A Few Thoughts on Confirmation

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Dedicated to the Kiwi Farms

I want to make clear my use of confirmation, and its relation to my understanding of theoretical models.

I will first say what I mean by the word “confirmation”. It is the process by which an internally held personal model, of something you keep to yourself, and which offers suggestion or hints at a belief without otherwise providing proof, becomes supported by later findings, observations, or ideas that vibe with it.

In my own studies I will frequently rely upon the formula “suspect first, confirm later”. With my reading I will recall certain ideas about such and such topics that I cannot otherwise prove, but that I am beginning to firmly believe for myself. I then seek out, consciously or not, certain confirming evidence for my internal model.

But herein lies a danger: if one seeks confirmation, one will inevitably find it. The very act of framing a question presupposes a certain interpretive structure that colors the answers we allow ourselves to see. We all make these kinds of mistaken assumptions in our thinking, and here I'd like to express a few concerns related to this kind of epistemological problem.

My view is this: whenever we seek an explanation for any natural kind, we are bound to find one, by virtue of the fact that the nature of answering questions necessarily yields a consequence aligned with what is sought. Every narrative we could devise in description of the tabled facts could work, in theory, given a few other concerns related to the philosophy of science, of which I will not delve into here, other than to briefly name the concepts of consistency, consilience, coherence, and concision. Scientific truth is recognition of what the actual state of nature is and how man may know it, not what is theoretically possible.

I have outlined my thoughts below.

Our Vague A Priori General Expectations for Desired Outcomes

We inherit, by our nature, a set of dispositions, assumptions or habits, that frame our expectations. Our knowledge too is a natural composition; we receive a series of pre-established conditions that have formed over a long line of interlinking things; a great chain of being you might call it. We will forever find ourselves in relation to the places we came from, the context we live in, and our being in relation to the whole rest of becoming existence.

The former U.S. Secretary of Defense Donald Rumsfeld has an excellent take on the epistemological situation inherent with such a position, that being the relationship between known things and unknown things. The result is a four part model: of known knowns, known unknowns, unknown knowns, and unknown unknowns. Knowledge works in exactly such a way, and our inheritance plays a deep role here as relates to the way we like to make assumptions about how we imagine what we both know and don't know.

One of these assumptions is that we know what we want, and that when we receive that thing it will be recognizable as such. What we imagine we know is small compared to what we don't know, and that itself is insignificant compared to all the things that we will never know. Perhaps our answer lies there, in the land of unknown unknowables!

Of course we, the quite lucky individuals that we are, get the convenience of an assumption: this being that our answer wont be an unknown unknowable, and that we, even if not yet but soon, will have in our possession the thing that we are desirous of. This is an assumption, and what I refer to when I reference “a priori expectations”. This “naive realistic” position I attribute to science.

For these reasons, and many unmentioned others, we carry natural biases into all the work we do, and we will never be free of it. These internal, but otherwise natural, biases incline us toward certain interpretations or models of reality in ways that we will probably never recognize. Notice, also, how the above discussion relates to desire, and the never ending torment related to dissatisfaction with a self that is already complete.

Confirmation Bias

Having stated the natural cause for the establishment of internal biases, I would now like to turn to the social, cultural, or otherwise external reasons for bias in scientific work. These, unlike our natural biases, are more easily accounted for and adjusted to by the inquiring scientist.

Man's cultural inheritance is a powerful sociological selection filter that reinforces certain fashionable consensus and decides what makes publicly acceptable behavior, like the politics of personal action, for example. An easy, but altogether low-hanging fruit would be Da Vinci's work on human anatomy by way of deceased corpses, and could serve as illustration here. The sociocultural aspects of science, while not being its most important factor during operation, nonetheless tremendously affects the status and flow of everyday science. We all are impressed by immense social pressures to conform, and the consequences for not doing so are severe and devastating.

The scientist, and despite the ideal of objectivity from some, is not immune to these kinds of concerns. Like any other individual, they are embedded in a community whose shared assumptions and intellectual taboos can quietly but otherwise quite overtly guide their judgments and testimony. We receive, in addition to our genetic complement, an array of socially enforced norms that already decide the appropriate behaviors in human life, both public and private.

This is where confirmation bias, an insidious subversive and saboteur, works its way into the cultural interrelationship with science. Nobody wants to “rock the boat” or be seen as the one doing or advocating for such. Societies use strong social mechanisms to guide normative behavior and these frameworks are rarely neutral. They carry with them assumptions, values, and invisible prohibitions, usually guided by some kind of planned agenda.

To conclude this section, I'll briefly refer to Charles Sanders Peirce’s essay *The Fixation of Belief*, which tells us how belief is not just the outcome of reasoned inquiry, but often emerges through other methods, like tenacity, authority, and social conformity. These serve to influence science by force rather than honest open investigation. Peirce reminds us that even our most seemingly rational convictions may owe more to enforced confirmation than to correctness in the scientific explication of nature.

The Convincing Effect of Subsequently found Confirming Evidence

Once a thesis feels personally, communally, or intellectually satisfying, or perhaps when used as a cudgel during engagements between opposed political forces during their endless struggle, subsequent confirming data gains extra emotional and explanatory weight: far beyond its actual evidential or theoretically useful value.

This is dangerous to the process of science and the conduct of its application, and can easily begin to dip into tyrannical ideology. Confirmation can strengthen our models only in proportion to the quality and independence of the evidence, not proportionally to our prior attachment or political convenience. Yet we often adopt confirmation as a kind of lever for satisfying our own goals, playing us deeper into illusion rather than actual theoretical robustness.

it’s subtle: it will be an agreement aligned with your own belief, however irrational. What confirmation does, on a deeper, personal level, is to beguile you into believing you have control. It seduces your intellect into thinking that you’ve discovered the ultimate truth: the secret that no one else saw. The more your surroundings echo it, the stronger its grip becomes, and you'll begin to see evidence everywhere.

Beliefs go viral not because they’re true, but because they confirm what people want to be true. Once an idea starts spreading, each new voice that repeats it becomes evidence. It's not independent proof, just repetition. The more people agree, the more correct something feels, even if it’s completely wrong.

The scientific public can be just as easily taken by these kinds of mimetic epidemics, and combined with the environmental strength of ideology backed by cultural norms, scientists themselves can get caught up in this with very little way of reliably verifying what's going on.

And often, when researchers become disillusioned or otherwise dissatisfied with their work, maybe due to the conditions described above, they will turn to other avenues not necessarily more rigorous, but more rewarding in a different way. They become communicators.

How Scientific Education Affects Expectations

Science communication today is increasingly focused on educating the public: clarifying scientific opinion, dispelling misinformation, and making research accessible across various media. This cultural role positions communicators not just as messengers but as mediators between complex systems of knowledge and lay understanding. Yet in this translation process, expectations are often reshaped. Communicators, intentionally or not, can present science as cleaner, more certain, and better known than it really is. The immense history and breadth of scientific thought becomes reduced to little toys. They claim certainty over things they could never know, and open questions are framed as nearly resolved. They also, by taking up public space, edge out opinions from other content creators, thereby bottlenecking the sources of information available to an audience.

In doing this, communicators may foster in the public a false sense of foundation: that science always knows what it's doing, that answers are imminent, and that progress is straightforward. When anomalies appear, or when knowledge shifts (as it must), the trust once given can quickly unravel. People feel misled, not because the science was wrong, but because the expectations were never honestly framed in the first place. Average lay people are offered a false sense of community, one in which they really have no place. If things ever did go sour, there might be a strong inclination by followers to cling to these communities, if for nothing else but lack of other developed options.

Our education, especially that in young childhood, very deeply affects us and steers young students into certain ways of thinking inherited from a previous generation. They, our teachers, and nowadays we can count communicators as teaching a significant portion of adult education, inform us of what they know, not necessarily because it's the truth, but because it's all they do know, and that they couldn't know any other way, nor would they necessarily be interested in trying to find some other way, or for upsetting the sense of consensus achieved by repeating the narrative. Teachers are not researchers, and they do not care much for really thinking about the problems at hand, but instead seem to enjoy repeating already accepted fact. We have no way of tabling anything other than what is taught, if only for the lack of accepted options and a platform from which to present them.

Institutional academia provides tools for rigorous study, but also steers students along pre-described lines of thought, this time within a phylogeny of scientific traditions. The paradigms one finds oneself in are rarely questioned until they are no longer useful, and by then the cost of revolution is high. Scientific learning doesn’t just convey knowledge; it sets perception within paradigmatic intellectual traditions. Truly radical ideas may be discouraged because it disrupts the otherwise gentle waters of the status-quo. As Kuhn observed, paradigm shifts occur not because of falsification alone, but because anomalies accumulate until a new frame is irresistible.

An understanding of physics has the strongest claim, so they say, to the tightly interrelated and most reliable control mechanism in the scientific world: that of causality.

The Relationship between Confirmation and Causality

Causality describes the direct linkage between events: something happens, and as a result, something else follows. It is also usually taken to mean physical causality: that when, in the Newtonian sense, a bouncy ball ricochets against the floor, or from a new physics perspective they could be seen as interacting fields or probabilistic waves collapsing into particle events upon observation. There is a probabilistic interpretation, but I dislike those models so we will ignore them here.

In such a framework, confirmation is straightforward: our predictions based on known causal laws hopefully match the results we observe, and we take this alignment as confirmation of our understanding. That is, when, as a result of interaction, A produces B, and B consistently follows A, we gain confidence in the causal model through repeated success in description and prediction. Here, causation is both the basis of knowledge and the justification of it. Scientific models that produce successful predictions, especially in linear systems, are confirmed not just by their coherence, but by their utility.

Biological systems often resist interpretations of linear causality. Those relationships between cause and effect are mediated by feedback loops, emergent structures, and interdependent variables. A gene does not simply cause a trait; it interacts with a network of other genes, environmental conditions, and stochastic processes, not to mention the influence from a living agent. In this nonlinear theoretical landscape, confirmation becomes more elusive, not because causality disappears, but because its action operates within a complex web of chance and contingencies.

Confirmation can be achieved in alignment with causality, both linear and nonlinear, when it extends to successful prediction. When our causal models yield correct predictions, they gain epistemic weight, not only as descriptions of the past or historical events but as reliable guides to the future. This transition from understanding causality to forming predictions is not trivial. The capacity of any theory lies in its ability to transform causal insight into predictive power for explanation.

The Relationship between Confirmation and Prediction

Your confirmation is apparently sound if it fits with all past observations and empirically gathered data existing in your system. Ideally you would like to get several accurate indicators signaling from different diverse sources, aiming for consistency and alignment with present theory. Yet this consistency must be differentiated from mere tautology or overfitting. A predictive model that always yields a “yes” answer is inert.

A confirmatory instance can further enable us to predict other novel results, which are themselves confirmed in the context that accepts that explanation. When a thesis generates new predictions that are later confirmed, it deepens its credibility within context. Each successful extension reinforces the original explanation, creating a self-sustaining cycle of theory, prediction, and confirmation.

Falsification serves as a circuit-breaker here for epistemic systems that otherwise would have no way of self correcting. Without it, a theory could absorb any explanatory framework and provide any reasoning for contradictory logic, becoming immune to error and insulated from reality: dipping into personal illusion. It draws the line between belief and knowledge, of what can be tested and then disproven. Be warned, however, that falsification provides no recourse for those wishing to find a grounding and justification for the origin of hypothesis. It only serves to challenge theory.

A theory that continues to predict outcomes correctly, while withstanding falsification, and in unifying a variety of diverse data and theoretical structures, is corroborated between those empirically gathered interdisciplinary data points. In addition, a concise methodology is incredibly important in working through this complex. Concision is the economy of explanation: the ability of a thesis to create detailed descriptions with short statements. A concise theory does not sprawl, it condenses overextended positions into simple principles. When such predictions are confirmed, its elegance becomes evidentiary. A theory of this kind can produce testable questions and is able to interpret an answer, or will have answers ready and waiting for experimental evidence.

Testable possibility, shaped by prior confirmations and constrained by falsifiability, is not yet knowledge, but it is a hypothesis.

The Relationship with Confirmation between Hypothesis and Verification

Finding any single piece of evidence in favor of a hypothesis is easy, and it is possible to become deluded by this state of confirmation. This is the trap of shallow confirmation, where a theory feels verified simply because it has not yet been challenged. A convergence of evidence from independent sources, diverse methods, and distinct contexts is required to confirm a hypothesis.

True confirmation is achieved not through singular supportive instances, but through consilience: a holistic interrelation of evidence across diverse domains, independent methods, and unrelated contexts. When different lines of inquiry, unaware of one another, all point to the same conclusion, this confirmation will not only carry weight, but will come with a theoretical structure backing it.

The justification for consilience is not just as a methodological safeguard to the generation of hypothesis, it is a psychological necessity. Human cognition is deeply susceptible to confirmation bias, the tendency to seek, interpret, and remember information that supports preexisting beliefs.

The Psychology of Confirmation

We, human beings, are deeply connected with the work that we do. Our emotions and personal feelings are one and the same with the day to day life of the practicing scientist. We couldn't work under traumatic conditions, for example, and the shining sun makes things run a little smoother.

Obviously, because of this, we also suffer from the ills of social society: the lying and backstabbing and fighting common to all of other parts of life. We constantly seek to one-up another, working out a win to prove the correctness of one's own theory, to show rivals wrong, or to repay old grievances. Norbert Wiener, emotionally upset and willing to take his conflict over an unreceived award to the committee itself, died of a heart attack on the steps of the Royal Institute of Technology. These things are important to us.

The feeling of being right is often mistaken with actually being right. We like to hear what others think when it agrees with us, and we seek consensus, especially from respected peers. Even when we are wrong, the reassurance from our colleagues is a soothing relief, and one can fabricate a coherent argument for anything from this fabric made of very comfortable cognitive dissonance and bias.

The human mind finds comfort in coherence. The feeling of “being right” is often mistaken for actually being right. It is entirely likely that “incoherent” models are perfectly acceptable scientifically, and are yet unpleasant to mine or anybody's sensibilities. We would have no way, or no easy way, of knowing such a thing.

Uncertainty is uncomfortable to us, and it may drive us to find closure with confirmation of something already believed but otherwise argumentatively faulty.

To practice good science, and to avoid cheap thinking, is to live with the discomfort of the unconfirmed. To hold ideas loosely, to suspect what you trust most, and to let your own opinion guide you, are not mere notions.

When I look over the edge at a pool of water, I am what I see for myself.