Gunk Mountain Puzzle Slideshow

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[warning: rough draft]

Background/ personal trivia:

I was working on a big positive project in philosophy of mathematics and metaontology (as usual), when I kept finding myself blocked by this puzzle.

I think it's (basically) a problem for everyone, and I'm giving this presentation in hopes of crowdsourcing a solution.

If any extra ideas occur to you after the talk, I'd love to hear them at seberry@invariant.org.

I. The Main Puzzle

Three Conflicting Intuitions

Int 1 It is metaphysically possible for there to be a mountain made of gunk in a world containing only gunk[1].

Int 2 If something isn't disposed to resist the motion of *our* hands, then it doesn't count as a mountain, e.g., a mountain shaped cloud doesn't qualify as a mountain.

Int 3 There is no fact about whether our hands (made of atoms) would be repelled by gunk existing in an all gunk world.

[1] By 'gunk' I mean homogeneous infinitely divisible matter.

Let's consider each intuition in turn.

Intuition 1: It is metaphysically possible for there to be a mountain made of gunk in a world containing only gunk.

- it certainly seems there could be a world macroscopically like ours but made of gunk, and that such a world would contain mountains.

Intuition 2 If something isn't disposed to resist the motion of *our* hands, then it doesn't count as a mountain, e.g., a mountain shaped cloud doesn't qualify as a mountain.

- without Intuition 2 it is hard to explain why clouds (or other insubstantial matter) in our world cannot not (literally) count as mountains.
- for example ...

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- most agents in that world (or the closest possible one that contains agents)?
  - No! What if there are cloudy agents in this world? Would cloudy mountains be mountains
- all agents in that world?
  - No! If Ghosts exist are mountains not mountains?

So I don't see how to give up Intuition 2, 'If something isn't disposed to resist the motion of *our* hands, then it doesn't count as a mountain.'

- though, interestingly, accepting it seems to imply that many more things are (in Chalmers' terms) 'twin-earthable' than we might have thought
- i.e., it suggests that 'twin' speakers made of cloudy/less dense matter and using the term "mountain" non-deferentially would mean something different than us

Intuition 3: There is no fact about whether our hands (made of atoms) would be repelled by gunk existing in an all gunk world.

- A Humean mosaic/god's t-shirt view of laws and counterfactuals motivates Intuition 3
  - All-gunk worlds don't contain anything like our matter
  - So either hypothesis (resist or pass through) about what would happen if we tried to touch stuff in the all-gunk world seems to fit equally well with the pattern of events within that world.
  - The patterns in the humean mosaic which might ground normal counterfactuals (e.g. 'what if the gunk baseball had hit the gunk window?') don't ground counterfactuals about interactions with exotic matter like our atoms
- But I'll point out a futher problem for rejecting Intuition 3.

I'll argue that rejecting 3 positing such definite *de re* counterfactuals relating objects from two such mutually-alien worlds (our world and any all-gunk world) without arbitrariness seems to require posting certain hidden deeply scientifically indetectable facts

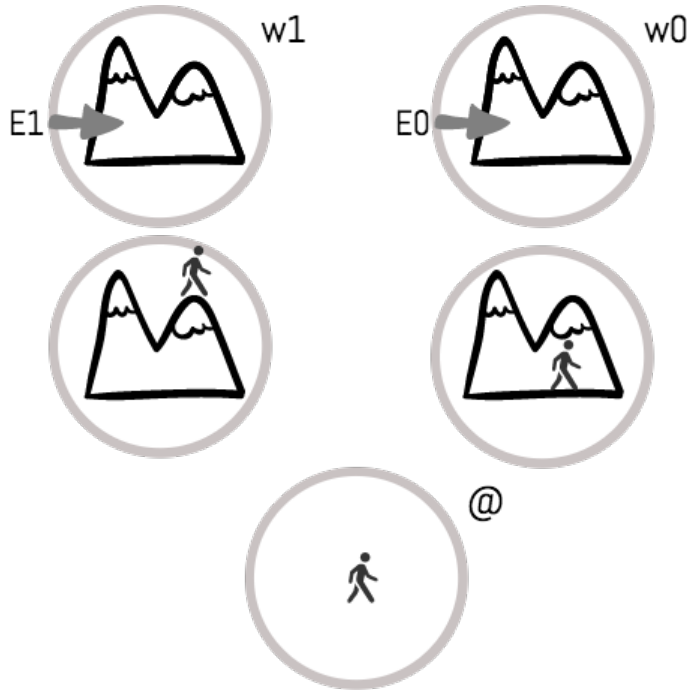
Suppose we accept Intuition 1 and 2 and say there's a world w_1 containing gunk peaks definitely disposed to resist our hands.

Then it seems we should also accept a structurally identical world w_0 containing gunk peaks *disposed to let our hands pass through*, for:

- hand-permeable gunk seems just as conceivable as hand-resisting gunk
- a kind of humean recombination motivates accepting such both w_1 and w_0, if you accept w_1 (and hence the fact that worlds can have definite counterfactual dispositions to interact with deeply alien matter) – for neither hand resistance nor hand-permeability seems implied in the concept of being gunk defined above.
- saying w_1 exists but not w_0 makes the space of possible worlds seem deeply **arbitrary**.

So we see forced to posit a pair of worlds w_1 and w_0 which are intrinsically very similar BUT[2]

- in the closest world where (a counterpart of) you tries to climb (a counterpart of) the mountain in w_1, you succeed
- in the closest world where (a counterpart of) you tries to climb (a counterpart of) the mountain in w_0, you pass throughFigure made with Logomakr.com



[2]:

Now it seems like this differnece in the counterfactual behavior of gunk in w_0 and w_1 should be grounded in some facts about w_0 and w_1.

- e.g., one might say that the chunks of gunk in w_0/w_1 have different essences, $gunk_0/gunk_1$, which explain their different dispositions to interact with us
- BUT positing such 'hidden' scientifically undetectable facts about w_0 vs. w_1 has struck many philosophers as **deeply undesirable**. For note that..

All the the scientifically discoverable laws within w_0 and w_1 will be exactly the same, with precisely analogous principles determining how objects with essences $gunk_1/gunk_0$ interact with each other and objects with other physically natural differences:

- so something extra is required above the scientifically discoverable facts about @, w_0, w_1 to explain why our atoms pass through gunk_0 but not gunk_1.

Thus rejecting Intuition 3 is also hard.

Gunk Mountain Puzzle

So that's the puzzle/dilemma!

Int 1 It is metaphysically possible for there to be a mountain made of gunk in a world containing only gunk.

Int 2 If something isn't disposed to resist the motion of *our* hands, then it doesn't count as a mountain, e.g., a mountain shaped cloud doesn't qualify as a mountain.

Int 3 There is no fact about whether our hands (made of atoms) would be repelled by gunk existing in an all gunk world.

Tentative show of hands re: which to reject?

II. Bonus Cardinality Problem

Now I'll present an extra problem which arises if we reject Intuition 3, and then avoid arbitrariness by positing the existence of parallel gunk worlds w_1 and w_0 as above.

I'll argue that advocates of this strategy are lead to posit a massive proliferation of essences and (perhaps) contradiction.

First I will note that this intuitive idea plausibly commits us to a countable infinity of different essences of each type.

- I will formulate my argument in terms of using different gunk essences to ground the difference in counterfactual behavior between w_0 and w_1.
- And I will assume that the types of gunk (aka essences $gunk_i$ compatible with satisfying the gunk axioms at some possible world) and the types of atoms (aka essences $atom_i$ compatible with playing the atom role at some possible world) are disjoint, so no essence can belong to both.
- But a similar argument can be proposed for other ways of grounding the difference between w_0 and w_1.

There is at least one atom-type essence, namely the essence had by atoms in the actual world. Call this essence $atoms_{@}$.

- let 'repels(a,b)' abbreviate the claim that things with essence *a* are disposed to resist things with essence *b*'
- we posited $gunk_1$ such that repels($atoms_{@}, gunk_1$)
- and then it seemed that by symetry we should also have $gunk_2$ $\neg$repels($atoms_{@}, gunk_2$)

Either:

- There is something special about atoms which ensured the existence of $gunk_1$ and,$gunk_2$, or the actual world (which seems implausible)
- or the same plentitude argument that convinced us $gunk_1$,$gunk_2$ exist tells us that there should be other atom essences which both do and don't repeal gunk1 (and the same goes for gunk2).

So it seems like there should be 3 more atom-type essences, so that all $2^2 = 4$ options for dispositions to interact with $gunk_1$ and $gunk_2$ are covered, i.e. we have

- $atom_@$ s.t. $\text{repels}(atoms_@, gunk_1) \wedge \neg\text{repels}(e_@, gunk_2)$
- $atom_2$ s.t. $\neg\text{repels}(atom_2, gunk_1) \wedge \text{repels}(atom_2, gunk_2)$
- $atom_3$ s.t. $\text{repels}(atom_3, gunk_1) \wedge \text{repels}(atom_3, gunk_2)$
- $atom_4$ s.t.$\neg\text{repels}(atom_4, gunk_1) \wedge \neg\text{repels}(atom_4, gunk_2)$.

But now the same principle can be applied to the atom_1 and $atom_2$ essences to derive the existence of further (hitherto unremarked on) gunk essences: .

- So it seems there should be at least $2^4 = 16$ distinct kinds of gunk type essences (including $gunk_1$ and $gunk_2$) corresponding to different possible relationships to $e_{@}, atom_2, atom_3, atom_4$.
- etc.

In itself maybe this is not so bad. But the things get worse.

For the intuition that let us infer the existence of multiple types of gunk is would seem to be most naturally formulated as something like the following:

- **Full Plenitude Principle**: For any set S of essences playing the gunk (atom) role and function f from S to a set of possible interaction dispositions (e.g., to resist interpenetration, both disappear, both explode), there is an essence e playing the atom (gunk) role such that e has interaction disposition $f(i)$ with any $i \in S$

And this yields a contradiction.

Full Plenitude Principle: *For any set S of essences playing the gunk (atom) role and function f from S to a set of possible interaction dispositions (e.g., resists(a,b) or ¬resists(a,b)) , there is an essence e playing the atom (gunk) role such that e has interaction disposition $f(i)$ with any $i \in S$*

Let α be the cardinality of different gunk-type essences. Then (by the principle above) the types atoms must have cardinality at least 2^{α}. But then (by the same principle-re-applied) there must be at least $2^{2^{\alpha}} \neq \alpha$ types of gunk. Contradiction

Help via privileging the actual world?

One can avoid the above cardinality problem by saying that objects at arbitrary possible worlds have a property like "solidity" which grounds definite counterfactuals about their interaction with *the stuff that makes up the actual world* but not other metaphysically possible stuff.

- But then we must admit that 'twin' utterances about the possibility of a gunk "mountain" in very physically different worlds could not be (definitely) true, because (we would be conceding that) there are no definite counterfactuals relating *their* hands to mountain-shaped things in other metaphysically possible worlds

Conclusion

In this talk I've suggested that:

- Three attractive things we'd want to say about metaphysical possibility (Intuitions 1-3) are inconsitent.
- Rejecting Intuition 3 doesn't just require positing (something like) hidden alien-world-counterfactual grounding essences distinguishing w_0 and w_1, but also dodging a cardinality problem about *how many different* such essences there are.

Suggestions, anyone?

Int 1 It is metaphysically possible for there to be a mountain made of gunk in a world containing only gunk[3].

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Appendix

Contrast With Kaplan and Armstrong's Paradoxes

Note that this cardinality problem for *essences* is different from two other ones discussed in *On the Plurality of Worlds*, and not fixed by the solutions which Lewis advocates there.

- Kaplan's cardinality problem for *propositions* is fixed by endorsing the constraints what propositions it is metaphysically possible to express
- Forrest and Armstrong's cardinality problem for *possible worlds* is fixed by endorsing constraints on when (so to speak) some collection of possible worlds can be combined to form a larger one

Neither move suffices to block the argument that there are in inconsistent multitude of different essences (or, in more Lewis-friendly terms, an inconsistent multitude of gunk peaks with diffferent de re counterfactual profiles).