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Book of abstracts

Joshua Babic (Università della Svizzera Italiana)
Title: Saving functionalism from inconsistency
Abstract: Functionalism about a certain entity is the view that the entity exists but can be reduced to, or defined in terms of, its functional and theoretical roles. Although functionalism originated as a theory about the nature of mental states, the central idea has been widely applied across metaphysics.
In the metaphysics of science, for example, Knox (2019) and Lam and Wüthrich (2018, 2020), among others, have articulated and defended space-time functionalism, i.e. the view that spacetime structure can be reduced to, or defined in terms of, the roles that spacetime regions play in the laws of nature. In quantum mechanics, functionalist strategies have been defended by Ney (2012) and Albert (2015), who argue that ordinary three-dimensional objects can be reduced to their roles, which are in turn realized by the wavefunction. Others, such as Allori (2021) and Lorenzetti (2022), have suggested that even the wavefunction itself can be functionally reduced. Robertson (2022) has defended a functionalist account of thermodynamic entropy, according to which entropy can be defined in terms of its theoretical roles.
Functionalism has also been applied to more traditional metaphysical debates. Lewis (1986) and Mumford (1998), for instance, defend a functionalist view of dispositions, arguing that a disposition is a second-order state of having a property with a certain causal role. Yates (2018) has applied the basic tenet of functionalism to powers, identifying them by their places within a causal structure. Payton (2021) has defended a functionalist account of negative actions.
Finally, Lynch (2001) articulates and defends functionalism about truth.
In sum, all these first-order metaphysical views are united by a common underlying commitment to functionalism. This naturally raises the question of whether functionalism itself is a viable metametaphysical framework for formulating such central views. In effect, Halvorson (2019) has recently revived a famous argument by Bealer (1978) which purports to show that functionalism is inconsistent, a result which would have troubling implications for the metaphysical views mentioned above. Despite this, as Halvorson himself notes, "functionalism lives on, apparently oblivious of this little problem of inconsistency" (Halvorson, 2019, p. 250).
If correct, Bealer's argument poses a serious threat to a substantial body of contemporary work and to a widely employed thesis across numerous philosophical debates. It is therefore urgent to critically evaluate the argument, its implications, and its overall validity.
The purpose of this talk is twofold. First, we propose a simplified version of

Bealer's argument. This version has the important merit of applying straightforwardly to the sort of functionalism presented in Lewis (1970, 1972). As often emphasized in the literature, when formal details matter Lewis's account of functionalism stands out as the most formal version of functionalism available (see Wüthrich and Huggett (2025), Butterfield and Gomes (2022), Lorenzetti (2022, 2024)). The main innovation in our version of Bealer's argument is that it does not involve the use of second-order logic. In fact, Lewis's account of functionalism is thoroughly first-order. This simplification will make it easier to see that the argument is valid and that it proceeds just by unpacking the definitions and by applying Beth's definability theorem, a basic result in model theory according to which, roughly, a theory T can implicitly define a symbol if and only if T can explicitly define it.

2The second goal of this talk is to propose a way to save functionalism from this "little problem of inconsistency". Just to give an idea of our defending strategy, let us consider a particular instance of functionalism, namely functionalism about theoretical entities in science. Lewis 1970 makes a familiar distinction between T-terms and O-terms. T-terms are traditionally interpreted as theoretical terms and O-terms as observational terms. Bealer constructs functionalism as the conjunction of two theses. The first thesis is positive: the T-terms can be functionally defined from the O-terms. The second thesis is negative: the T-terms cannot be explicitly defined from the O-terms. Bealer shows that the conjunction of the two theses is inconsistent.

Although Bealer's argument is correct, we argue that his characterisation of functionalism should be revised, in particular, the negative thesis. The latter was meant to single out functionalism from what we may call classical reductionism. However, Bealer's negative thesis is too coarse-grained and stronger than required. As we will see, Lewis's style functionalists can and do explicitly define the T-terms from the O-terms. The functionalist definitions they provide of T-terms are a special sort of explicit definitions. What sets Lewis's style of functionalism apart from classical reductionism lies in the logical form that functional (explicit) definitions of T-terms must take, or so we argue. Functionalism does not rule out explicit definitions altogether, but only what we call 'classic reductionist definitions'. Hence, to correctly single out functionalism, we simply need a less strong and finer-grained version of the negative thesis. Once functionalism is understood in this way, the inconsistency disappears.

In sum, we show that functionalism can live on. Furthermore, in doing so, we improve our understanding of what it means to construct a functional definition on a formal level, clarifying what kind of explicit definitions functionalism appeals to and how they differ from non-functionalist explicit definitions.

Claudio Calosi (Università Ca' Foscari Venezia)

Title: Presence and absence

Abstract: In the paper I first frame the debate about presence and absence around three questions: *monism* vs. *pluralism*, *primitivism* vs. *reductionism*, and *parsimony* vs. *independence*. I then develop in some detail a (formal) theory of presence (and absence) that is (i) monistic, (ii)

reductive, and (iii) parsimonious. Finally, I (briefly) show how to apply such theory to a range of cases in metaphysics, philosophy of science, and philosophy of religion.

Catharine Diehl (Universiteit Leiden)
Title: Arguments for ontological nihilism
Abstract: TBA

Carl Hoefer (Universitat de Barcelona)
Title: Natural kinds, laws, and modalities: lessons from post-Twin-Earth science and philosophy
Abstract: In a paper co-authored by Genoveva Martí (Hoefer & Martí 2019), we defended the Kripke-Putnam thesis that water is essentially composed of H2O molecules, i.e., that there is no world in which the substance we call 'water' exists but is not composed mostly of H2O molecules. But we agreed with Putnam that it can be hard to know what to say about imagined possible worlds in which the physical (and hence chemical) laws are different in certain ways. In this talk I will explore some of the speculative ways in which *physicists* investigate what would be the case in such "counternomic" worlds, and how these speculations interact with the nature of water and other natural kinds, as well as with *powers, dispositions*, and other denizens of folk physics and chemistry. I will use these explorations to motivate some polemical lessons that I believe we should draw for the debates about the metaphysics of laws.

Jens Jäger (University of Texas at Austin)
Title: Haecceitism and the Gibbs paradox
Abstract: According to haecceitism, necessarily, it's possible that things are as they actually are qualitatively, while differing in some non-qualitative respect. Anti-haecceitism is the negation of haecceitism. Core to statistical mechanics are measures over sets of possibilities, and these measures are sensitive to the difference between haecceitism and anti-haecceitism. To illustrate, consider two energy levels, ε_1 and ε_2, with one particle each. Anti-haecceitism counts one microstate, while haecceitism allows two: the actual configuration and the swapped one. If both particles occupy ε_1, both views count one microstate. So the measures differ in general. Do these differences affect hacceitism's and anti-haecceitism's respective success as foundations of statistical mechanics?

It might seem so. In the large-system limit, thermodynamic entropy is commonly assumed to be extensive: increasing a system's size *r*-fold increases its entropy *r*-fold. For a classical system of *N* qualitatively identical particles, a simple combinatorical argument shows that $\mathbf{\Omega}_\mathrm{h} = N! \cdot \mathbf{\Omega}_\mathrm{a}$, where $\mathbf{\Omega}_\mathrm{h}$ and $\mathbf{\Omega}_\mathrm{a}$ are the haecceitist's (Liouville) measure and the anti-haecceitist's (distribution space) measure, respectively. Since the anti-haecceitist's Boltzmann entropy, $k_B\log(\mathbf{\Omega}_\mathrm{a})$, turns out to *be* extensive, this entails, problematically, that the haecceitist's Boltzmann entropy, $k_B\log(\mathbf{\Omega}_\mathrm{h})$, is not: for $\log((rN)!) \not\approx r\log(N!)$. This is (a version of) the Gibbs paradox.

Does the Gibbs paradox mean that the haecceitist fails to reduce thermodynamics? At least for boxes of ideal gases, the haecceitistic can still recover the empirical predictions of thermodynamics—by using global entropy. Once we count cross-boundary identity swaps too, as the haecceitist should, the possibility counts for a compound system differ merely by a factor of $N_\mathrm{tot}!$, where N_tot is the compound system's *total* particle number: $\mathbf{\Omega}_\mathrm{h} = N_\mathrm{tot}! \cdot \mathbf{\Omega}_\mathrm{a}$. Thus, if N_tot

remains fixed, as it does for closed compound systems of ideal gases, then $\log\Omega_h = \log\Omega_a + \text{const.}$, with the constant leaving the locations of entropy maxima unaffected.

But structural questions remain. Thermodynamics is canonically formulated from the bottom up, starting with individual systems and their state quantities, including entropy, and then deriving the state quantities of compound systems from them. Can the haecceitist recover anything like this? She had better—as Saunders (2013) points out, single-system entropies are arguably crucial for "any *general* statement of the second law".

The key insight is that, for the haecceitist, single-system microstates are correlated: what micro-possibilities are compatible with a system's macrostate depends on the environment's microstate—in particular, on what particle identities are available. I argue that, to register this dependence, the haecceitist should define single-system entropy *conditionally*:

$$S_B(M \mid E) := k_B \log\left(\frac{\Omega_h(M \wedge E)}{\Omega_h(E)}\right). \tag{1}$$

The right-hand side of (1) is (k_B times) the logarithm of M's (Liouville) measure *per* environmental microstate. The division by $\Omega_h(E)$ removes multiplicity that lives wholly inside E, leaving only M's internal multiplicity and M and E's joint contribution from cross-boundary identity sharing. In the resulting formalism, additivity is replaced by a symmetric chain rule:

$$S_B(X \cup Y \mid E) = S_B(X|E) + S_B(Y|X \cup E)$$
$$= S_B(Y|E) + S_B(X|Y \cup E).$$

In the rest of the talk, I'll explain

1. how this preserves the Second Law's familiar explanation, from the bottom up, in terms of relative sizes of macrostates;
2. how the contextualist move to *conditional* entropy is continuous with other contextualist maneuvers already required to make sense of thermodynamics;
3. what the rest of haecceitistic thermodynamics looks like:
    (a) how it recovers the familiar fundamental relation, $\mathrm{d}S = \frac{1}{T}\mathrm{d}U + p\mathrm{d}V - \mu\mathrm{d}N$, even on the *single-system* level, and
    (b) how the chemical potential μ is shifted by a gauge parameter but retains its ordinary theoretical role of determining the equilibrium condition in the presence of particle exchange;
4. that entropy additivity *can* be recovered by splitting the global correlational term across subsystem entropies—most naturally done by a Shapley allocation—but that the resulting "reduced entropy" (à la Peters (2013)) is best viewed as a mere calculational aid;

5. that while extensivity is recovered in the large-environment limit—reminiscent of the large-system limits already assumed in standard thermodynamics—it and its consequences, including the Gibbs-Duhem equation, are indeed dispensable for a successful thermodynamic theory.

The result, I argue, is a satisfactory haecceitistic foundation for thermodynamics. Thus, while haecceitism and anti-haecceitism do lead to different foundations, those foundations are each empirically and theoretically adequate, with clear interpretations and theoretical roles for single-system entropies. Haecceitism thus survives the Gibbs paradox.

Lorenzo Lorenzetti (Università della Svizzera Italiana)
Title: An effective approach to naturalistic metaphysics
Abstract: Traditional metaphysical debates have typically been conducted purely a priori, often relying on an intuitive classical picture of the world (Lowe, 1998). In contrast, naturalistic approaches to metaphysics have gained increasing prominence in recent years (Esfeld, 2018; Maudlin, 2007; Ladyman and Ross, 2007). These approaches hold that metaphysical accounts should be informed by our best physical theories. For instance, accounts of laws of nature should reflect the form laws take in fundamental physics (McKenzie, 2016); views on determinism and indeterminism should be grounded in current physics (Wuthrich, 2011); classical accounts of spatial location or persistence over time should be revised in light of relativity and quantum theory (Pashby, 2016; Calosi, 2015).
A natural motivation underlies the naturalistic approach. Metaphysics aims to describe the fundamental structure of reality. Naturalistic metaphysicians argue that since science offers our best guide to what the world is like, metaphysical inquiry should begin with science (Maudlin, 2007). And because metaphysics targets the most fundamental aspects of reality, it should rely on our most fundamental physical theories. As a result, much recent work has focused on revising classical metaphysical accounts in light of modern physics, such as quantum mechanics, general relativity, and quantum field theory.
Yet, these theories are incomplete and, strictly speaking, false. None currently qualifies as a final theory of fundamental physics, and no such theory is available (if one will ever be). In particular, some of today's most successful physical theories, which could qualify as the most fundamental theories we have, such as general relativity and quantum field theories, are known to be false in important respects, as they break down in certain contexts and yield incorrect predictions (Weatherall, 2023; Dougherty, 2023). This poses an underappreciated challenge to naturalistic metaphysics. If metaphysics is to concern itself with the fundamental level, then – by the naturalist's own lights – naturalistic metaphysical inquiry must be indefinitely deferred until an ultimate physical theory is achieved (McKenzie, 2016).
1Naturalised metaphysicians might argue that fundamental metaphysics can be set aside, and that meaningful metaphysical claims can still be grounded in non-fundamental scientific theories, provided we can justify a realist stance toward them. However, it is unclear whether this approach is warranted or which kind of metaphysical theses it can genuinely support.

In fact, scepticism about non-fundamental metaphysics has also been raised. Notably, McKenzie (2020, 2021, 2024) argues that (e.g.) debates about laws of nature depend on their formulation at the fundamental level. Accordingly, she claims such debates should be postponed until a final theory is available, since metaphysical theories are not the kind of claims that can be "approximately true." Similar concerns may apply to debates about determinism, persistence, location, and other topics, casting doubt on the viability of much contemporary metaphysics. If no final theory is forthcoming, or if none is ever available, these debates risk becoming moot.

The key question can be framed as follows:

Does it make sense to base science-informed metaphysical theories on physical theories already known to be flawed and likely to be revised?

Are all metaphysical debates equally affected?

This talk develops a strategy for addressing these questions called effective metaphysics. While so far mentioned mainly in critical terms (McKenzie, 2024; Le Bihan, 2020), the idea is inspired by the emerging 'effective realist' approach in philosophy of science. Effective realism holds that our best physical theories are not all-encompassing descriptions of reality but effective theories, to be held reliable and true within their specific domains of applicability and valid regardless of future advances in fundamental physics (Fraser, 2020; Williams, 2019; Ladyman and Lorenzetti, 2023).

In a similar spirit, effective metaphysics treats metaphysical theories as scale-relative. Just as effective realism vindicates non-fundamental scientific ontology at the appropriate scales, effective metaphysics construes metaphysical claims—about persistence, location, laws of nature, or intrinsic properties—as holding only within the domains for which they are designed, without presupposing access to a final, fundamental theory. The focus of this talk is to test whether such a scale-relative conception can salvage science-informed metaphysics in the absence of fundamental physics. Specifically, I will explore criteria for when metaphysical debates remain viable under this framework.

To make the proposal concrete, I turn to three case studies. The first concerns the metaphysics of location. An effective metaphysical approach might hold that 'classical' location theory applies at macroscopic scales, even if quantum physics 2undermines it at more fundamental levels. While this may seem like a natural strategy, it remains unclear whether all metaphysical accounts can meaningfully be made scale-relative.

The second case study, the metaphysics of laws of nature, raises a similar but more complex issue. A Humean account of laws may be defensible at the scales where it aligns with our best scientific theories, even if it fails to capture how laws function at the fundamental level. Together, these cases suggest a guiding hypothesis: that certain classical metaphysical theories may be effectively true within specific domains of applicability, and remain valid even in the absence of a final physical theory. By reframing metaphysical questions in scale-relative terms, we resist the deferral of metaphysical inquiry and affirm its relevance within current scientific practice.

The third and most challenging case study concerns determinism. Can the world be determinate or indeterminate only at a given scale, or must such features be fixed at the fundamental level? Unlike location or laws, determinism may seem less

amenable to a scale-relative interpretation. Comparing it with the previous cases will help develop criteria for determining which kinds of metaphysical theses can be meaningfully treated as effective.
Overall, I will defend a more optimistic view of the prospects for naturalised metaphysics than has so far appeared in the literature, by developing an effective approach to metaphysics. If scale-relativity is taken seriously in science, then a scale-relative metaphysics is often warranted—though in some debates (e.g. laws of nature, determinism) it requires more radical revisions than in others (e.g. location). These case studies will highlight both the promise and the limits of effective metaphysics.

Cristian Mariani (Università della Svizzera Italiana) & Jessica Wilson (Toronto)
Title: Does spacetime emerge?
Abstract: The question of whether spacetime emerges from more fundamental structures has gained prominence with the development of quantum gravity theories, including string theory, loop quantum
gravity, and causal set theory. This paper examines three critical aspects of spacetime emergence claims: methodological issues surrounding quantum gravity research, the precise meaning of "space-time" in emergence contexts, and the adequacy of current philosophical accounts of emergence when applied to spacetime.
Part I addresses methodological concerns about taking quantum gravity seriously in philosophical analysis. Despite common motivations for studying quantum gravity—such as the alleged incompatibility between quantum mechanics and relativity, phenomena where current theories break down, and the imperative to follow recent physics developments—significant problems remain. These include the lack of novel empirical predictions, severe underdetermination, and the persistence of the measurement problem. Moreover, quantum gravity theories face a novel challenge: the Eigenstate-Eigenvalue Link problem, which questions how observables describing fundamental spacetime properties (such as area and volume) can have definite values without assuming a solution to the measurement problem. Given these limitations, we argue that philosophical claims about quantum gravity should be understood as conditional statements rather than definitive metaphysical conclusions.
Part II analyzes what "spacetime" means in emergence claims, revealing that different conceptions lead to dramatically different emergence theses. We identify five key aspects typically associated with spacetime: continuity, dimensionality, metric structure, locality, and Lorentzian signature. Examining how these features are treated across different quantum gravity approaches reveals no universal story about spacetime emergence. String theory modifies continuity at the string scale, requires extra dimensions, and challenges locality through holographic relationships, while loop quantum gravity proposes discrete "atoms of space" and multi-layered emergence at different scales. We distinguish three construals of spacetime: Core (minimal essential features), Wide (all classical aspects necessary), and Cluster (multiple sufficient conditions). Under Wide construals, emergence claims are well-motivated but nearly ubiquitous, while Core and Cluster construals yield more limited but ambiguous emergence claims. The physics literature typically specifies which spatiotemporal aspects are emergent, while philosophical discussions often treat "spacetime emergence" abstractly, leading to confusion about which philosophical problems are actually at stake.
Part III examines whether current philosophical theories of emergence can coherently account for

spacetime emergence. Standard emergence concepts presuppose spacetime through temporal dependence relations, spatial co-location requirements, and causal efficacy conditions. This creates a circularity problem: how can spacetime emerge if emergence itself presupposes spacetime? We eval-1uate three proposed solutions. Crowther's weakened emergence approach removes spatiotemporal notions by relying on supervenience, novelty, and autonomy conditions, but these prove too weak to establish genuine non-fundamentality. Functionalist approaches treat spacetime as whatever plays the spacetime role, but realizer functionalism reduces to reductionism rather than emergence, while role functionalism requires multiple realizability conditions insufficient for emergence. Mereological models propose that spacetime emerges through parthood relations from non-spatiotemporal
components, but face serious problems from quantum superposition, since quantum states in superposition lack the definite structure that mereology requires. Additionally, parthood relations do not track fundamentality relations.
Our analysis reveals that all current philosophical approaches to spacetime emergence fail to provide adequate accounts. The deeper problem is that removing spatiotemporal notions from emergence concepts undercuts the argumentation for genuine non-fundamentality. Claims about spacetime emergence often lack the precision needed for rigorous philosophical analysis, and attempts to abstract away from spacetime assumptions weaken rather than strengthen emergence claims.
We conclude that current discussions of spacetime emergence suffer from three main problems: the speculative nature of quantum gravity theories limits claims to conditional statements; the lack of specificity about which spatiotemporal aspects are allegedly emergent obscures the philosophical stakes; and existing emergence concepts are inadequate for analyzing spacetime emergence due to persistent circularity problems. Future work should either develop genuinely non-spatiotemporal notions of emergence or focus on specific spatiotemporal aspects rather than treating "spacetime" as a monolithic concept.

Cole Tucci (CUNY Graduate Center)
Title: Typicality and the Best Systems Account
Abstract: Given a deterministic dynamics, it is natural to suspect that probability assignments in a physical theory must be reflective of something other than objective chances. And, given that our physical
theories are meant to describe one and only one world (i.e., the *actual* world), interpretations of probability that appeal to a proportion of outcomes across possible worlds are somewhat puzzling. Nonetheless, in statistical mechanics, the *statistical postulate* (SP) instructs us to make predictions using the standard Boltzmann-Gibbs uniform probability distribution over initial conditions—over all possible microstates compatible with a particular macrostate. Moreover, SP, together with the dynamical laws and "the past hypothesis" (Albert 2000) provides an explanation for the tendency of physical systems to approach thermodynamic equilibrium. This leaves us with two questions: (i) what are we supposed to make of a probability distribution over initial conditions in the context of a deterministic theory? (ii) Are we justified in attributing precise probabilities to the behavior of physical systems (as SP instructs us to do)?
One approach to answering (i) and (ii)—dubbed the "Mentaculus," (Loewer 2020)—
situates the past hypothesis approach within a Humean metaphysic. Most notably, the Mentaculus accepts *Humean supervenience*—i.e., the thesis that the laws supervene on the on the complete collection of space-time points and the properties instantiated at those points at a

world— and thereby adheres to a Lewisian "best systems account" of laws (BSA). This means that the Mentaculus takes the SP (along with the dynamical laws and past hypothesis) to be a law of nature, and justifies the assignment of probabilities with the role of the uniform probability distribution within a maximally simple and informative system.

A consequence of the Mentaculus is that it assigns a precise probability to any well-formed proposition about a physical system (e.g., that the Dodgers win the 2028 World Series, or that it will rain tomorrow) and some (see Albert 2015, FN 2) have objected to this feature of the view on epistemic grounds. That is, one may find it objectionable for a physical theory to, for example, assign a probability of *precisely* 57.2% to the chance of the Dodgers winning the World Series in 2028. But the Mentaculus seems well poised to respond to this worry: according the BSA, we are justified in taking SP to be a law iff it is a theorem in the "best" deductive system, where the best system maximizes *simplicity*, *informativeness*, and *fit*. And according to the Mentaculus, SP *is* a theorem in the best deductive system, and this is all the justification we need for the assignment of precise probabilities.

Anti-Humeans will be quick to reject this response, given that they do not accept the BSA. But for a more fruitful debate, we ought to accept the terms of the disagreement, and meet Humeans on their own ground. Moreover, there is reason to reject the Mentaculus even if we accept the BSA. By the BSA's very own lights, we are only justified in accepting the theorems of the Mentaculus (as laws) insofar as it actually *is* the best system. But the Mentaculus is not the clear winner—there are other deductive systems in the competition. In particular, we can imagine very similar probabilistic theories that differ only with respect to the probability distribution that they employ, and so differ in the probabilities that they assign to various propositions. This amounts to a skeptical challenge for the Mentaculus: why should we conditionalize on the initial conditions using the standard Boltzmann-Gibbs uniform probability distribution (rather than some other distribution)?

In particular, the Boltzmann-Gibbs distribution says that probability is proportionate to phase space volume—the true microstate of a physical system is no more likely to be located3 within one particular region than it is to be located in any other region of equal volume. But there are (many) other distributions we might place over the initial conditions such that statistical mechanics can successfully vindicate thermodynamic predictions. In fact, *any* probability distribution in the neighborhood of the Boltzmann-Gibbs distribution will predict thermodynamic behavior that we tend to expect. For the Mentaculus to be the best system, then, is for it to balance simplicity, informativeness and fit better than these competing systems.

I argue that comparing the Mentaculus to other systems in terms of fit—i.e., the degree to which the probabilities that a theory assigns to the history of a world match the actual history of that world—brings back the epistemic issue we sought to avoid: without knowing the complete history of a world, *w*, we cannot know which system scores better in terms of fit with respect to *w*. I propose an alternative approach that avoids the epistemic difficulty altogether: the *typicality* approach (Maudlin 2020, Goldstein 2012). Rather than placing a probability measure over possible microstates in a state space, the typicality approach demarcates certain properties of those microstates as "typical" whenever a sufficiently large number of microstates have that property. As such, this approach does not invoke the notion of probability at all, and thereby avoids the epistemic problem. Moreover, there is reason to think that the typicality approach outperforms the Mentaculus as the best system. Although the Mentaculus offers more in the way of informativeness, the typicality approach does not include a detailed mathematical apparatus that assigns real-number valued probabilities to all measurable subregions of the state space, plausibly making it much simpler. Additionally, if the typicality approach can be evaluated in terms of fit at all (which it is not clear that it can), the is reason to think that it scores at least as well as the Mentaculus, given that it is compatible with *any* probability distribution that assigns a high probability to behavior that is typical.