Fitness and Dispositional Properties

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Outline

1. Some objections to the PIF
   - 1.1 Bad ones
   - 1.2 Good ones
2. Dispositions: fitness and fragility
3. The potentiality interpretation of fitness
   - 3.1 Answering (waving at?) objections

The take-home message: The **potentiality** interpretation of fitness lets us take seriously the metaphysics of dispositions, respond to objections to the PIF, and separate fitness's foundation & measures.

Some Backstory

Objecting to the PIF

badly.

$$F(O, E) = \exp\left(\lim_{t \to \infty} \frac{1}{t} \int_{\omega \in \Omega} Pr(\omega) \cdot \ln(\phi(\omega, t)) \, d\omega\right)$$

well.

What happened to the idea of fitness as a general, graded notion that applies across organisms or environments?

e.g., Bouchard and Rosenberg

Does this make fitness depend too tightly on fine-grained details of the environment that are irrelevant for our understanding of natural selection?

Abrams

Whatever happened to trait fitness?

Sober, Abrams

Why do we think it's the job of a philosophical interpretation of fitness to both describe fitness's metaphysical foundation and take into account its (empirical or modeled) measurement?

implicit in Brandon, somewhat in Pence and Ramsey, really due to Millstein

A Detour via Fragility

Fragility has a similar problem.

Conditional account: If a fragile object were struck (by a reasonably small force), it would break.

1. **Lots of precise dispositions: If *this* vase were struck with a force *of 3.24 N or higher* (and that's small), then it would break.**
2. **One general disposition: If a fragile object were struck by a force in a range between X and Y N, then it would break.**

1. Lots of precise dispositions: Accurately describe fragile objects, avoid objections, lose unity of fragility as a property
2. One general disposition: Keep unity, gradability, comparability of fragility, lose clear structure/form

1. Lots of precise dispositions: Accurately describe fragile objects, avoid objections, **lose unity of fragility as a property**
2. One general disposition: Keep unity, gradability, comparability of fragility, **lose clear structure/form**
3. Give up! Fragility isn't a property. (*shrug*)
4. Ground the precise dispositions in a **potentiality** to be fragile (Vetter)

The potentiality to be fragile is the property that grounds the possession of the various precise dispositions for fragility, "all the way down the spectrum" from an extremely fragile vase to an extremely non-fragile brick.

This *isn't* fragility itself – we could call it something like "breakability." It expresses the possibility, for the object, that it could break. Put differently, a fragile object is an object *that can break.*

The Potentiality Interpretation of Fitness (PoIF?)

And we're finally back to Brandon's objection.

What if we think of fitness, more generally – at the level of its philosophical interpretation – as the potentiality to survive and reproduce?

This potentiality, then, grounds the possession of more precise dispositions – like the disposition for O to have an average of N offspring in environment E.

A few things we need to make more precise.

But this potentiality doesn't depend only on the organism; it depends also on the environment, right?

That's not a problem. We often make use of extrinsic dispositions and, by analogy, joint potentialities – fitness will just need to be the joint potentiality of the organism *and* the environment to be such that the organism survives and reproduces.

What about the Pence and Ramsey arguments that fitness needs to be long-term?

We can appeal to *iterated* potentialities: an organism has a potentiality to have offspring, which have potentialities to have offspring, etc. This lets us keep an actualist metaphysics (no more infinite future populations!) but still talk about the future. (For short, we can call this "the potentiality to give rise to a lineage.")

What about trait fitness?

This is a harder question. **Traits are themselves dispositions!** So if you take an Abrams-style line, where fitnesses are properties of traits, you have a weird ontology of free-floating dispositions with properties...

What about trait fitness?

If we accept Vetter's account of dispositions, on which what individuates dispositions are *only* their manifestations, then the trait "having brown fur" can be re-identified pretty easily across the various individuals that express it. (That won't be true if we need *both* stimulus conditions and manifestation.)

What about trait fitness?

Then we should be able, in turn, to talk about the potentiality that organisms give rise to offspring that, in turn, can express a trait – the facts we need to ground trait fitness ascriptions are present in the potentiality to give rise to a lineage.

The fitness of an organism is its joint potentiality with the environment to be such that it gives rise to a lineage.

Gesturing Toward Objections

Assorted Objections

1. A disposition that you can't help but manifest?
2. Getting biological practice back from the potentiality
3. Getting populations back from individual properties
4. Did we, uh, really need somebody to do this?

Questions?

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