

Probabilistic Claiming as Meta-Comparative Practice

Alexander Porto | 2025

This essay recasts Sellars' account of probability in terms of Bayesian inference to exercise a method for comparing theories that constitute our conceptual scheme. I argue against the view that we possess multiple conceptual schemes in competition. Instead, I propose that we are in possession of a single conceptual scheme with a two-sided structure. On one side are our prior beliefs, authorized through scientific practice. On the other side lies the possibility that our framework might be challenged by posteriorly available evidence. This generates a danger of scepticism between these sides: if we have good reasons for our current doxastic commitments, then we ought to endorse them; but if we recognize that our conceptual scheme may require revision, then why should we commit to it now? I argue that our conceptual scheme is historically developing and holistically singular, and that the theories that compose it ought to be robustly compared through a framework of conceptual change grounded in a Sellarsian version of Bayesian inductive inference. I aim to leverage Sellarsian probability, reframed in Bayesian terms, to show that epistemic modesty toward probability arguments helps us avoid this danger.

Keywords: Sellars; probability; Bayesian inference; pragmatics; epistemic modesty

Introduction

1. A substantial aspect of Wilfrid Sellars' work is an attempt to understand how our conceptual scheme—our organized system of theoretical knowledge—serves as an intelligible image of a non-conceptual reality, a reality independent of our discursive practices. It is a question that Sellars inherited from Kant's distinction between the world of appearances and the world as it is in itself. For Kant, the latter is knowable only through a transcendental semantics beyond our reach; by contrast, Sellars naturalizes the distinction and advocates that the knowability between reality and our conceptual scheme is something within reach, and takes it that the knowability of this relation is possible through natural science (Sellars, 1958: SM V. §§67-69).¹ Sellars—following C.S. Peirce—is committed to natural science pragmatically improving upon its knowledge until its theories converge on an ideal conceptual scheme and no longer require modification (Sellars, 1958: SM V. §95). The underlying motivation is to

¹ Reference to Sellars follows the standard abbreviation format and is referenced differently than secondary sources. See: <https://www.wilfridsellars.org/abbreviations>

establish ideal picturing relations that progressively update our conceptual scheme in favour of more adequate pictures of reality (O'Shea, 2007).

2. However, Sellars offers only a blueprint for understanding how we should go about updating our picture of reality toward ideal ends: we are left to build up the scaffolding for making an ideal conceptual scheme intelligible. An outstanding problematic in Sellars' account is that the manner in which theories ought to (retrospectively and prospectively) converge is inexplicit. That is, if theories are in competition to one another (say, ongoing debates about the undecidability of the Continuum Hypothesis in contemporary set theory),² then how ought these theories converge into our unified conceptual scheme? Thus, the motivation of this work is to suggest that probabilistic claiming pragmatically plays a fundamental role in the development of ideal conceptual knowledge through its comparative and meta-comparative force. In the following, I explain the function of probability as a meta-linguistic practice for comparing competing theories and learning in general.

3. I will defend the following argument:

- **Thesis:** Our conceptual scheme is holistically singular and historically developing. The theories that build up our conceptual scheme ought to be robustly compared through a framework of conceptual change based on a Sellarsian spin on the methods of Bayesian inductive inference. I argue that these claims ought to be thought together.
 - **Premise:** Probabilistic claiming underpins scientific knowledge and commonsense learning. Its structure is threefold: (a) commonsense probabilistic claiming, (b) scientific probabilistic claiming, and (c) probabilistic meta-comparative practice.
 - **Premise:** Probabilistic inference is a meta-linguistic practice that allows for the straightforward comparison of competing theories.

In **(I)**, I outline and develop Sellars' account of probability (primarily through his essays "Induction as Vindication" and "Counterfactuals, Dispositions, and the Causal Modalities") and show how Sellarsian probability aligns with Bayesian inference. I then suggest that the basic framework of Bayesian inference serves as a useful heuristic for explicating the function of probabilistic reasoning in Sellarsian terms. To show how

² cf. Pérez-Escobar, Rittberg, and Sarikaya (2024).

probabilistic knowledge underpins scientific and commonsense learning, I address Sellars' critique of looks-talk and reformulate his concerns in (II.). In (III.), I make a distinction between the Sellars-Bayes account of probability and expressive nonfactualist accounts of epistemic modality in order to show how we can see probabilistic inference can be both nonmonotonic and still picture the world. I conclude by elaborating a three-fold structure of probabilistic claiming in (IV.), and argue that we are obligated to a stance of epistemic modesty in our knowledge production practices.

I. Sellarsian Probability & Bayesian Inference

4. I advance a thesis to shed some light on what happens when we make probability statements. This includes everyday probability statements (*It will probably rain tonight*) and scientific probability statements (observational statistical arguments in support of a theory or set of theories and hypotheses). I will demonstrate that probabilistic statements are pragmatic epistemological claimings rather than ontological claims: Thus, pointing to probability is a way to justify beliefs and commitments to our conceptual scheme rather than a way of picturing reality, but that still keeps reality in view. Probability statements help us make explicit in the form of reasons what we take our beliefs to amount to, and voice how we take them to be central to our learning. For one to inferentially and inductively reason from probability to the world is to take a practical position to determine whether or not one ought to endorse a state of affairs, but without being deductively able to actually judge it to be so.

5. Sellars takes the core of probability to be a form of practical reasoning that results in three kinds of distinct but related outcomes: proximate, practical, and terminal (Sellars, 1964: IV §24, §42, §48). Proximate outcomes are justificatory first-order probability statements asserted on observational grounds; for example:

It will probably rain.

Practical outcomes—which correspond to proximate ones—are the result of reasoning processes that lead to the decision to accept, say, the probability of rain in light of the authorization of evidence; for example:

In light of the evidence (*e*), it is reasonable to accept that it will rain.

Therefore, I shall accept that it will rain.

Terminal outcomes take the form:

In light of the evidence (e), I am committed to the likelihood that it will rain. Therefore, I shall act in accordance with that commitment (say, by bringing an umbrella with me).

Terminal outcomes are the assertions of an hypothesis stating a rational sequence of events. For Sellars, terminal outcomes are the point (the ‘*end-in-view*’) of the inductive enterprise—rational practical reasoning, performed in a normative space of doxastic commitments, which gives us a way to accept or reject outcomes of probability claims in light of available evidence for ways the world is. Said differently, statements about proximate outcomes voice first-order propositions based on observation; likewise those about practical outcomes express the intention to accept or reject proximate outcomes, based on normative justification; and statements of terminal outcomes assert (successfully carry out) the intentions expressed by practical outcomes.

6. The three outcomes make it possible to vindicate induction. They (1) tie together interactions between outcomes inferentially derived from evidence, (2) enable one to obtain justified intentions, and (3) equip one pragmatically to act on those intentions with reason. However, this does not yet tell us how probability can be used to inductively develop inferential knowledge that pictures reality.

7. In order to play a role in scientific picturing, the three outcomes must also be framed as second-order probability arguments, transposed into a subjunctive conditional tone (Brandom, 2015). In particular, we must understand how statements of the form:

If p implies q , then one ought to accept *that- q* .

It is probable that p implies q .

I shall accept that p implies q .

So: p implies q .

So: *that- q* .

range over instances of singular observationally available empirical circumstances and become lawlike statements of the form:

that p implies q in C implies that the proposition p would obtain in $C^{(n+1, \dots)}$.³

³ Where each instance of $C^{(n+1)}$ stands for inductively inferred, future, and unobserved circumstances.

8. Sellars offers a preliminary account to satisfy this movement. The suggestion is that an accepted framework of evidence provides the ground rules for inductive inference. For example, from the proximate statement:

It is probable that p implies q in C .

moves to the practical reasoning:

There is a relevant body of evidence (e) such that if p implies q in C , then p would imply q in $C^{(n+1, \dots)}$.

that results in the practical outcome:

I shall accept that p would imply q in $C^{(n+1, \dots)}$.

that then provides the grounds for the terminal (assertable) outcome:

p implies q in $C^{(n+1, \dots)}$.

In my view, this does not add much to first-order probability arguments except that it makes relevant bodies of evidence—empirical reasons and practical commitments—explicit when endorsing an inferential inductive belief. According to Sellars, we also need a transposition of the form:

(In all probability) p implies q is true in a finite set of examined instances (E).

So: I shall accept that p implies q .

to:

E is a part of a framework of evidence φ .

That E is in φ makes it probable that p implies q would be true in a set of unexamined φ -type instances.

So: I shall accept (and act in accordance with) a proposition which satisfies the probability condition of an unexamined φ -type instance.

Such a distinction provides the outlines of a framework in which probability arguments are able to be read and asserted as lawlike statements, taking the form of terminal outcomes. This is the point in my argument where I improve upon Sellars' view of probability and contribute to ongoing work in the connection between having the world in view and epistemic modality. I will return to this in the final section of this work.

9. Sellars (1964) states:

For the end-in-view in nomological induction [...] is not the possession of empirical truth, but the realizing of a logically necessary condition of being in the very framework of explanation and prediction, i.e., being able to draw inferences

concerning the unknown and give explanatory accounts of the known. This end-in-view, unlike Reichenbach's end-in-view with respect to which he attempts to vindicate nomological induction, is something which can be known to obtain. (IV §62)

To grasp how the end-in-view of lawlike probability outcomes can be known to obtain, Sellars outlines a logical order of dependence among modes of probability: (P1) The probability of theories rests on (P2) the probability of practical outcomes and their corresponding terminal assertions, which rests on (P3) probability involved in the statistically inductive explanation of the composition of samples in terms of the composition of the relevant finite populations to which they belong (Sellars, 1964: IV §65-66).

The strategy is to show that P1—the probability of a theory—is part of an inductive dialectic: P1 claimings *take true* P2 practical reasoning which *makes true* P3 proximate probabilistic propositions; but every new P1 forms a new P3, to which scientific practice provides practical machinery for generating new P1 terminal outcomes. The point is that the inductive enterprise is a dynamic, processual state of doxastic commitments, subject to change over new sets of relevant evidence. For instance, when researchers in cognitive science developed new methods for testing Theory of Mind capacities in children on the Autism spectrum, new sets of evidence became available to facilitate improving our conceptual scheme. That improved set thereby allows further scientific practice to pragmatically investigate just what is going on when we attribute, say, mind-reading behaviour to young children. Importantly, such new investigation—new P1 terminal outcomes—is made available through engaging with practices that call our commitments into question.

10. However, Sellars omits an important, higher-order dependence relation in the order of probability: the probabilistically derived comparison of theories that results in lawlike statements, which rests on (P1)–(P3). That is, Sellarsian probability requires a *meta-comparative practical dimension* that allows for our conceptual scheme to be improved upon. The reason for this is that the explication of lawlike statements is a practical rule-governed activity that depends upon our discursive practices to be made intelligible. For, as I have articulated above, probability gives us nothing other than a justified doxastic position in the space of reasons. It is thereby necessary for a theory of probability to include a deontic framework to demonstrate how we should learn what to

believe, when beliefs ought to be modified, and, most importantly, how to update the conceptual scheme of the space of reasons itself. We need a framework that provides a way to reconcile apparently incompatible or contradictory P1 claims (i.e., theories that might be in competition with one another). For example, the P1 claiming that:

Water is boiling *implies* that water is at least at 100°C

and the P1 claiming that:

Water is boiling (at an altitude of 1829m) *implies* that water is at least at 94°C

Without a meta-comparative framework, we risk resting the outcomes of probability arguments on sophisticated but empty description, which I elaborate in (II.).

11. I would like to draw a distinction between probabilistic description and what I call *probabilistic claiming*, which is practically invested probabilistic activity (the apex of which, I suggest, is meta-comparative activity on the conceptual level). The distinction can be drawn straightaway: Probabilistic descriptions are abstract entities⁴ generated by (statistically robust) epistemic modal inference, instantiated through correlations derived from empirical observation. These are the statistical results of, say, a particular experiment.

Probabilistic claiming is contingent upon probabilistic description; by contrast, however, it plays a postulational role—rather than a merely descriptive one—in scientific activity. By postulational role, I refer to the practice of formalizing beliefs about unobservable circumstances or evidence derived from scientific practice and postulating a view of the world through those beliefs. Recognizing the practical dimension of what one is in a position to *do* with probabilistic description provides one

⁴ I assume familiarity with Sellars' account of abstract entities and point the reader to EAE and NS. Sellars states:

[Abstract entities] are linguistic entities. They are linguistic expressions. They are expressions, however, in a rarified sense, for they are distinguishable from the specific linguistic materials (sign designs) which embody them in historically given languages [...] ·red· is a type which is shared by the English word “red, the German word “rot” and the French word “rouge” (EAE §1).

Later, Sellars replaces types with kinds; in any case, abstract entities do not ‘exist’, for Sellars, in reality as it is in itself, independent of our thinking it. For, if sortals (·red·) corresponded to different objects, the sortals themselves would be different.

with the machinery necessary for postulating unobservable conceptual items—like physical laws—based on rational belief, eligible for further scientific examination. Without a practical dimension, conceptions of probability easily run the risk of confusing the foundation of our conceptual scheme: when we fail to realize that a rational theory of acceptance is *produced* by our practical activity, we take it for granted and believe that our practices have revealed something that we ourselves couldn't have produced: a picture of the world as it is independently of our thinking it.

12. But how does probabilistic claiming play a postulational role? Through seeing probability as practical activity: probability is not something that we discover as a part of the world, but rather a method for tying together our beliefs to the observable world in the space of reasons. For example, when meteorologists predict a 70% chance of rain, they are not describing the weather; they are giving us reasons for belief *about the world*, which inform our actions (say, bringing an umbrella with us).

Such practical activity is what enables our conceptual knowledge to reach lawlike ends, manifested as second-order terminal outcomes asserted in a shared space of reasons. That there is already a formal process for this practice—Bayesian inference—makes this less philosophically demanding. Before spelling this out, it is helpful to start with a toy model.

13. Suppose we knew nothing of the behaviour of water when heated. Suppose that, at some point in history, it became clear that when water was heated, we could do more with it (say, cook certain foods). So, we continue to heat water until it begins to bubble vigorously and is too hot to touch. Then, Jones comes along and invents a thermometer that can accurately measure the temperature of water while it is placed under heat. We test and retest heating the water and find that it reliably boils at 100°C after *n*-repetitions. Now, we have a ground-level scientific description of the behaviour of water:

At 100°C, water boils.

or:

Water at a temperature of 100°C *implies* that water boils (and the implication works conversely).

which is the lawlike version of the practical, normative, conditional commitment:

One should accept that water *would* boil *if* it were heated to 100°C.

14. Suppose James, a student of Jones, takes a community into the mountains, equipped with thermometers. They set up camp at an altitude of 1829m. After some time, James returns and expresses to Jones that he has discovered that:

At 94°C, water boils.

Surprised,⁵ they both try James' thermometers in the original location of Jones' discovery and find that water only boils at 100°C. They have a number of practical options, all of which have corresponding doxastic commitments:

1. Never return to the mountains and believe that the thermometers are broken, because in all other cases, water reliably boils at and only at 100°C.
 2. Return to the mountains, find that water reliably boils at 94°C, and believe that the thermometers work differently in the mountains.
 3. Return to the mountains, find that water reliably boils at 94°C, and believe that water behaves differently in the mountains.
- ...etc.

That is, they apply one theory to the observable world and make corresponding commitments that influence their behaviour and their picture of the behaviour of water.

15. The point is that there is an *appearance* of at least three competing theories at play in this toy model. And without filling in all of the details, it *seems* clear that the adequate theory is the one that updates its beliefs and corresponding commitments in light of new and sound information, thereby allowing one to change their actions and conceptual scheme. Such a picture can be formulated as the following lawlike statement:

At time t and at place p , water reliably boils at 100°C.

We believed and were committed to the concept that: "water is boiling" *implies* "water is at a temperature of at least 100°C".

Then, at t' and p' (an altitude of 1829m), we learned that water reliably boils at 94°C.

⁵ Surprised by James' discovery because they were, all along, making probabilistic inductive inferences. I expand on this below.

So: we believe and are committed to the concept that: there is a φ -type circumstance for the boiling point of water and accept that “water is boiling” *implies* “water is heated to a minimally sufficient temperature”.⁶

16. What the toy model demonstrates is that, in order for probabilistic reasoning to reach lawlike ends, it requires the community of reasoners to recognize that their doxastic commitments do not limit the space of reasons. Instead, the necessary constraint for using probability statements to expand upon knowledge is a commitment to explicating the space between one’s prior beliefs and posteriorly available information, possible only after new evidence enters onto the scene. Without this commitment, the lawlike power of probabilistic inference cannot come to fruition and remains mere empirical description. For there is a world of conceptual difference between the statements:

(In all probability) x does y in C .

and:

x does y in C *implies* that “there are minimally sufficient conditions such that if x were in $C^{(n+1, \dots)}$, it would do y ”.

The latter statement makes explicit the range of conditional robustness of the inferences supported by the first claim. The point of putting the right-hand-side into dot-quotes is that they let us generalize across changes in the conceptual scheme, while still retain the kernel of the same singularly holistic, historically developing doxastic state.

17. If we want to see how probabilistic inferences develop into lawlike claimings, then it is crucial to make clear that, while the process of making inferences occurs in the logical space of reasons, what those inferences are inferences *of* is predicated on the dynamics of material conditions of natural objects (say, the variable boiling point of water at various altitudes). For one to successfully—in both the natural and normative sense—infer the conditions for bringing about (or predicting) a state of affairs requires that those conditions are recognized as existing in the world as it is independently of our

⁶ And now I have instantiated Sellars’ dot-quotes to suggest that we have a particular kind of lawlike statement that can be translated into other φ -type circumstances without losing its sense. That is, I have instantiated a conceptual scheme that acts as a one-place predicate for explaining and describing material particulars. See SM (III., IV. §52-57) or deVries (2021) for a discussion of dot-quotation.

thinking it. It is a result of this recognition that probabilistic inferences are eligible to develop into lawlike statements: despite the fact that the inferential machinery about the world changes, the natural dynamics of the world are what such machinery pictures.

18. So far, much of this argument accords with Brandom's (2010; 2015) reading of Sellars. Brandom argues that modal claims, made explicit by subjunctively robust everyday and scientific discourse, are defeasible and nonmonotonic. For example, the subjunctive material inference:

Water *would* boil *if* it were heated to a temperature of 100°C.

is subject to robust revision in light of new conditions. Because our inferential capacities are subject to change, the consequences of our inferences are nonmonotonic. However, the mere fact that we can recognize the nonmonotonicity of probabilistic statements does nothing to secure a transition to lawlike claimings (P1). We are still in need of seeing how probability arguments can develop into lawlike claims.

19. By prioritizing the minimally sufficient conditions for inductive inferences to obtain, I offer an account of the transition from probabilistic to lawlike statements that satisfies this need. My stance is positioned between *open-* and *closed-world* assumptions. The logical space of reasons is an *open-world*, eligible for revision in shared linguistic communities; the world as it is independently of linguistic communities is a *closed-world*, the varying conditions of which are the objects of the natural sciences. This position affords us normative flexibility (updating what we ought to believe in light of better information) as well as scientific objectivity (retaining an external constraint on our knowledge).

20. This account differs from other readings of Sellars' probability because it does not stop at correlational descriptions of single instances of observed empirical objects (cf. Pitt, 1981). In emphasizing the minimally sufficient conditions—that which we can put between dot-quotes—for inductive knowledge to obtain, the scope of the empirically observed space expands through probabilistic inductive inference. This positions us to progressively form a more adequate conceptual scheme, while keeps the kernel of our prior view intact. Our toy theory of water expanded once we expanded the circumstances in which we performed our empirical descriptions. Posteriorly available information transposes prior doxastic commitments into iterative conceptual knowledge of a similar reliability. Doing so allows us to make lawlike statements about unexamined future cases based on minimally sufficient conditions.

21. Now, I take it that Sellars' account of probability can be reconstructed in terms of Bayesian inference. While it is outside the scope of this work to offer a detailed account of Bayesian probability theory, I will provide a framework of Bayesian inference that emphasizes its practical applicability for comparing theories that appear to be in competition.

22. Sprenger (2016) describes statistical inference as a process of answering three primary questions:

What should one believe?

What should one do?

When do data count as evidence for or against a hypothesis?

Bayesian accounts of probability focus on the first question and use the latter two as methodological equipment for establishing belief (Hájek and Hitchcock, 2016; Kaplan, 1981). They ask how and in what ways does the probability calculus inform rational beliefs. Sprenger (2016) states:

[Bayesian accounts] interpret probability as rational degree of belief. That is, an agent's system of degrees of belief is represented by a probability function $p(\cdot)$, and $p(H)$ quantifies his or her degree of belief that hypothesis H is true. These degrees of belief can be changed in the light of incoming information. The degree of belief in hypothesis H after learning evidence E is expressed by the conditional probability of H given E , $p(H|E)$ (p. 384).

23. But how should beliefs be changed in light of new information? On the Bayesian picture, the basic idea is that prior beliefs are systematically made explicit. For example,

Given that every instance of x has done y in C , it is reasonable to believe that x' will do y in all C -type circumstances).

This is our so-called prior. But in our toy model, we saw that the difference between our prior and posterior theory resulted in:

x does y in C implies that \cdot there are minimally sufficient conditions such that if x were in $C^{(n+1, \dots)}$, it would do y .

We were then able to change our doxastic commitment—our conceptual scheme—toward our theory of water *depending on the context* of its boiling without losing the basic aspects of our concept. This is our so-called posterior. In effect, we have learned something new about the behaviour of water and were entitled to improve one part of our conceptual scheme through converging competing theories. The most important

point to note here is that *our doxastic commitments are always based on something prior*. de Finetti (1970/2014) states:

[Inductive reasoning] reveals how it is that one ‘learns from experience’, and this is true, up to a point. It must be made clear, however, that experience can never create an opinion out of nothing. It simply provides the key to modifying an already existing opinion in light of the new situation. The complex A (the experience) by itself determines nothing, nor does it provide bounds: to reach a conclusion—that is to determine a new (‘posterior’) opinion P —we require the conjunction of A with P_0 (the initial, or ‘prior’ opinion). [And this is not about abandoning priors, as] On the contrary, the adoption of P in the new state of information is the only way of remaining consistent with what was adopted as the initial opinion in the initial state of information (Section 11.2.3).

So, we retain part of the conceptual scheme we started out with but improve upon it in light of new information.

24. Bayesian inference formulates doxastic attitudes through the ratio of prior and posterior likelihood odds between a set of counterfactual hypotheses, conditional on data D. Bayesian probability is interested and invested in the credibility of a hypothesis given a body of evidence. Specifically, Bayes’ Theorem:

$$P(H | D) = P(D | H) \cdot P(H)/P(D)$$

(where H is a hypothesis, P is probability, and D is data) is a rational representation of subjective degrees of belief in terms of probabilities (Bernardo and Smith, 2000; de Finetti, 1970/2014; Sprenger, 2016). Bernardo & Smith (2000) state:

With $P(H)$ regarded as a probabilistic statement of belief about H before obtaining data D, the left-hand side $P(H|D)$ becomes a probabilistic statement of belief about H after obtaining D. Having specified $P(D|H)$ and $P(D)$ the theorem provides a solution to the problem of how to learn from data (p. 2).

And Sprenger (2016):

From the perspective of Bayes’ Theorem, all that is needed to update a prior to a posterior is the likelihood of H and $\neg H$ given the observed data. In a statistical

inference problem, this corresponds to the probability of the data x under various values of the unknown parameter θ (p. 385).

25. In effect, by doing Bayesian inference, we are already in the business of improving our conceptual scheme in two ways: (1) through learning the minimally sufficient conditions for a theory to obtain; (2) through being committed to postulating new aspects of our original theory in light of new information⁷. Moreover, meta-comparative probabilistic practice, when put into Bayesian terms, can be translated into subjunctively robust distributive singular terms expressing rule-governed functional classifications (hence, can be construed in dot-quotes). That is, if we can construe, as Sellars does,

“rot” in German is a ·red·.⁸

then:

(In all probability) x does y in C

x would do y if it were in C implies ·there is a minimally sufficient condition for x doing y in C -type circumstances·, based upon $P(D|H)$.

which now permits:

I shall accept the theory that any x would do y in any C -type circumstance.

the first-personal normative version of the lawlike statement:

There is a justified theory such that if any x is in any C -type circumstance, it would do y .

⁷ An upshot to the Bayesian model of inference is that we do not have to worry ourselves with how theories should converge. So, rather than worrying about competing theories, I would like to say that we are in position of a singularly holistic conceptual framework where the minimally sufficient aspects for it to obtain—what is dot-quoted—can be improved upon, i.e., historically develop. That is, theories do not stand in relation to other theories; we work with a conceptual model and, in good scientific practice, make it more ideal. This idea is made explicit in (III.).

⁸ Again, refer to SM (III., IV. §52-57) for a discussion of dot-quotes. Briefly: what falls between dot-quotes are distributive singular terms that apply to all the terms that play the same role in every possible language and express functional classifications. E.g., ·red· plays the same role as red in English, rot in German, rouge in French, etc. What I am suggesting here is that the likelihood ratio of a probability argument that comes from comparing prior and posterior information can serve as a distributable singular term.

So, in the game of giving and asking for reasons, Bayesian inference provides a statistically justified reason that positions one (or a community) to rationally reconstruct theory in light of new information, while always keeping the kernel of their prior commitments in view.

26. That this is sufficient material for comparing the probability of theories is clear by:

There is a new language and we have learned that its expression “zed” is a
·red·

That is,

“...” *implies* ·---·.

Hence, for the comparison of competing theories:

There is a posterior theory (T') that adds information to the minimally
sufficient condition for our prior theory (T) to obtain.

So: I shall accept that the minimally sufficient conditions of T' ought to
replace those of T as a more adequate theory.

which takes the same generalizable form as the empty equation for the new colour-word just mentioned.

27. It is important to note that while there are rational processes for selecting priors (selecting e.g., uninformative priors, the Jeffreys prior, and other priors derived from formal rules) (Kass and Wasserman, 1996; Lenk and Orme, 2009), coming to learn that such commitments may be irrational is missing from Bayesian accounts. That is, the practice of Bayesian inference does not provide a way of learning that prior conditional doxastic commitments are unreasonable. There is an important lesson to be learned from Sellars here: we can vindicate our conceptual scheme through a rational reconstruction that includes critical reflection upon principles and practices of inductive inference (Sellars, 1964: IV §38, §39, §44, §84).

That is, we are not forced to allow our posteriorly available knowledge to serve as a new set of priors: we are capable (and arguably obligated) to reason about further commitments we take up. Having scientifically robust methods of prior-selection makes this less demanding, but the robust selection of priors *alone* is insufficient for the inductive enterprise. We also ought to rationally discard priors when we have good reasons for doing so (Sellars, 1964: IV §§84–89).

The point is that we can rationally revise the conditions under which we accept credal rules and inferences, rather than merely suppose those to be fixed inputs for formal Bayesian updating rules. In the rational critique of conditional probability, we

must accommodate the Sellarsian requirement for engaging in a process of critical reflection, which allows us to improve upon our conceptual scheme dialectically and holistically.

28. This point is clear when Sellars makes explicit the idea that arriving at a lawlike probability argument, an *end-in-view*, with the corollary terminal outcomes (bringing about the intention that one shall accept that-*p*) is nothing other than a robust implication statement (Sellars, 1964: IV §62, §63, §64, §73, §84). Lawlike probability arguments express reasons for endorsing subjunctive conditional propositions. For example, the proposition:

In light of posteriorly available evidence, it is probable $Pr(0.889)$ that *x* does *y* in *C*.

does *not* say that the conclusion of the argument is $Pr(0.889)$, but rather that one has good inferential reasons for making doxastic commitments to propositions of the form:

$Pr(0.889)$ *x* does *y* in *C* *implies* that any *x* would do *y* in any *C*-type circumstance.

That is, it gives us first-order proximate, practical, and terminal outcomes while it *also* gives us second-order proximate, practical, and terminal outcomes. In other words, it justifies us in saying:

It is probable that *x* does *y* in *C*.

I shall accept that *x* does *y* in *C*.

So: I pragmatically shall endorse (i.e., shall be willing to assert) that any *x* would do *y* in *C*.

and *also* in saying:

It is probable that *x* does *y* in *C*.

One *ought to accept* that *x* does *y* in *C*.

One ought also to accept that *if* any *x* were in any *C*-type circumstance, then it *would* do *y*.

So: One pragmatically shall endorse (i.e., shall be willing to assert) that any *x* in any *C*-type circumstances would do *y*.

29. We have now generalized comparative inductive implication relations in order to become lawlike probability arguments. But such implication relations are also meta-comparative implication relations. For, by the lights of the argument so far, if posterior knowledge calls into question the legitimacy of the first- and second-order proximate outcomes, then one ought to reject the implication relation altogether. That is, we can

inverse the logical form of the three outcomes (of both the first- and second-orders) to have a dialectical method of revising prior doxastic commitments (Sellars, 1964: IV §§57-60). We are now in a position to see how conceptual knowledge can be pragmatically and probabilistically improved upon in a robust manner through serving as meta-comparative conceptual machinery. Before seeing how this is so, it is important to alleviate a concern about probability that Sellars does not address.

II. Probability Statements & Looks-talk

30. In EPM (1997; §12-21), Sellars diagnoses a particular mode of empirical description: looks-talk, which is a kind of descriptive report that allows one to withhold endorsement of their claims. For example,

Its looking to one that x , over there, is red.

Its looking to one as though there were a red x over there.

Such expressions merely describe a possible experience of persons and do not require a commitment to the belief actually being the case. Instead, looks-talk separates the fact of there being a red x from one experiencing a red x . In fact, Sellars explains that the second claim outright rejects the claim that there is a red x over there. The alternative to looks-talk are expressions like:

Seeing that x , over there, is red.

or simply

x is red.

The difference is that only the alternative is able to be used in reporting roles in the space of reasons. The reason for this is that being red, for Sellars, is logically prior to looking red (EPM §14, §16, §18). For to have an experience of a red x is indistinguishable from actually seeing that x , over there, is red.

31. McDowell (1996) says:

[Sellars' account of looks-talk] makes the authority of an observational judgment that something is green turn on the subject's knowledge that her own report "This is green" is reliably correlated, in the right conditions, with something's being green. But once the impression of green is in view, it can figure in a parallel grounding, in a position corresponding to that of the report in the kind of grounding Sellars envisages (p. 144, footnote 19).

That is, when one says and means that things are thus and so, one's thoughts and meanings don't stop short of the fact that things are thus and so. In breaking off the commitment to things being thus and so, looks-talk doesn't really express anything at all. For if one sees that x is red but is unwilling to commit themselves to it actually being so (that is, believing it), then their report cannot be about reality. Instead, it would have to be taken as a report about something like a private impression of something red without really believing the thought. Looks-talk does not play a reporting role in the business of describing and explaining the world: it cannot justify conceptual content in a normative space of reasons.

32. Now, it should be seen straightaway that there is only a precarious difference between the following two statements:

(In all probability) if any x were in y it would be red.

and

Its looking to one as though x , over there, were red.

This becomes clear when the former is written in everyday language:

x is probably red [in y].

This can be expressed through Sellars' own example in EPM. If Jim were colour-blind and asks John, the necktie salesman, what colour a certain tie is and John responds:

In all probability, it is red (or the everyday expression: it is probably red).

one would think: *well, is it or isn't it red?*

33. We are faced with the question: if Sellars denies that looks-talk plays a reporting or claiming role for failing to endorse things being thus and so in the space of reasons, how is it possible that, for Sellars, probability statements express reasons for committing ourselves to beliefs?

34. To answer this, we need to follow a detour to demonstrate that all learning is probabilistic. It will be shown that probability statements express endorsements to things being a certain way, but only when framed as a practical epistemological action, rather than an ontological description.

35. Our case example for rescuing probability statements from lapsing into looks-talk will be the ways in which children learn how to participate in language-games. A child learns how to discriminate colours with colour-words by assimilating those expressions into a framework they have already mastered (say, primitive linguistic expressions and visual coordination). But the child only becomes able to participate in language-games—participate in a normative space of reasons—insofar as they accommodate part

of their framework for the broader framework of (sensible) language (Piaget, 1954/2000). Assimilating colour-words to primitive linguistic expressions and visual coordination gives the child a mere manner of speech whereas accommodating the language of others gives the child a manner of expression. That is, both assimilation and accommodation put the child into a shared space of reasons with other language users. That is to say that the successful participation in the colour-word game requires assimilation and accommodation in order to avoid being a kind of looks-talk. Sellars (1967/1992) states:

[...] the ability to teach a child the colour-shape language game seems to imply the existence of cues which systematically correspond [...] to the colour and shape attribute families, and are also causally connected with combinations of variously coloured and shaped objects in various circumstances of perception (SM, I., IV. §47).

The power of the game rests on the child's ability to pick out material particulars (such as a red toy) and develop an intelligible intersubjective conceptual scheme about them. It is patently not about being equipped to describe representations, inner speech, or mental states. As Wittgenstein (1953/2002) says:

§180. This is how these words are used. It would be quite misleading, in this last case, for instance, to call the words a "description of a mental state". —One might rather call them a "signal"; and we judge whether it was rightly employed by what he goes on to do (p. 62e).

36. So, it can be said that a child who has learned to say:

I want the red toy over there.

is committed to there actually being a red toy over there. The child has not learned to say:

I think that there is a red toy over there and I want it.

So: I want what looks to be, over there, a red toy.

The child has a conceptual scheme that they apply to material particulars and is able to form expressive communicative statements with others. They have derived this conceptual scheme in a twofold manner: (1) they have normatively mastered how to use colour-words, and (2) they actually take there to be (through practical acts like seeing, wanting, etc.) things with which those words, in all probability, correspond. What the

child is able to do is to instantiate practical outcomes through committing themselves to the inductive inference they employ when making the expression.

37. The child, through assimilation and accommodation, has mastered first-order probability arguments:

It is probable that there is a red toy over there that I want.

I shall accept that there is a red toy over there that I want.

I bring about acts which satisfy my acquiring the red toy.

and is now in a position to commit themselves to the lawlike thought that if there were a minimally sufficient condition for a red toy over there (say, tomorrow), then they would want it in the same way.

38. The purpose of introducing intellectual development in childhood is to point out that the first-order probability arguments get truncated into the endorsement of things being thus and so in everyday language. For, it is always possible that a shadow was cast on a white toy which made it look red. The child, however, was not committed to this possibility and instead made a propositional expression with all of the components necessary for it to be a lawlike statement. Imagine one says to the child:

No, there isn't a red toy over there, but a white one. The shadow made it look red.

And the child responds:

Well, if there were a red toy over there, then I would have wanted it.

The conceptual scheme has not been replaced. It has been improved upon without failing to make a commitment to things actually being as they are experienced.

39. On this picture, all conceptual knowledge can be said to be probabilistic: there are particular frameworks where the propositional application of corresponding conceptual terms would obtain, without being materially necessary (i.e., someone could be wrong). Similarly, probability statements—framed as ground-level epistemological practical tools—can avoid being a kind of looks-talk insofar as the commitments to the relation between the framework and the corresponding conceptual terms is made explicit. Having mastered the framework in which statements (x is red) can be propositional makes it no longer necessary to qualify claims with the probability token (in all probability...). We simply know when to apply a particular portion of our conceptual scheme, in spite of the fact that it could be a misapplication (i.e., that we could be mistaken). This is the reason that to say—in commonsense contexts like asking for toys

and playing the colour language-game—that such-and-such is probably the case withholds a commitment to it actually being so.

40. We can now see that first-order probability statements do not necessarily fall into looks-talk and can be transposed into second-order probability statements once a particular framework is mastered. It is time to address how probability statements in scientific language-games do not fail to make an endorsement.

41. The reason for rendering Sellars' account of probability in Bayesian terms is that, on such a picture, one is explicitly committed to their prior beliefs and acts accordingly.

We have an original theory and are committed to its being the case; we are likewise committed to improving upon it in light of new evidence but do not fail to endorse our prior beliefs. In fact, our commitment to those prior beliefs make improving the framework possible. But unless that process is explicitly part of the inductive framework of probability argumentation then the only outcome is a kind of empirically descriptive but empty looks-talk. If our scientific aim is a conclusion of the form:

There is a significant probability $Pr(0.889)$ of x being y in C .

So, (in all probability) x is y in C .

then all we can do is evaluate hypotheses in a descriptive manner, but without committing ourselves to the likelihood of something being the case. By limiting the aim of scientific probability to mere description, we cannot transpose first-order probability into second-order probability. For to reject or accept a hypothesis, in light of relevant evidence, is nothing other than stating:

Its looking to one as though (in all probability) there were a red x over there.

which we cannot do anything with, as we are not committed to x being red over there. All that we have done is described a kind of formal experience (say, what has occurred in a particular behavioural experiment).

42. I indicated above that the line separating probability statements from looks-talk is precarious. That this is so results from a misunderstanding of what probability statements express. The misunderstanding is that statements like:

There is a significant probability $Pr(0.889)$ of x being y in C .

So, (in all probability) x is y in C .

do not say:

$Pr(0.889)$ means (in all probability) x is y in C .

but rather:

There is a minimally sufficient reason (or set of reasons) that implies that any x would be y in all C -type circumstances.

and that, taken together, we are committed to the minimally sufficient reason changing in light of newly available evidence, but nevertheless endorse it as an adequate conceptual scheme for a particular theory. That is, we cannot accept an outcome from a probability argument as expressing how things stand. Rather, probability arguments express implication relations between a framework of minimally sufficient conditions and the possibility of lawlike statements. Just as:

Its looking to one as though x , over there, were red expresses nothing, we must guard ourselves against believing that probability arguments express anything more than reasons for belief, but reasons to which we are committed to explicating through testing, re-testing, and improving upon.

43. Probability lapses into looks-talk as a result of a tendency to accept the outcomes of probability arguments as conclusive evidence for or against a hypothesis; i.e., as in itself a given picturing relation. I have been suggesting that this is unacceptable, as probability statements only provide grounds for belief. The alternative that I am recommending is to recognize how probability statements produce recursive outcomes, through which we are practically equipped to improve upon our conceptual scheme. So, to rescue probability arguments from looks-talk, we must bear in mind that our knowledge cannot stop with outcomes of probability arguments. It is to recognize that there is no empirically descriptive score to be settled by probabilistic inference and that to accept a probabilistic statement as a picture of the world is to accept an empty picture.

III. Sellars-Bayes Inductive Rationality & Expressive Nonfactualism

44. Before concluding my argument, it is important to take a second detour in order to distinguish between what I take to be the gem of rational inductive reasoning and standard expressive nonfactualist readings of epistemic modality. The basis of the distinction is in the two-way emphasis on the normative practice of probabilistic claiming and making claims about the natural dynamics of the world that I urged above (I. 17.).

45. Standard expressive nonfactualists emphasize that epistemic modality expresses an agent's (or community's) epistemic position, where robust probabilistic inference

assertions (say, *in all probability, it is raining*) reflect beliefs that agents have of the world. The standard move is to refrain from reading modal claims as truth-functional propositions (*there is a 70% chance of rain*) in favour of modelling propositions as doxastic states of mind (i.e., *asking what it is to be committed to the 70% of rain*). Importantly, the line is that when one is in a doxastic state of believing that it will probably rain—even with high probability—, claims made from this position are not truth-functional propositions but rather credal ascriptions. Yalcin (2011, p. 327) says:

One does not describe oneself, or one's evidence. One expresses a property of one's state of mind—not a proposition, but a condition on a probability space—with the intention of coordinating one's interlocutors' states on the satisfaction of that property [...] But the question of truth as it arises for ordinary factual informational content does not arise here, any more than it would for epistemic possibility claims.⁹

I argue that this is mistaken. If expressive nonfactualists are correct (*viz.*, that doxastic states do not picture the world), then there is no way of seeing how inductive reasoning can be vindicated into lawlike propositions, the second-order terminal outcomes of probabilistic claiming that I described above. Indeed, it gives us no way out of reasoning about belief-states and into reasoning about postulated unobservable circumstances. It also gives us no way to translate one's doxastic commitments (*I believe that any x will in all probability do y in C-type circumstances*) to justified assertible claimings (*if any x were in any C-type circumstances, it would do y*).¹⁰ Put in the terms that I introduced in the previous section, expressive nonfactualist accounts of probability remain fixed in looks-talk.

46. Let's return to our toy example. Suppose that Jones and James were expressive nonfactualists about probability (as opposed to the scientific realists we introduced them as being). If that is so, when they reason about the likelihood of the boiling point of

⁹ Given the scope of this writing, I only address expressive nonfactualism about probability statements. There is a close connection across the epistemic modal forms, but it would be problematic to gloss over them in one fell swoop.

¹⁰ It is even arguable as to whether or not expressive nonfactualists can say that one's doxastic state is justified to begin with. Yalcin (2011) does not provide guidance on this point.

water changing at different altitudes in, say, unexplored parts of their miniature world, then they would be doing nothing more than ascribing belief-states to one another. Now suppose they use sophisticated estimation methods (e.g., Markov Chain Monte Carlo algorithms) to estimate the conditional probability of water boiling at every habitable altitude of their world. That is, they now are entitled to have strong credal commitments. By thereby claiming that the boiling point of water is plausibly between 94° – 100°C at every altitude, even those unobserved, is surely doing *more* than ascribing beliefs and normative reasons for why one should hold that belief. They are, in fact, engaged in the process of vindicating their inductive reasoning by robustly identifying material regularities *through* taking up belief-states in a truth-functional manner.

47. Indeed, Sellars argues in IV that modal probability claims are justified by the lights of scientific practice. Successful scientific inductive reasoning is not merely a reflection of an agent's belief-state; rationally achieved belief-states make one eligible to be vindicated by the success of predictive and inductive accuracy. How reliable one's inductive inferences are gives ground for having justified beliefs that results in having a robust position in a space of a reasons, based on the material regularities identified by scientific practice. Expressive nonfactualists correctly account for the pragmatic nature of epistemic modality (i.e., that being so committed to a probabilistic proximate outcome obliges one to practically act in light of one's commitments), but *cannot* cash out on the idea that this affords us a view of objectivity based on rational success, itself brought about by the reliability of probabilistic inductive inference.

My Sellars-Bayes account of probabilistic claiming emphasizes the idea that epistemic modality is objectively justified by our reasoning practices in terms of the success of scientific knowledge. Our achievements of rational induction are a step toward our conceptual scheme being isomorphic with the world as it is independently of our thinking it. It follows that the successes of scientific knowledge afford a point of view of ways that one ought to think and act, thereby adding a normative basis to epistemic modality. Expressive nonfactualists cannot account for the things one *ought* to believe and ways one *ought* to act in light of scientific practice. Again, the consequence of standard expressive nonfactualist accounts is that they cannot say which sorts of inferences are robust (stand in relations of material consequence; say, *if I drop this stone, it will probably fall*) because doxastic commitments merely reflect subjective epistemic commitments. I am arguing that there is a holistic connection between what Brandom calls *taking-true* (discursive practice) and *making-true* (scientific practice) and

that the probabilistic claiming as meta-comparative practice, when framed in terms of this dialectic, is a unifying path between the two movements. The advantage of the my account is that it gives us a machinery to take up a pragmatically entitled claims in the space of reasons while being rationally entitled to knowing that our pragmatic entitlements result in the lawlike status of such claims.

48. At base, what distinguishes my account from expressive nonfactualists is that I uphold a vital distinction between scientific language and semantic-normative language. Brandom (1994, p. 329) says:

Mastering the vocabulary of physics (or for that matter, etiquette) gives us expressive access to a range of facts we cannot otherwise express. Mastering semantic vocabulary just gives us a new way (useful for other reasons, having to do with communication and generalization) of getting at a range of nonsemantic facts we already had access to.

So, expressive nonfactualists about epistemic modality do express the normative belief-states implicit in any semantic vocabulary; but they do not express the robust inferential relations that connect those belief-states to the world. I urge that our doxastic commitments—brought about through epistemic modality—are indeed pragmatic reasoning practices for normatively identifying beliefs one ought to have and are not *only* descriptive of an agent's doxastic state of mind. We *cannot* have a doxastic state of mind *without* reasoning in a conceptual space of reasons; and we *cannot* have a concept without it being *about something*.

IV. Probabilistic Claiming as Meta-Comparative Practice

49. So far, I have offered an account of Sellarsian probability in Bayesian terms that demonstrates how probabilistic knowledge develops into lawlike knowledge. The purpose of this was to show that our probabilistic statements can be construed in terms of a commitment to modifying our prior beliefs about minimally sufficient conditions for a given inference with posteriorly available information. Then, I showed that there is a risk of probability statements turning into empty empirical descriptions. To avoid this, I showed that probabilistic reasoning underpins learning in general, which gives us a way of committing ourselves to outcomes from probability statements while remaining open to conceptual improvement. Before concluding, I distinguished the foregoing account from standard expressive nonfactualist readings of epistemic modality; the

point was that expressive nonfactualists only account for one half of an important dialectic: we achieve inductive doxastic states through such states coming about in the context of material regularities in the world. That is, probability arguments do far more than merely model belief-states. The remaining task is to see how probabilistic claiming—the highest form in the logical order of probability statements—is capable of being put into meta-comparative practice for the evaluation of competing theories. In order to do so, I will introduce a three-fold structure of probabilistic claiming: (a) commonsense claiming and asserting, (b) scientific claiming and asserting, and (c) meta-comparative probabilistic claiming.

50. I have been suggesting that probabilistic claiming is a kind of recursive learning that underpins the development of all conceptual knowledge. Made explicit, I suggest that without recognizing that knowledge—commonsense and scientific—is a result of probabilistic recursive learning, it is not possible to see how the comparison of theories into a unified conceptual scheme for improving our world-picture is possible. One consequence of this commitment is that, *pace* Kuhn (1987), Rorty (2009), Foucault (2013), and Hacking (2002) (among others), the idea of having multiple, competing conceptual schemes (say, the Ptolemaic and Copernican systems, classical and relativistic mechanics, and Euclidean and Riemannian geometry) becomes unintelligible. But a second consequence of this commitment is that, *pace* Davidson (1984) and Putnam (1973), we can show that our singularly holistic, historically developing conceptual scheme is immanently operative in the ways we bring the world into view.¹¹ By contrast, on the picture I am suggesting, all of our conceptual knowledge is based upon prior beliefs that come into contact with a conceptually-structured world that exists independently of our linguistic practices.

51. Commonsense claiming and asserting is the first practice of leveraging past beliefs toward improving our grasp of how things are. This mode of probability was outlined above through the case of intellectual development. The important result of that discussion was understanding how we truncate probability tokens in everyday language,

¹¹ It would take us too far afield to expand on the important distinctions between these accounts here. I point readers to Wang (2009) for a compelling critique of Davidson's account and to Sellars' CC (1973) for his argument in favor of the intelligibility of the idea of a conceptual scheme.

as a result of mastering a normative framework for expressing ourselves with others where it is possible reliably to report on the world in a commonsense manner. Hence, withholding commitments is no longer necessary and strikes us as odd. I showed that, in order to master the normative framework, one must already be capable of using first-order probability arguments in a way that, in everyday language, turn into second-order probability arguments through acting upon our commitments and being able to justify them, even in cases where we may be speaking subjunctively. For example:

If it were later, I would be tired.

where what is truncated here is the probability token:

If it were later, I would (in all probability) be tired (for all of the typical reasons one becomes tired later in the day, based on my prior beliefs about tiredness).

In this way, commonsense claiming and asserting can be put as a kind of folk approach to building up a normative framework of reasons, where we use prior beliefs to make reliable predictions about the future. The important point is to recognize that we are able to apply commonsense claiming and asserting if and only if we already understand the types of frameworks in which our statements obtain¹².

52. Scientific claiming and asserting follows from commonsense claiming and asserting. It is the practice of formalizing prior beliefs about the world into a systematic framework for explication. It is a step in the logical order of probability toward improving our conceptual scheme in that it utilizes (statistical) probabilistic inference to test beliefs and provide ground-level descriptive accounts of material particulars.

Scientific claiming and asserting should be thought of as a kind of basic research, though basic research whose task is to robustly outline the space of reasons. This differs from what is typically referred to as basic research, as its practical foundation needs to be framed as providing reasons for belief rather than explaining and describing how things are.

¹² While playing chess and thinking-out-loud, for example, we would not think: our opponent is going to score a goal by kicking the ball past the goalkeeper. Such a prediction would not fall into the proper framework for our commonsense claiming and asserting, so we would not have good prior reasons for believing that such a prediction would obtain.

Of course, part of providing reasons for belief involves explaining and describing how things are, but without a commitment to improving upon those reasons, scientific claiming and asserting stops short of its task and turns into looks-talk. We saw this in our toy model of the boiling point of water. Had the account that reliably argued

“water is boiling” *implies* “water is at a temperature of at least 100°C”.

stopped there, it would have remained inadequate in its partiality. Instead, we realized that it was necessary to put the implication into a dot-quotable form and emphasize the minimally sufficient condition for the proposition to obtain:

“water is boiling” *implies* ·minimally sufficient conditions have been met·.

which is able to be transposed into a subjunctive tone:

“...” *implies* ·if minimally sufficient conditions were met·, then (---)

would obtain.¹³

The important point is that the minimally sufficient conditions serve as a definitional promissory note that permits us to drop probability tokens. We no longer need to withhold a commitment to those minimally sufficient conditions, as we are committed to the improvement of a definitional framework for a particular concept. There can be new facets of the definitional framework that provide reasons for changing our beliefs without lapsing into looks-talk.

53. Meta-comparative probabilistic claiming follows from scientific claiming and asserting. It is the practice of leveraging knowledge derived from correlational observation (through, for example, statistical models) in order to make postulational conceptual statements about the world. For example, a meta-analysis of neural correlates for colour perception in adult humans surveys the available scientific claims and aims to provide a holistic definitional conceptual scheme of the relation between the brain and colour perception. Hence, the findings of the meta-analysis provide not only reasons for belief but a theory of colour perception that should be able to stand on its own. That this is already an established scientific practice removes much of the philosophical weight in understanding the role of probability in improving our conceptual scheme.

¹³ Again: the point of the dot-quotes that they let us generalize across changes in the conceptual scheme.

54. However, there is an outstanding problem that relates to Sellars' inexplicit vision of comparing competing theories toward ideal ends. There is an idea that we are in possession of multiple conceptual schemes that are in competition; the idea is that we will eventually discard the inadequate conceptual scheme in favour of the better one. But this idea is deeply mistaken.

Instead, I suggest that we are only ever in possession of one holistically singular, historically developing conceptual scheme that has a two-sided structure. On the one side, there are all of our prior beliefs which have been normatively validated through scientific practice; we have followed particular methodological patterns which have entitled us to a position in the space of reasons. On the other side, there is the possibility that our picture is inadequate and could be challenged by posteriorly available evidence. There is a sceptical danger between these two sides: if we have good reasons for our doxastic commitments, then we should endorse them; but if we know—as is commonplace in the history of science—that our conceptual picture might need to change, then why should we make the commitment to the current picture we have? But the danger is unnecessary: it comes from the mistaken idea that there are numerous conceptual schemes.

We can identify the kernel of the idea that persons are only ever in possession of one holistically singular, historically developing conceptual scheme in Sellars (1967/1992: SM VI. §47):¹⁴

To say that the semantic rules governing '*f*'s in our language could change over a period of time, and yet that the '*f*'s could all be *f*'s, is what is meant by saying that *f*-ness has changed over this period. Just as we have the concept of a developing language or conceptual scheme, from which the concept of a language as studied in current formal semantics is an abstraction, so we have the concept of a developing linguistic or conceptual role from which the usual concept of a 'sense' or 'intension' is also an abstraction. To be an *f* (stand for *f*-ness) does not require in this context the expression to be classified plays the identical *determinate* role currently played by '*f*', but that its function in the earlier stage of the language is sufficiently similar to the current function of '*f*' to warrant classifying them together. Roughly, '*f*'s at *t*₁ stand to L at *t*₁ as '*f*'s at *t*₂ stand to L at *t*₂ (p. 131).

¹⁴ For similar discussion, see Sellars (1973) in CC §23, §43-§45, and §49-56.

So, despite the fact that our conceptual scheme *does* change over time and across linguistic communities, this change is *holistically singular, normatively historical* and does not introduce a new competing scheme.

What I have tried to demonstrate is that in order to see that this is so, and to provide a rigorous method of tracking knowledge development, we ought to explicate our commitments in terms of convergence along defeasible, nonmonotonic Bayesian inference. I have supplemented similar accounts by advocating that it is the commitment to minimally sufficient conditions, able to stand in dot-quotable form, that enables us to recognize that our conceptual scheme is always actively in convergence, while remaining singular and developing. The solution to the mistake of believing that we have multiple conceptual schemes that are in competition comes from recognizing that our prior commitments entitle us to make sense of posteriorly available information. Without them, we would not be in a position to improve the scientific endeavour.

55. In our toy model, it was clear that what changed was not the behaviour of water but the minimally sufficient conditions we used to describe it. But in order to provide a robust expansion of those conditions, it was necessary to recognize that both Jones and James were committed to the same prior subjunctive belief: that x does y in C and would do y in any C -type circumstances.

Now, we can ask: did they need to compare two competing conceptual schemes to improve upon their world-picture? And it should be clear that the answer is *no*. For, if their conceptual schemes were in comparative competition, then it would be nonsense to say that they had the same prior subjunctive belief. Instead, they shared a prior conceptual commitment and leveraged it to expand their theory of boiling water; and it just so happened that there *were* competing theories that they needed to account for in the conceptual scheme. So, what changed was not the physical behaviour of water when heated (statements of which would be looks-talk), but the conceptual knowledge about what kinds of C -type circumstances must be present for the minimally sufficient conditions to obtain.

56. I am suggesting that probabilistic statements of all three types need to be epistemically modest. Likewise, it must be clear that there is only a single conceptual scheme at play: we have a set of formalized prior beliefs that entitles us to ask further questions; doing so could result in posterior information requiring us to modify our beliefs. The terminal outcome of meta-comparative probabilistic claiming is to provide a definitional framework for minimally sufficient reasons for knowing that our

propositions would obtain. But it just might turn out—and often has in the history of science—that our prior definitional framework becomes inadequate in light of new information. If we are not epistemically modest, our implication relations regress into statements that we cannot be committed to.

57. That this seems to be backwards—that by arguing for epistemic modesty and committing ourselves to the possibility of new reasons for beliefs or entirely new beliefs instead of orthodox hypothesis testing—stems from a temptation, common in empirical science and dormant in scientific philosophy, to believe that our definitional frameworks, which are nothing other than methodological practices, are themselves pictures of the world. We must draw attention to the arrogant scepticism of believing that what we do in basic research is describe and explain the world, full stop. Without epistemic modesty, we confine ourselves to a descriptive picture of the way things, over there, look to be.

58. On the holistically singular, historically developing model of probability I have introduced, it is possible see the need for epistemic modesty. The problem with probabilistic statements based on correlations in empirical science is that, unless explicitly made to serve as promissory notes for more adequate conceptual knowledge, we are left with an empty picture without committing ourselves to it. Then, we find ourselves with beliefs that seem at odds with those of others: we believe that we have different conceptual schemes. But this belief is not necessary. In fact, it prevents a way out of probabilistic looks-talk.

59. So, the commitments we make from probabilistic claiming should be placed in the minimally sufficient conditions that would make it the case that our propositions would obtain.

60. So, our practical use of probabilistic claiming should be recognized to be a robust method of understanding if and to what extent we must modify the minimally sufficient conditions for the probabilistic conceptual scheme we are committed to. We must learn, through experiencing the flexibility of our prior commitments in light of new information, how to retain—rather than replace—the core of our world-picture. This gives us a method for both retrospectively and prospectively understanding how new conceptual knowledge should be integrated into our commitments.

61. So, we must be committed to an epistemic modesty. For doing so will make the prior and posterior integration of our shared commitments to concepts possible.

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