

Ontological Taste

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To appear in D. Nagase (Ed.), *Quine's Word and Object at 65*. Cambridge University Press.

0.0 Introduction

Cognitivists must solve a problem that behaviorists like Quine do not: the problem of first evidence. Simplifying this problem by stating it in a very abstract way, it is the problem of how the world can be experienced and thought of by a developing mind as a ‘space of reasons’ rather than a ‘blooming, buzzing confusion’, given that cognitivists tend to posit relatively powerful learning mechanisms the rational operation of which presupposes conceptual resources related specifically to evidence that very young children almost certainly lack. In this chapter, we propose that suggestive remarks from Quine can be developed into a theory of a psychosocial capacity that may solve this problem.

A caveat. We do not focus on the general problem of first evidence as it arises for just about any cognitivist psychology. That is too ambitious. Our focus, instead, is only on explaining how defenders of a version of cognitivism called *rational constructivism* can solve the problem of first evidence as it arises by creatively extending a somewhat inchoate Quinean idea. This chapter is about how some of the earliest forms of learning, namely, a child’s first rational inferences about evidence are facilitated by a psychological capacity that we call *ontological taste* that, when paired with the psychosocial capacity for joint attention, offers rational constructivists an explanation of how children overcome the problem of first evidence.

Here is how the chapter is organized. We provide a brief introduction to rational constructivism in section 1, and then introduce the problem of first evidence in section 2. Section 3 develops an interpretation of some of Quine’s remarks in *Word & Object* and elsewhere that suggest that Quine had an inceptive conception of what we are calling *ontological taste*. After explicating ontological taste, we export the concept into contemporary developmental psychology in section 4, where we argue that, when combined with the capacity for joint intention and shared intentionality, ontological taste offers an interesting solution to the problem of first evidence. Brief concluding remarks are offered in section 5.

Quine would have had no interest in rational constructivism or the problem of first evidence as we present it. Rational constructivism posits psychological mechanisms that Quine would have regarded as logically unnecessary, and the problem of first evidence is a problem only because of these posits. But there is nevertheless an important history in psychology of cognitivists developing some of Quine’s suggestions into serious psychological theory — most notably (Carey, 2000). This chapter is therefore best read not as a piece of traditional Quinean scholarship or Quinean exegesis, but as a modest continuation of a tradition in contemporary psychological theory of developing scientifically and philosophically interesting psychological theory by way of creative extrapolation from Quine.

1.0 Rational Constructivism

Rational constructivism is a theory of cognitive development that aims to chart a middle ground between empiricism and nativism. It views children as active, rational learners who build — which means, often enough, consciously or intentionally construct — knowledge in a way that resembles the process of scientific discovery (Fedyk & Xu, 2018; Xu, 2019). Rational constructivism rejects the view that children are born with innate or core knowledge that is virtually sufficient in its generality to allow a children to begin learning about almost any topic or domain; but it also rejects the view that children’s learning is largely a process of the accretion of increasingly complex

associations that are themselves built up out patterns in a child's sense data. According to rational constructivism, children instead start with a handful of proto-conceptual primitives (e.g., proto-concepts for agents, objects, causation, and number) that are more complex than any particular, discrete sensory experience, but nevertheless lack both the internal structure and external inferential relations that define more developed (more "adult") concepts. In addition to these proto-conceptual primitives, rational constructivism holds that children are also endowed with psychological capacities ("learning mechanisms") for different kinds of rational inference — and rational constructivism specifically posits that children are able to update their beliefs in a way that closely approximates how someone following Bayesian rules or norms would update their beliefs (Fedyk & Xu, 2018; Xu, 2019; Xu & Kushnir, 2013).

Learning — in the sense of fixing beliefs that are reasonably accurate representations of both the observable and unobservable (i.e. abstract, or social, or psychological) properties — is largely a downstream effect of the operation of these Bayesian psychological capacities. These capacities may be discrete computational mechanisms, or they may be the aggregate effect of a variety of different underlying, more basic neurophysiological mechanisms. For rational constructivists, the developmental perspective is more important than the question of what level of neurological or physiological organization implements or realizes any psychological capacity through which inferences are made and beliefs are formed: rational constructivism simply predicts that, as learning evolves, the cognitive system will develop an internal architecture that approximates a system of beliefs organized according to Bayesian norms (Fedyk & Xu, 2020). Children are predicted, specifically, to be able to form hypotheses and test them probabilistically, and their beliefs will tend to express the most probable hypotheses, conditional upon the evidence the child has experienced, at any given time. Critical inflections points in the development of the content of the cognitive system will occur when prior beliefs are strengthened, updated, or even replaced in the presence of new evidence — evidence which needs to be statistical in character to be 'used as input' by the Bayesian learning mechanisms and thus ultimately be able to effect changes in beliefs. As a result, much of the experimental evidence for rational constructivism attempts to create these inflection points in children by presenting them with different kinds of statistical evidence (Xu & Kushnir, 2013).

But the 'Bayesian learning mechanisms', whatever they are, are not the only resources that children draw on to engage in cognitive learning — where "learning" is defined as the increasingly intentional, increasingly rational adaptation of the content of the cognitive system to both the observable and unobservable world. Language acquisition and an increasing ability to internalize other symbolic but non-linguistic resources also plays an important role (Fedyk et al., 2019; Fedyk & Xu, 2020; Flanagan et al., 2024), as does 'learning to learn' (Dewar & Xu, 2010; Kemp et al., 2007), as well as the child's own beliefs about how to gather evidence, search out reliable teachers, and what sorts of social differences are relevant to learning (Bramley & Xu, 2023). Other cognitive and social factors, like joint attention and intergenerational cooperation, also have important functions in coordinating learning (Tomasello, 2024; Tomasello & Farrar, 1986).

Ultimately, then, a child's proto-concepts are transformed, or replaced, by sophisticated concepts and theories that are, at least, empirically adequate to the domains about which the child has successfully learned. These developmentally and epistemically more sophisticated concepts and theories are adapted to these domains in the sense that further interaction with the domains rarely generates evidence that causes dramatic inflections in the concepts and theories: they are

increasingly stable in the face of new evidence from the domain. They are, in so many words, a rational construction.

2.0 The Problem of First Evidence

Rational constructivists must make a non-trivial metaphysical assumption: the domains that children are learning about are, literally, sources of evidence. These domains, that is to say, contain evidence, and that the cognitive system's ability to be sensitive to, and eventually adapt itself to, the evidence in a manner largely consistent with Bayesian norms involves accommodating the mind in a normatively appropriate way (i.e. "rationally") to 'objective' evidence. There can be no learning if the domains the child is learning about is not 'made of' evidence in some important sense.

With this assumption in hand, the problem of first evidence can be put this way: given that it can be rational to conceptualize absolute anything — any object, event, process, or effect — as evidence, how is it possible that a child's very first rational inferences using (non-a priori) evidence to form a belief or a judgment can be sensitive to evidence as it is found in the world? What counts as evidence is not an ontological or perceptual primitive for either cognitivists generally or rational constructivists specifically: things are or are not evidence only to the extent that they are conceptualized as such, and, importantly, in a way such that both the content and the format of the representations can eventually serve as input for whatever learning mechanisms a cognitivist happens to posit.

The problem is not solved by positing innate knowledge, such as a proto-concept of evidence. Here, the issue is the regress which defines some forms of Cartesian scepticism: conceptualizing something as a piece of evidence is evidence that the proto-concept of evidence is reliable or accurate, but this would require a proto-proto-concept of evidence to facilitate. Pushed to its furthest, this imputes to a child a proto-concept for evidence that nevertheless encodes all of the features or properties needed to treat anything and everything as evidence for any concept the child might wish to learn or apply, which is absurd. This of course is the problem that Kant solves by developing the machinery of transcendental inference. The regress we are gesturing at can be avoided to the extent that the problem is turned into the problem of formatting experience so that it can serve as appropriate input for cognition. In Kant, this is the problem of explaining how 'raw' experience ("sensation") is transmuted through the application of the categories of cause, effect, space, and time, into perceptions that can be objects of knowledge.

But Kant's solution to sceptical regress is not a solution that rational constructivists can accept. It leads to a distinction between knowable phenomena versus unknowable phenomena that is inconsistent with the metaphysical materialism embedded in rational constructivism. More importantly, the Kantian machinery of the transcendental aesthetic presupposes concepts that are much richer and much more generally applicable than the proto-concepts that are the posits of rational constructivism.

Our point, then, is just that the problem of first evidence is similar to Kant's problem of explaining how synthetic a priori judgments are possible. Yet Kant is not the only philosopher with whom comparison helps clarify the problem of first evidence. One of Fodor's earliest defenses of his massive modularity thesis (Fodor, 1983) can be summarized this way: the human cognitive system, whatever it is, is defined by two properties: its isotropy and its Quineanism. Isotropy means any piece of information — any concept or belief — can be evidentially relevant to the confirmation or

disconfirmation of any other, and Quineanism means that, during learning, new evidence is compared with not individual beliefs taken in isolation, but the totality of one's beliefs or concepts. Fodor argued, in short, that it was hard to explain how the cognitive system could both be a computational system and also have the properties of Quineanism and isotropy, but a very large network of computationally isolated modules the function of which is to process relatively constrained bundles of information might behave similarly to a general purpose cognitive system to be compatible with extant experimental results without giving rise to any intractable philosophical puzzles.

This is not the place to worry about whether Fodor is right about modules. All that matters is his insight that the cognitive system likely is defined by informational isotropy and Quineanism about the structure of beliefs. Given these, the problem of first evidence is the problem of explaining how a child is able to, for example, conceptualize some lower-order perceptual input, or relatively simple belief, *as evidence* for any other concept or belief — which includes, of course, the inference that the perceptual input is evidentially irrelevant to beliefs. We stress that this is not the problem of first conceptualization: we grant that proto-concepts are sufficient to allow a child to recognize, more or less at birth, even some abstract objects and processes — e.g., mother, and maybe even some basic forms of causation. The problem of first evidence is the problem of how a child first conceptualizes some of their experiences as *evidence*, given that absolutely any percept or proto-concept can, in principle, be evidentially relevant for absolutely any belief, concept, or inference. What makes *this* perceptual experience *evidentially relevant*? How can that be the application of a concept of evidence that it is plausible to impute to a child more or less at birth? Very few experiences can be experiences of a cat on the mat or of undetached rabbit parts; but almost any experience can be *evidence* for almost any belief.

A slightly different, and in some aspects much simpler, way of putting the problem of first evidence is to think of it as a chasm-crossing problem between a child's initial endowment of proto-concepts (one side of the chasm) and the conceptual resources necessary to structure information in a way that it can serve as *rationally useful* input for whatever cognitive mechanisms are posited by a cognitivist (the other side of the chasm). The initial proto-concepts for evidence, if there are any, are very likely to be too simple and too incomplete to generate the ability to produce representations that can function as *epistemically* or *rationally* appropriate representations for whatever learning mechanisms are posited by a cognitivist theory. This is not to deny that the initial construal of objects, agents, and causes afforded to a child by her proto-concepts helps her focus on what sorts of things she should reason about. The point is that, for these inferences to be rational — to have the right structure and content — for input into the mind's learning mechanisms, some exogenous-to-the-cognitive-system resources are necessary. So, in the case of rational constructivism, the problem of first evidence is the problem of figuring out how, lacking concepts for sampling, distributions, conditionalization, and so on, a child could nevertheless attend to phenomena which exemplify these properties and characteristics and, in a non-circular way, acquire the kind of evidence that would allow them to form these concepts and thus begin to utilize their mind's most powerful capacity for rational inference. The Bayesian learning mechanisms require that a child be able to perceive distributions that can be sampled from, but it is extremely unlikely that a child has a proto-concepts for different kinds of statistical distributions that are required in order for Bayesian inferences to operate — for, by comparison, the proto-concepts for numerosity that children appear to have are much too rudimentary (Xu, 2003; Xu et al., 2005; Xu & Spelke, 2000).

So, the problem of first-evidence is something like a developmental catch-22, the solution to which is an explanation of how the mind's most powerful learning mechanism can receive the kind of perceptual and experiential input they need without presupposing the possession of concepts that presuppose the pre-existing operation of the relevant learning mechanism.

3.0 Quine and Ontological Taste

By way of solution, we want to suggest that children have a resource that is even simpler and less structured than a proto-concept, and our suggestion amounts to a development of some remarks from Quine about whether one can be certain that one's ontology is correct. As we noted in the introduction, we stress that our solution is far too psychological for Quine — indeed, Quine can be read as avoiding the problem of first evidence by exporting it from psychology and into the logical superstructure of natural language, where it reappears as the problem of radical translation because of the indeterminacy of meaning, a different kind of “input/output gap” (Roth, 2005). So, the following is a Quinean solution to the problem of first evidence only in those possible worlds where Quine's behaviorism is interpreted as being more or less neutral with respect to the ontology of cognitive science.

We also want to stress that we are aiming to develop a plausible psychological response to the problem of first evidence — we are not trying to develop, at the same time, an epistemology of evidence and learning that is able to address the very large number of philosophical problems that are embedded within, or otherwise logically connected with, how we have presented the problem of first evidence. That project is of course a project similar in motivation and philosophical purpose as Quine's in writing *Word & Object*; our aims are obviously more limited than his. Likewise, we are not proposing to develop an argument that both shows that *how* a child first begins to organize some of her experiences as evidence and *also* how this psychological explanation solves skeptical challenges — similar to how some commentators have tried to show that, with some independently plausible adjustments to the Quinean machinery of language use, determinacy of meaning can be restored and certain skeptical worries overcome (Katz, 1988, 1993).

3.1 Quine's Non-Transcendental Aesthetic

The solution to the problem of first evidence that we think rational constructivists should favor is to posit a psychosocial ability that we suggested be called *ontological taste*. Ontological taste is a focal ability that is not driven by possession of a specific concept. It is the child's ability to maintain attention fixed on *just what there is*, and not to attempt to allocate any attention to *that which is not*, even though they lack a concept for what they are attending to. Ontological taste therefore is the ability to perceive something *as it is* — but not *for* what it is — without shifting into distraction that causes a loss of sensory contact with the object, property, or process. Ontological taste therefore creates opportunities to saturate the senses or perception with the qualities or properties of whatever happens to be the object of an exercise of ontological taste — but at the same time, ontological taste is not the same as the perceptual saturation corresponding to *all* or the *deepest* or the *essential* qualities or properties of the object saturating the senses, as grasping which may be an application of more complex conceptual resources than are involved in deploying the first exercises of ontological taste. Ontological taste is therefore the ability to attend to something *in*

absence of having a concept for, about, or which applies uniquely to, that which the person is attending.

How does this idea emerge from Quine? There are two routes. The first is that it may seem that ontological taste is all someone would be left with if they accepted Quine's radical translation thesis and decided to try to escape the global logical nominalism thereby implied by refusing to conceptualize any of their experiences, somewhat like Mach's neutral monism, according to which all there is are sensations that should never be conceptualized (Mach, 1914).

The second, more interesting route runs as follows: Quine appears to have an inchoate theory of taste that appears both in a few key passages in *Word & Object* and also in his writings elsewhere. Here are the exegetical details.

In *Word & Object*, the word "taste" is used four times, three of which are philosophically interesting. In these three uses, "taste" is used to express a *sense for what there is* that is psychologically and logically prior to a person's explicit ontological commitments, and thus in some important sense prior to a person's explicit conceptualization of the objects of one's tastes. Two of the uses concern Quine's own ontological commitments. In a passage where Quine glosses his initial gloss of scientific reasoning this way, he writes, "Scientific method was vaguely seen [in an earlier section of this book] as a matter of being guided by sensory stimuli, a taste for simplicity in some sense, and a taste for old things." (Quine, 2013, p. 21) Later, Quine reuses the idea of a taste for simplicity without using the word "taste": a philosopher whose practice is ontology exercises, among other things, a taste for simplicity by taking up the task "of making explicit what had been tacit, and precise what had been vague; of exposing and resolving paradoxes, smoothing kinds, lopping off vestigial growth, clearing ontological slums." (Quine, 2013, p. 254) Consider also a similar passage: "If we are limning the true and ultimate structure of reality, the canonical scheme for us is the austere scheme that knows no quotation but direct quotation and no propositional attitudes but only the physical constitution and behavior of organisms.... If we are venturing to formulate the fundamental laws of a branch of science, however tentatively, this austere idiom is again likely to be the one that suits." (Quine, 2013, p. 202) Given that this is largely what Quine is up to in his book, it is possible to read *Word & Object* as an exercise in a *taste* for ontological or metaphysical simplicity.

The remaining use of "taste" parallels these other uses. Here, Quine is analyzing the arguments of philosophers who reject the existence of abstract objects. "[T]hese thinkers have appreciated ... that concrete general terms carry no commitment to attributes or classes, and then have concluded the same for the corresponding abstract singular terms[.] This line of thought derives wishful vigor from a distaste for abstract objects coupled with a taste for their systematic efficacy." (Quine, 2013, p. 222) Again, exercises of taste 'about what there is' are prior to the formation of beliefs, judgments, or assertions about what does and does not exist.

Finally, set alongside these quotations, the famous passage from Quine's essay "On What There Is" that is about any philosophical ontology that admits non-actual possibilities also seems to express the same idea: about any such ontology Quine reports that it "offends the aesthetic sense of us who have a taste for desert landscapes." (Quine, 2011)

Thus, "taste" appears often enough in Quine's writing for it to make sense to say that Quine does have a theory of taste — though not, specifically, ontological taste. Which is to say, we are not imputing to Quine the position that the human cognitive system has the ability to be sensitive to objects, properties, or processes that it has not yet, or perhaps even cannot yet, conceptualize.

Instead, what Quine seems to hold is that one's metaphysics is ultimately downstream of one's aesthetics, and that a 'taste for simplicity' is the correct ontological aesthetic to adopt in one's philosophical aims to maximize congruence with scientific history. The key point is that a taste for simplicity is also logically prior to the conceptualization of anything *as being that which it is* — i.e. as fixing the values of one's bound variables.

3.2 Quine and Bergström

Drafts of this chapter were shared with scholars with much more expertise about Quine than either of us have, and these scholars responded to our suggestion that Quine had an aesthetics with skepticism. However, Daniel Nagase was more sympathetic to our line, and he helpfully dug up evidence that uses of "taste" could be more than just an artful turn of phrase for Quine. Here is a key passage from Bergström's *Quine in Dialogue*:

Bergström: Yes, I can see that moral and aesthetics statements may not be very useful in theoretical science, to fill out the gaps as it were in the theory, but couldn't it still be the case that they are tied to evidence in a certain sense, namely that some ethical statements and some aesthetic statements are really observation sentences in your sense, that people are conditioned to tie those to certain stimulation. For example, wouldn't a sentence like "this is good music" be an observation sentence in a certain community?

Quine: Yes, it could, and insofar it would certainly be cognitive. Here would be a subtle sense quality, that the members of that community would all recognise and agree to the presence of. And I should think that at a primitive level there would be no difference in principle between this and the other sentences. (Quine, 2021, p. 79)

As Nagase said in writing to us, "Quine in the end admits that aesthetical and ethical statements could be tied to evidence, and the reason is that they are pretty much of the same kind as other observation statements, namely reactions to sensible qualities. So here is some more evidence that the idea of "taste" is indeed central to Quine, even if he himself may not have recognized it."

We agree. But at the same time, aesthetical statements would not ipso facto be expressions of what we are calling ontological taste. It would, specifically, be the sensitivity to the subtle sense quality that would be the specific exercise in ontological taste.

4.0 A Solution to The Problem of First Evidence

So, there is some reason to believe that Quine had a theory of taste. Whatever the case, the most important idea is that aesthetics is prior to ontology, and so in principle there is in Quine the suggestion that an aesthetics capacity can operate in absence of, or prior to, conceptualization. It is this specific idea that we want to build into a solution to the problem of first evidence.

4.1 The Solution

Ontological taste, again, is a focal ability that is not driven by possession of a specific concept. It is the child's ability to maintain attention fixed on *just what there is*, and not to attempt to allocate

any attention to *that which is not*, even though they lack a concept for what they are attending to. Ontological taste therefore is the ability to perceive something *as it is* — but not *for* what it is — without shifting into distraction that causes a loss of sensory contact with the object, property, or process. Ontological taste therefore explains how, at least in principle, a child could orient towards experiences that *should* be conceptualized as evidence (i.e., it is *rational* to conceptualize as evidence) without having any concepts of evidence that are suitable for expressing or encoding the relevant epistemic norms.

But ontological taste on its own does not solve the problem of first evidence. We want to add to the posit that children have a capacity for ontological taste the claim — well supported by decades of experimental research now — that children have a capacity for joint attention. Together, this creates the possibility of a dyadic interaction between parent and child through which a child can witness the effects of inferences made using any number of complexes of evidential concepts without themselves being able to implement the very same inferences or deploy the very same concepts. Put a bit more philosophically: ontological taste plus joint attention allows evidential relations to become concrete to a child in the flow of their experience, allowing whatever evidential proto-concepts a child has to establish themselves as having non-empty or non-random (i.e. *rational*) extensions, without the child having to possess some kind of meta-level concept of evidence available to do this work.

4.1.1 Joint Attention

Much of what we know about joint attention comes from infant looking-time studies in psychology (Baillargeon, 2008; Corkum & Moore, 2014; Mundy, 2018; Mundy & Jarrold, 2010; Mundy & Newell, 2007; O'Madagain & Tomasello, 2021; Scaife & Bruner, 1975; Spelke, 2022; Spelke et al., 1992; Tomasello & Farrar, 1986; Xu, 2019). These studies have been used to investigate many different hypotheses about what kinds of knowledge may or may not be innate or early emerging, including knowledge of certain statistical principles, certain grammatical principles, and certain geometric principles. In these studies, infants often sit on their parent's lap, and the parents are instructed to close their eyes or turn away from the stimuli or events shown on a stage. Infants' attention – reflected in their duration of their looks – is guided by how they reason about the stimuli or the events. Something new, interesting, and unexpected will elicit longer looking times. Although infant looking-time studies are designed to prevent parents from influencing their babies' attention to the stimuli or events shown in the lab, nonetheless infants' looking behavior may be influenced by what they have observed in the real world. In particular, in real life situations, parents and infants often engage in what we call 'joint attention' – sometimes the infant stares at something and the parent joins in, or sometimes the parent looks at something and the infant joins in, such that the parent-infant dyad is focused on the same thing in the world. These joint attention episodes, which are quite frequent, may provide a clue for what is worth paying attention to in the world. That is, these may be interpreted as instances of scaffolded ontological taste for (various different specific kinds of) evidence (and not evidence in some general sense). Both infant and parent are, that is to say, able to focus, together, on just what there is — viz. the evidently-relevant stimuli — and not the hundreds of other things that one could be attending to in their environment. But for the parent, the evidence is part of the perceptual content; for the infant, it is not, being instead simply attended to, focused on, oriented to, or otherwise a point of fixture or focus.

4.2 Back to Quine (and Davidson)

Thus, triangulation between objects, the perceptual and limited conceptual resources of infants, and the much richer perceptual and conceptual resources of a child's parents provides a (psychological) solution to the problem of first evidence. A child's capacity for ontological taste plus a capacity for joint attention provides them with the ability to 'find' the things which *correctly* or *rationally* count as evidence in the flow of their earliest experiences. In this way, we suggest, a child can be inducted into seeing the world as a space of reasons.

Interestingly, Quine at least contemplated a similar collection of ideas — we are again grateful to Daniel Nagese for pointing this out. Writing about Davidson's idea that "thought itself is essentially social" (Davidson, 1993), Quine suggests that "triangulation" plus "perceptual harmony" is sufficient to explain how it is we learn both how to reason about aardvarks and how to use such mellifluous words as "aardvark". "The causal chains from the aardvark to you and to me part company already at the aardvark itself and make their divergent ways into our unlike nerve nets, but we both end up calling the creature an aardvark. We shall find that what forges our link in the triangle, linking us, is a preestablished harmony." (Quine, 2000)

Quine arrives at territory nearby to the thesis by a well known sequence of analysis laid out most plainly in his "Natural Kinds". Whether a statement counts as evidence for some other statement — say, "This leaf is green" as evidence for "All non-black things are non-ravens" — is a question of whether the predicates involved are projectible as per Goodman (Boyd, 2000; Goodman, 1990). And whether predicate is projectible turns out to be whether it refers, more or less uniquely, to a set that scientists have come to regard as stable enough to incorporate the relative predicates into their language. "Natural Kinds" ends with this passage:

In general we can take it as a very special mark of the maturity of a branch of science that it no longer needs an irreducible notion of similarity and kind. It is that final stage where the animal vestige is wholly absorbed into the theory. In this career of the similarity notion, starting in its innate phase, developing over the years in light of accumulated experience, passing then from the intuitive phase into theoretical similarity, and finally disappearing altogether, we have a paradigm of the evolution of unreason into science. (Quine, 1969, p. 55)

This echoes a more frequently cited earlier claim, that scientific progress causes talk of similarity and natural kinds to "ultimately submit to analysis in the special terms of that branch of science and logic." (Quine, 1969, p. 45) Sufficient scientific progress will eventually replace the output of an innate similarity space with its own technical vocabulary.

We do not believe that this line of analysis helps solve the problem of first evidence, even if it is a plausible account of how a capacity for edge detection might be a precursor to the development of a capacity for certain forms of geometric thought. For one, the problem of first evidence arises when children are in a pre-verbal — or at least pre-propositional — state of development. They are not able to regard statements *as evidence*. But this also gets at the deeper problem: many — perhaps all — of the things *that are evidence* even for a child in a pre-verbal state of development *are evidence* entirely because of social conventions. There are no physical properties or characteristics that mark

something out as evidence: what makes something evidence is more or less entirely, at least to a very young child, how people do and not not respond to ‘that which should be regarded as evidence’. For example, consider a child learning that the adults around her believe in such things as “statements” or “propositions” and she has to figure out what makes this utterance ‘a statement’ and that utterance ‘not a statement’ [cf. (Rhodes, 2012, 2013; Rhodes et al., 2012)]. An innate similarity space is very unlikely to have evolved to be sensitive to subtle social differences that are likely proprietary to, in evolutionary terms, exceedingly short windows of historical time. But a computational system capable of Bayesian reasoning probably could help members of a new generation converge on approximately the same conceptual structures as their elders (Fedyk & Xu, 2020; Goddu & Gopnik, 2024).

Or, to put the same point in a more intuitive way: the problem of first evidence may be solvable using Quine’s analysis if children are just little physicists. Unfortunately, they have to learn how to be effective social scientists — they have to develop a capacity for rudimentary ethnography, anthropology, and social epistemology — before they can develop the kinds of insights that would allow them to reconcile any of the output of any innate similarity spaces with whatever “branches of sciences” happen to prevail in the child’s proximate social world. For the young child, certain basic social scientific inferences must precede all other forms of inference, if these later inferences are to have a degree of rationality to them.

We take these considerations to show that positing pre-established harmony in innate similarity spaces is a piece of speculative biology that may be developmentally unnecessary because it cannot address the fact that evidence is socially constructed. Rather more mundane psychological theorizing perhaps does better here: scientific parsimony is served by seeing at least some cases of triangulation as exercises of ontological taste paired with a capacity for joint attention. Through such coordinated actions, we suggest, children and parents collaborate in the stabilization of the earliest forms of rational inference in the child.

5.0 Conclusion

The learning mechanisms that both rational constructivists and most other cognitivists posit require input that is non-random in an important respect: it must be organized *as evidence* for the respective learning mechanisms. For this to happen, a learner must be able to selectively attend to that which can be *rationally* — in both the sense of instrumentally and normatively (Fedyk & Xu, 2018) — integrated with the reliable operation of the mind’s learning mechanisms. For the rational constructivists specifically, perceptual experience needs to be organized as representing increasingly complex statistical properties, as no Bayesian inferences are possible without eventually being able to see the world as being at least partially constituted by distributions that can be sampled from. More generally, each cognitivist theory of learning presupposes that children learn, somehow, to appropriately (i.e. rationally) recognize what sorts of external events, shapes, processes, objects, and effects count as evidence. How someone can learn to more or less intentionally seek out the experiences which generate appropriate input for whichever learning mechanisms form the core of the human cognitive system is the problem of first evidence.

We’ve argued that the elements of a psychologically interesting solution that should be acceptable to rational constructivists — given their focus on active learning in social contexts paired with Bayesian inference — to this problem can be found in Quine. Children and parents collaboration

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in the construction of the earliest forms of rational inference about evidence in the child's mind by engaging the child's capacity for ontological taste through exercises of joint attention, whereby the child is able to attend to 'that which should count as evidence' in some specific context, without being able required to have anything but the most rudimentary proto-concepts of evidence, and perhaps even no concept of evidence at all.

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