in the immune system of each individual person. Sure, people's immune systems vary, and a vaccine that worked on one might not work on another, but that doesn't make it meaningless to talk about the effectiveness of a vaccine.

The situation with art is messier, of course. You can't measure effectiveness by simply taking a vote, as you do with vaccines. You have to imagine the responses of subjects with a deep knowledge of art, and enough clarity of mind to be able to ignore extraneous influences like the fame of the artist. And even then you'd still see some disagreement. People do vary, and judging art is hard, especially recent art. There is definitely not a total order either of works or of people's ability to judge them. But there is equally definitely a partial order of both. So while it's not possible to have perfect taste, it is possible to have good taste.

Thanks to the Cambridge Union for inviting me, and to Trevor Blackwell, Jessica Livingston, and Robert Morris for reading drafts of this.

Beyond Smart

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If you asked people what was special about Einstein, most would say that he was really smart. Even the ones who tried to give you a more sophisticated-sounding answer would probably think this first. Till a few years ago I would have given the same answer myself. But that wasn't what was special about Einstein. What was special about him was that he had important new ideas. Being very smart was a necessary precondition for having those ideas, but the two are not identical.

It may seem a hair-splitting distinction to point out that intelligence and its consequences are not identical, but it isn't. There's a big gap between them. Anyone who's spent time around universities and research labs knows how big. There are a lot of genuinely smart people who don't achieve very much.

I grew up thinking that being smart was the thing most to be desired. Perhaps you did too. But I bet it's not what you really want. Imagine you had a choice between being really smart but discovering nothing new, and being less smart but discovering lots of new ideas. Surely you'd take the latter. I would. The choice makes me uncomfortable, but when you see the two options laid out explicitly like that, it's obvious which is better.

The reason the choice makes me uncomfortable is that being smart still feels like the thing that matters, even though I know intellectually that it isn't. I spent so many years thinking it was. The circumstances of childhood are a perfect storm for fostering this illusion. Intelligence is much easier to measure than the value of new ideas, and you're constantly being judged by it. Whereas even the kids who will ultimately discover new things aren't usually discovering them yet. For kids that way inclined, intelligence is the only game in town.

There are more subtle reasons too, which persist long into adulthood. Intelligence wins in conversation, and thus becomes the basis of the dominance hierarchy. [1] Plus having new ideas is such a new thing historically, and even now done by so few people, that society hasn't yet assimilated the fact that this is the actual destination, and intelligence merely a means to an end. [2]

Why do so many smart people fail to discover anything new? Viewed from that direction, the question seems a rather depressing one. But there's another way to look at it that's not just more optimistic, but more interesting as well. Clearly intelligence is not the only ingredient in having new ideas. What are the other ingredients? Are they things we could cultivate?

Because the trouble with intelligence, they say, is that it's mostly inborn. The evidence for this seems fairly convincing, especially considering that most of us don't want it to be true, and the evidence thus has to face a stiff headwind. But I'm not going to get into that question here, because it's the other ingredients in new ideas that I care about, and it's clear that many of them can be cultivated.

That means the truth is excitingly different from the story I got as a kid. If intelligence is what matters, and also mostly inborn, the natural consequence is a sort of *Brave New World* fatalism. The best you can do is figure out what sort of work you have an "aptitude" for, so that whatever intelligence you were born with will at least be put to the best use, and then work as hard as you can at it. Whereas if intelligence isn't what matters, but only one of several ingredients in what does, and many of those aren't inborn, things get more interesting. You have a lot more control, but the problem of how to arrange your life becomes that much more complicated.

So what are the other ingredients in having new ideas? The fact that I can even ask this question proves the point I raised earlier â€” that society hasn't assimilated the fact that it's this and not intelligence that matters. Otherwise we'd all know the answers to such a fundamental question. [3]

I'm not going to try to provide a complete catalogue of the other ingredients here. This is the first time I've posed the question to myself this way, and I think it may take a while to answer. But I wrote recently about one of the most important: an obsessive interest in a particular topic. And this can definitely be cultivated.

Another quality you need in order to discover new ideas is independent-mindedness. I wouldn't want to claim that this is distinct from intelligence â€” I'd be reluctant to call someone smart who wasn't independent-minded â€” but though largely inborn, this quality seems to be something that can be cultivated to some extent.

There are general techniques for having new ideas â€” for example, for working on your own projects and for overcoming the obstacles you face with early work â€” and these can all be learned. Some of them can be learned by societies. And there are also collections of techniques for generating specific types of new ideas, like startup ideas and essay topics.

And of course there are a lot of fairly mundane ingredients in discovering new ideas, like working hard, getting enough sleep, avoiding certain kinds of stress, having the right colleagues, and finding tricks for working on what you want even when it's not what you're supposed to be working on. Anything that prevents people from doing great work has an inverse that helps them to. And this class of ingredients is not as boring as it might seem at first. For example, having new ideas is generally associated with youth. But perhaps it's not youth per se that yields new ideas, but specific things that come with youth, like good health and lack of responsibilities. Investigating this might lead to strategies that will help people of any age to have better ideas.

One of the most surprising ingredients in having new ideas is writing ability. There's a class of new ideas that are best discovered by writing essays and books. And that "by" is deliberate: you don't think of the ideas first, and then merely write them down. There is a kind of thinking that one does by writing, and if you're clumsy at writing, or don't enjoy doing it, that will get in your way if you try to do this kind of thinking. [4]

I predict the gap between intelligence and new ideas will turn out to be an interesting place. If we think of this gap merely as a measure of unrealized potential, it becomes a sort of wasteland we try to hurry through with our eyes averted. But if we flip the question, and start inquiring into the other ingredients in new ideas that it implies must exist, we can mine this gap for discoveries about discovery.

Notes

[1] What wins in conversation depends on who with. It ranges from mere aggressiveness at the bottom, through quick-wittedness in the middle, to something closer to actual intelligence at the top, though probably always with some component of quick-wittedness.

[2] Just as intelligence isn't the only ingredient in having new ideas, having new ideas isn't the only thing intelligence is useful for. It's also useful, for example, in diagnosing problems and figuring out how to fix them. Both overlap with having new ideas, but both have an end that doesn't.

Those ways of using intelligence are much more common than having new ideas. And in such cases intelligence is even harder to distinguish from its consequences.

[3] Some would attribute the difference between intelligence and having new ideas to "creativity," but this doesn't seem a very useful term. As well as being pretty vague, it's shifted half a frame sideways from what we care about: it's neither separable from intelligence, nor responsible for all the difference between intelligence and having new ideas.

[4] Curiously enough, this essay is an example. It started out as an essay about writing ability. But when I came to the distinction between intelligence and having new ideas, that seemed so much more important that I turned the original essay inside out, making that the topic and my original topic one of the points in it. As in many other fields, that level of reworking is easier to contemplate once you've had a lot of practice.

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Weird Languages

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When people say that in their experience all programming languages are basically equivalent, they're making a statement not about languages but about the kind of programming they've done.

99.5% of programming consists of gluing together calls to library functions. All popular languages are equally good at this. So one can easily spend one's whole career operating in the intersection of popular programming languages.

But the other .5% of programming is disproportionately interesting. If you want to learn what it consists of, the weirdness of weird languages is a good clue to follow.

Weird languages aren't weird by accident. Not the good ones, at least. The weirdness of the good ones usually implies the existence of some form of programming that's not just the usual gluing together of library calls.

A concrete example: Lisp macros. Lisp macros seem weird even to many Lisp programmers. They're not only not in the intersection of popular languages, but by their nature would be hard to implement properly in a language without turning it into a dialect of Lisp. And macros are definitely evidence of techniques that go beyond glue programming. For example, solving problems by first writing a language for problems of that type, and then writing your specific application in it. Nor is this all you can do with macros; it's just one region in a space of program-manipulating techniques that even now is far from fully explored.

So if you want to expand your concept of what programming can be, one way to do it is by learning weird languages. Pick a language that most programmers consider weird but whose median user is smart, and then focus on the differences between this language and the intersection of popular languages. What can you say in this language that would be impossibly inconvenient to say in others? In the process of learning how to say things you couldn't previously say, you'll probably be learning how to think things you couldn't previously think.

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