

Review of "TAKING FEAR BACK INTO THE MARGINAL VALUE THEOREM: THE RISK-MVT AND OPTIMAL BOLDNESS."

One reason that GUDs and MVT receive separate treatment is that they are pretty different - one (GUDs) is more of a qualitative description of a phenomenon, equation notwithstanding, but that offers a method for uncovering certain values experimentally, as Brown has done with squirrels and other organisms; the other (MVT) is a theoretically-motivated equation that permits much more rigorous mathematical analysis and extension.

Putting them into a common framework is commendable and reasonable, but does not lack precedent, which the authors do allude to (though there are many additional intermediate developments over past decades that are not referenced here). In addition, a recent paper which is cited throughout this one (Arehart et al, 2023) explicitly unifies MVT and GUD approaches, at least in the "death" scenarios of the present work. While there is clearly room for additional development in this space, I don't think it is clear what the authors' new approach offers that is particularly valuable compared to previous contributions in the area.

Perhaps this is just a matter of presentation. The main part of the paper reads a bit too much like description of the derivation of the math, rather than providing clear connections/examples relevant to applications. The rescaling of time in particular is something that makes sense, but could make sense much more quickly if it is explained differently. An ecologist without expertise in this specific realm of theory would, I feel, likely get lost/lose interest unless more examples are identified and presented. For instance - what is an example of a distraction vs costly vigilant scenario, amongst real organisms' foraging strategies? What about the escape examples? You highlight the example of a bee or reproducing organism for the "all or nothing" scenario, but could present that in more depth, and compare to other scenarios for which your framework might be useful.

I do think there is value in making some sort of distinction between (a) fitness dynamics due to behavior in response to perceived predation risk, and (b) the fitness dynamics of actually dying because a predator kills you. However, I find the breakdown into six categories a bit contrived. If the purpose of the paper is to provide a unifying link between GUDs and MVT, then a more straightforward and intuitive interpretation would be helpful. Is it really illuminating to make a categorical distinction between "disturbance" and "escape," or would it be sufficient to present the disturbance scenarios as a subset of escapes? Within disturbance, isn't distraction just a cost-free subset of costly vigilant scenarios?

In addition, it strikes me that these three categories of scenario must all be relevant for any real foraging organism. Are there cases where a forager would have to be costly-vigilant, but would not potentially encounter one of the death scenarios? How does the framework integrate those? Presenting a worked example incorporating all of these elements would be invaluable, and demonstrate the new flexibility afforded by this approach.

When drawing the connection between rMVT equations and Brown's GUDs (Pg 9), the authors only draw a clear connection between 'death' scenarios and GUDs. This is also demonstrated in the Arehart et al paper, so I feel it would be necessary to clarify the distinction between that paper's derivation and the present one. It also feels a little like the paper has overpromised by offering a synthesis between GUDs and MVT, but only providing it in these specific cases.

Overall, I think that this work could form a useful contribution to the MVT/GUD/foraging theory literature, but unfortunately I believe it needs to be rewritten to better highlight the innovations and place them in a more intuitive context.

MINOR NOTES:

The paper does contain some typos, and would benefit from a careful editing pass.

The title of the paper appears as "TAKING FEAR BACK..." on the title page, but as "WHEN CHARNOV MEETS BROWN" on subsequent pages - which is it?

Figure 2: I would consider redrawing this as a table, rather than as a graph, as I feel like the implied axis scales could be misleading.

Figure 3: the lines are drawn well outside of figure margins, creating a confusing plot.

Figures 4-5: There is a lot of emphasis here on comparing the true and effective timescales, which I think could serve to confuse ecological readers, and could be more fruitfully replaced with more figures exploring the dynamics of examples from the 6 scenario types