Humean Laws: Stability, Undermining, and Context

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1.1 Humean Laws: The 'Best System Analysis'

Humeanism The laws of nature supervene on the 'mosaic' of categorical occurrences – the actual total pattern of instantiation of categorical properties across spacetime (Earman 1986: 85).

- The laws are 'the fewest and simplest assumptions, which being granted, the whole existing order of nature would result' (Mill 1874: 317, III.iv.§1; cf. Ramsey 1928).

> Take all deductive systems whose theorems are true. Some are simpler, better systematized than others. Some are stronger, more informative, than others. These virtues compete: an uninformative system can be very simple, an unsystematized compendium of miscellaneous information can be very informative. The best system is the one that strikes as good a balance as truth will allow between simplicity and strength. How good a balance that is will depend on how kind nature is. A regularity is a law iff it is a theorem of the best system. (Lewis 1994a: 478; cf. Lewis 1973: 73)

1.2 Stability and Resilience

> A set of truths is stable exactly when its members would all still have been true under any counterfactual circumstance that is logically consistent with their all being true. (Lange 2009: xi)

Stability 'The set containing all and only the laws is a stable set' (Lange 2009: xi). (See also Loew and Jaag (2020: 96) on 'counterfactual resilience'.)

- Note the set of truths of the form 'it is a law that ϕ' need not be stable even if the set of all laws is stable.
- In fact, Lange thinks, something like this **functionally** defines a law: laws are those claims that would hold conditional on any accident obtaining (Lange 2009: 20).
- Indeed Lange goes further

> not only [is it] that every law m would still have been true had p been the case but also [it is the case] that $(q > m)$ would still have been true had p been the case, for any sub-nomic claims p and q [which are consistent with the laws]. For example, had we access to 23rd-century technology, then had we trued to accelerate a body from rest to beyond the speed of light, we would have failed. (Lange 2009: 53)

1.3 The Problem of Nested Counterfactuals

> Now consider what counterfactual conditionals would have held, had there been nothing but a lone electron. … For example, is it true … that had there been more electrons than one, then any two electrons would have repelled each other in accordance with Coulomb's law? According to the Best System Account, the supposition of more than electron is logically inconsistent with the laws in the closest lone-electron world. Therefore, the principle mandating the laws' preservation under any supposition with which the laws are logically consistent does *not* require the truth of the nested counterfactual 'Had there been nothing but a lone electron, then had there been more electrons than one, the force between any two electrons would have accorded with Coulomb's law'. (Lange 2009: 54)

- See also Hall (2015).

1.4 The Problem Elaborated

(1) The laws of a world are fixed by its best system. (Best System Analysis, **assumption** for *reductio*)

(2) A counterfactual '$A > C$' is true at w iff at the w-selected A-world, C – for short, '$A > C$' is true at w iff C is true at (or throughout) $f(A, w)$. (**Assumption**: Stalnaker (1975))

(3) A nested counterfactual '$B > (A > C)$' is true at w iff C is true at (or throughout) $f(A, f(B, w))$. (from 2)

(4) The selection function at a world is fixed by its laws. (**Assumption**)

(5) The selection function at w is fixed by the best system of w. (from 1, 4)

(6) There is a claim O consistent with the best system of laws $\mathcal{L}_w$ and such that the best system of $f(O, w)$ would have been $\mathcal{M}$. (Lange's example)

(7) The selection function at $f(O, w)$ is fixed by $\mathcal{M}$. (from 5, 6)

(8) There is a claim N consistent with the best system of laws $\mathcal{L}_w$ and some consequence λ of $\mathcal{L}_w$ is not true at (or throughout) $f(N, f(O, w))$. (Lange's example)

(9) $O > (N > \lambda)$ is false. (7, 8, 3)

(10) $O > (N > \lambda)$ is true. (Stability, **assumption**)

(11) The laws of a world are not fixed by its best system. (*Reductio*, 1, 9, 10)

1.5 Options for the Humean

New Semantics Reject (2), and offer some rival account of the semantics of counterfactuals that doesn't invoke any kind of selection function – note we didn't say anything about **similarity**.

- All the main rivals I know of appeal to un-Humean whatnots – e.g., primitive dependence facts (see Starr 2021: §3).

Instability Reject (10): 'Fans of Lewis' account might argue that intuitions about nested counterfactuals with radically false antecedents are insufficiently robust to be worth saving' (Lange 2009: 55).

Bad Example Deny that there are O, N and λ with the features Lange requires (and hence deny (6) or (8)). A hard road to follow, given that the best system varies from world to world (Loew and Jaag 2020: §IV).

Invariant Selection Reject (4): the selection function at a world is not fixed by the laws there.

- I reckon these all look bad.

2 Is there a Problem of Nested Counterfactuals?

2.1 Lincoln's Riddle

- Remember the old riddle, popularly ascribed to Lincoln: 'How many legs does a sheep have if you call his tail a leg?' The answer; **still four**, of course.
- Why? Because **we** speak a language in which *leg* means leg, and the riddle is phrased in our language.
- The riddle is amusing, to the extent it is, because of an ambiguity in whether we are using *leg* or mentioning it. At the risk of drawing all the humour out, we can distinguish

  (12) Had we used *leg* to mean tail, a sheep would still have had four legs.

  (13) Had we used *leg* to mean tail, *sheep have four legs* would have expressed a falsehood.

  – We talk in terms of 'expressed a falsehood' because even saying 'would have been true' tends to collapse the distinction we are aiming at, given the attraction of applying the T-schema even within the counterfactual consequent.

2.2 Standards of Selection

- What's the relevance of this old chestnut?
- Just this: when we evaluate a nested counterfactual, we need to make sure we're evaluating it using **our language**, not the counterfactual language of the antecedent world.
- The formulation in (2) collapses two things we ought to keep distinct.

  1. The fact that a selection function is a function that takes a world as argument;
  2. The fact that the **standards of selection** depend on a world.

- Tease these apart, and the selection function should look something like this:

Selection In a given circumstance, some standards of selection are operative; these determine a selection function f_s, which in turn maps any given world and proposition to the nearest-by-those-standards world where that proposition is true.

- The actual laws fix the **semantic value** of the selection function which plays a role in counterfactual evaluation – this makes '>' a **context-sensitive** expression, and we need to use it with its actual meaning.
- The key point is this: **when we evaluate a nested counterfactual, the world of the nested antecedent does not set the standards of selection**.

2.3 The Argument Revisited

- By this reasoning, the argument is invalid: (9) doesn't follow from (3) and Lange's example.
- It would follow if we had this principle – here

(14) A nested counterfactual '$B > (A > C)$' is true at w iff C is true at (or throughout) $f_{f_w(B,w)}(A, f_w(B, w))$.

- This premise says to use the standards of the selected B-world in selecting an A world from it – in particular, it would select a world where the laws of the B-world obtain.
- But that alternative semantic clause for counterfactuals (14) does not follow from the standard selection semantics (2).
- Note that we don't need any **special argument** about why the Humean should hold the actual laws fixed counterfactually (contrast Loew and Jaag (2020) and Bhogal (2020)); if the actual laws are important to our standards – something everyone grants – then the standard semantics says they'll be important in nested counterfactuals too.

2.4 Evaluating Nested Counterfactuals

- To evaluate a nested counterfactual, the fact that each world determines its own laws and its own standards of selection (i.e., 4) is neither here nor there: what matters is that **our world determines our standards of selection**.
- Consider again Lange's example: 'Had there been nothing but a lone electron, then had there been more electrons than one, the force between any two electrons would have accorded with Coulomb's law'.
- This is true if from the selected lone-electron world, **our standards** – informed by our laws – determine the more-electrons world we should select.
- And of course our standards are fixed in part by the **actual lawhood** of Coulomb's law.
- So we obviously select a Coulomb's law-satisfying world as closer to the lone-electron world than a gratuitously law-violating one.

  - This is despite the fact that the lone-electron world standards would select a different world.

2.5 Two-Dimensionalism

- This may be related to the two-dimensionalist's 'considering as actual/considering as counterfactual' kind of talk (Stalnaker 1978; Chalmers 1996; Jackson 1998).
- When we evaluate a nested counterfactual $B > (A > C)$, we are required to evaluate $A > C$ from the perspective of B.
- But in the two-dimensional framework, there are two ways to understand what looking at things from the perspective of B might involve.
  - We could entertain the truth of B and consider what our standards would judge the nearest A-world to be – considering B as counterfactual.
  - We could imagine inhabiting B and consider what the nearest A-world according to B's standards would be – considering B as actual.

2.6 Parallels: *You*, *Tall*, and *Rational*

Other context-sensitive expressions that would have had a different semantic value counterfactually will exhibit the same sort of behaviour. Consider, in increasing subtlety:

(15) Had I been talking to Sara instead, then had I called you/my interlocutor 'Sara', I would have called you/my interlocutor by the correct name.

- Seems false; but in the world of the antecedent, my use of 'you'/'my interlocutor' refers to Sara, so the nested counterfactual should come out true.

(16) Had Robert Wardle been the only man alive, then if he'd had an exceptionally tall son, they'd be about the same height.

- This seems true, but in the world of the nested counterfactual, RW is average and to be exceptionally tall would require being very much taller than RW.

(17) Had the future turned out not to resemble the past, then had I reasoned counterinductively, I would have been rational.

- Again, seems false: I would have been luckily right in my beliefs, but not rational.

2.7 Nested Counterfactuals and their Metalinguistic Counterparts

- But if we explicitly **mention** the context-sensitive expressions in those sentences, we do get the right results:

(18) Had I been talking to Sara instead, then 'if I had called you "Sara", I would have called you by the correct name' would have expressed a truth.

- Likewise, I think, for Lange's nested counterfactual:

(19) Had there been nothing but a lone electron, then 'if there had there been more electrons than one, the force between any two electrons would have accorded with Coulomb's law' would have expressed a falsehood.

2.8 A general lesson

> If the closest p-world's laws differ from the actual laws, as the Best System Account entails for the closest lone-electron world, then surely the closest p-world's laws (rather than the actual laws) should influence which q worlds count as closest to the closest p- world (Lange 2009: 55)

- **Why?** (That 'surely' is doing a lot of work here!)
  - Though I note some Humeans might be read as conceding this (Beebee 2000: 591–92).
- The Humean world is an austere one.
- But that doesn't mean we are restricted to comparisons of mosaics when ranking similarity.
- Once we get a supervenient feature that fixes the extensions of our terms – like the laws do in fixing the extension of the counterfactual conditional, or extensions of gradable adjectives, or indexicals – we get to use that feature in similarity judgements, even if weighting that feature means that we judge $w\dagger$ closer to w than w' even though the mosaic of w' is – by purely mosaical standards – more similar to w.

3 Undermining

3.1 Humean Chance Laws

- The issue for Humean laws was that a world where $\mathcal{L}$ are not the laws is nomologically possible according to $\mathcal{L}$.

- This is also possible for chancy Humean laws: there is a world with different chances which has some chance.
  - It has some chance because its outcomes match actuality perfectly up to the point earlier than which nothing is (any longer) chancy, and diverges from actuality thereafter in a way that (i) **undermines** the actual grounds of the chances (e.g., total frequencies) but (ii) is a pattern of outcomes that has some chance according to the actual chance-making facts.
  - Suppose in @ the coin-toss frequencies are 50/50 heads/tails in a random pattern. This grounds $Ch_{@}(H) = 0.5$. In a world w that matches ours in coin toss outcomes up to now, and thereafter is all heads until the end of time $HHH…H$, $Ch_w(H) > 0.5$, but $Ch_{@}(AHHH…H) > 0$.

3.2 Undermining and the PP

- (Lewis 1986) says this is how we ought epistemically defer to chance:

Principal Principle $C_e(p \mid \langle Ch_e(p) = x\rangle) = x$, where e is any admissible body of total evidence.

- Undermining is supposed to pose a problem for the Principal Principle.
- Consider our proposition $HHH…H = AH$, that the coin lands heads from now on; $Ch_e(AH) = 1/2^n > 0$ for some n given our actual past history e.
- But that the chance of AH has that value is a product of the actual chances; if AH were actualized, the chance of AH would be different (higher).
- So $\langle Ch_e(AH) = x\rangle$ and AH are **inconsistent**, and hence for any rational C, $C(\langle Ch_e(AH) = x\rangle \wedge AH) = 0$.
- But given that credences are probabilities, $C(a \mid b) = \frac{C(a \wedge b)}{C(b)}$. Hence $C(AH \mid \langle Ch_e(AH) = x\rangle) = 0$, so by the PP, $Ch_e(AH) = 0$. Contradiction.

3.3 Why Inconsistent?

> Let's suppose that we have a Humean analysis which says that present chances supervene upon the whole of history, future as well as present and past; but not upon the past and present alone. … Then different alternative future histories would determine different present chances. … Let F be some particular one of these altemative futures: one that determines different present chances than the actual future does. F will not come about, since it differs from the actual future. But there is some present chance of F. That is, there is some present chance that

events would go in such a way as to complete a chance making pattern that would make the present chances different from what they actually are....

[Consider] F, our alternative future history that would yield present chances different from the actual ones; and let E be the whole truth about the present chances as they actually are. ... F is inconsistent with E, so $C(F \mid E) = 0$. (Lewis 1994b: 482–83)

3.4 Repeating Ourselves

- Why are $\langle Ch_e(AH) = x \rangle$ and AH **inconsistent**?
- One answer: **had it been that** AH**, it would have been that the chance of** AH **isn't** x.
  - And if $x \vDash A > \neg B$, then $x \vDash \neg(A \wedge B)$.
- But this counterfactual is subject to the same considerations we've already raised: is the occurrence of 'the chance' in the consequent to be considered as actual or as counterfactual?
- If we consider the chance as actual, then $AH > \langle Ch_e(AH) \neq x \rangle$; had AH been actual, the chances would have been AH-informed chances, and they make AH more likely than it actually is.
  - But unless we're two-dimensionalists this should really be understood metalinguistically: $AH >$ '$\langle Ch_e(AH) \neq x \rangle$' would have expressed a truth.
- If we consider the chance as counterfactual however, then we ought to reject $AH > \langle Ch_e(AH) \neq x \rangle$ – the chance would have been, like the laws, robust under counterfactual suppositions consistent with them.

3.5 Isn't Undermining *Desirable*?

- There is an issue here with the argument of (Eagle 2019), which argued that Humean reductionists about laws are able to avoid the settled future from a deterministic settled past by appealing to the falsity of

  Future Independence of Laws If $\mathcal{L}$ specifies the laws of nature in w, and f_t is any proposition consistent with $\mathcal{L}$ which is about the future of w as of t, then this is true at t: *if it were to turn out that* f_t*, it would still be that* $\mathcal{L}$. (Eagle 2019: 791)

- Accepting this principle, we get the triviality of deterministic chance (the settled laws and past entail the settled future; and what's settled can't have a chance).
- Well, maybe.

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